Men Have Lower Rates Than White Men of Biochemical Failure with Primary Androgen-Deprivation Therapy

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Coffee, Caffeine, and Risk of Hospitalization for Arrhythmias

Optimizing Treatment of Intra-amniotic Infection and Early-Onset Postpartum Endometritis: Advantages of Single-Agent Therapy

Virtual Visitation in the Neonatal Intensive Care Unit: Experience with the Use of Internet and Telemedicine in a Tertiary Neonatal Unit Implementation Study

Building a System of Care: Integration across the Heart Failure Care Continuum

Qualitative Assessment of the Impact of Implementing Reiki Training in a Supported Residence for People Older Than 50 Years with HIV/AIDS

Hospital Medicine's Evolution: Literature Search and Interview Study with Practices

The Role of Minimally Invasive Surgery and Outcomes in Colorectal Cancer

Improving Diagnostic Reasoning to Improve Patient Safety

Retinal Drawing: A Lost Art of Medicine

Climate Change: It’s Not About the Weather—Continuing Medical Education and Maintenance of Certification and Licensure
Black Men Have Lower Rates Than White Men of Biologic Failure with Primary Androgen-Derivation Therapy, Priyak Sanaei, MD, Jeremy M Blahd, MD, T Craig Cheatham, PharmD, MS, Fang Niu, Stephen G Williams, MD, Gary W Chien, MD

Black men have a higher incidence of advanced stage at diagnosis and mortality from prostate cancer. From the Kaiser Permanente Southern California Cancer Registry 163 men with prostate cancer on androgen deprivation therapy from 2003 to 2006 were studied. Black men were the only group with a lower rate of treatment failure compared to whites. Although the etiology of this finding is unclear, it suggests the possibility that prostate cancer in black men may be more androgen sensitive.

9 Building Teams in Primary Care: What Do Nonlicensed Allied Health Workers Want? George W Jaha, PhD, Stephanie Taché, MD, Lila Ward, MD, MS, Philip Hilton, MD, Charles Amerson, MD

During semistructured interviews, 11 health coaches reflected on their yearlong experience in the transit model at an underserved urban primary care clinic. Emerging themes included: 1) responsibilities and roles varied from theoretical expectations of model; 2) communication and relationships were key to health care coaching; 3) prior education and health care roles influenced the experience; and 4) there were systems and personnel obstacles to model effectiveness.

19 Coffee, Caffeine, and Risk of Hospitalization for Arrhythmias, Arthur J Klauber, MD, Arnold S Haas, MD, Mary Anne Armstrong, MA, Natalia Ushakov, PhD, Cynthia Morton, MD

From data on the coffee habits of 13,079 men, this study assessed coffee-related risk in 3,677 persons hospitalized for cardiac arrhythmias and caffeine-related risk in an 11,670 person subgroup with data about other caffeine intake. The adjusted hazard ratio for any arrhythmia was 1.0 for <1 cup/day, 0.9 for 1–3 cups/day, and 0.8 for >4 cups/day. Results were similar for persons with history or symptoms of possible cardiac arrhythmia disease and for those without such history or symptoms.

Optimizing Treatment of Intra-amniotic Infection and Early-Onset Postpartum Endometritis: Advantages of Single-Agent Therapy, Norma Snglich, MD, Wendy D Alston, MD, Simone vanSwam, MD

Intra-amniotic infection and early-onset postpartum endometritis occur in 5% of delivering patients at Denver Health Medical Center, the safety-net hospital for the city and county. In this retrospective study of 577 patients, 195 received the standard multi-agent antibiotic regimen and 152 received a single-agent (ampicillin/sulbactam). The results support the use of a single-agent. These patients collectively received 196 fewer medication doses.

32 Virtual Visitation in the Neonatal Intensive Care: Experience with the Use of Internet and Telemedicine in a Tertiary Neonatal Unit, CL Niu, MD, Selina KY Hu, MD, KC Khong, RN, BHSN, YY Lau, RN, BHSN

Families of newborns requiring prolonged neonatal intensive care faced emotional and financial difficulties. To evaluate Internet-based telemedicine, eligible newborns were identified and written consent was obtained before a Web camera was installed by the baby’s cot. Using the child-specific, confidential password, families viewed real-time video images of their newborns through a secure portal via an Internet browser or smart phone. Virtual visitation was well accepted by families.

Implementation Study.

37 Building a System of Care: Integration across the Heart Failure Care Continuum, Jackie Cawley, DO, Cassandra Cote Grantham, MA, Cassandra Cole, Grantham, MA

Disparate heart failure (HF) services existed across MainHealth until an interdisciplinary joint HF work-group was convened and created a comprehensive set of strategies that better linked HF activities and care settings across the health system, which resulted in better communication, coordination, reliability, and standardization of HF care; improved readmission rates for Medicare/Medicare (18% to 12.7%), increased prescribed ACE inhibitors (77% to 96%), smoking cessation counseling (77% to 97%), and completed discharge instructions (65% to 87%).

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43 Qualitative Assessment of the Impact of Implementing Reiki Training in a Supported Residence for People Older Than 50 Years with HIV/AIDS. Lewis Mehl-Madrona, MD, PhD, MPhil; Nita M Renfrew; Barbara Mainuy, MA

Reiki is a Japanese form of energy healing popular in the US. The authors set out to implement a program to train clients of a supported residence in Brooklyn, NY, who were all older than age 50 years and had HIV/AIDS and substance-abuse and/or mental-health disorders. A qualitative, narrative-inquiry study was conducted. Stories were collected from 35 participants who all reported benefit, many with life-changing experiences, from participation in Reiki and training that can be successfully implemented in this population.

SPECIAL REPORT

51 Hospital Medicine's Evolution: Literature Search and Interview Study with Practices. Ruth Greenwald, MA, MS; Marianne Novelli, MD; Tom Lorenze, MD

In the early years of hospital medicine, research focused on clinical outcomes, efficiency, and cost effectiveness. Increasing attention now is on the patient and hospitalist experience. A literature search was used to develop a semistructured interview guide with Kaiser Permanente (KP) hospitalists and physician leaders and KP experts. Factors influencing sustainability include scheduling, workload, comanagement responsibilities, and recruitment and retention. Respondents viewed themselves as the center of a web involving communication with patients, other physicians, nurses, and other hospitalists.

REVIEW ARTICLES

61 The Role of Minimally Invasive Surgery and Outcomes in Colorectal Cancer. David S Kwon, MD; George J Chang, MD, MS, FACS, FASCRS

Robotic rectal surgery has recently emerged as an attractive alternative to laparoscopic surgery because it allows for superior visualization within a narrow pelvic field and more precise dissection. Studies of robotic rectal resection have suggested similar or potentially improved short-term oncologic outcomes when compared with laparoscopic rectal resection.

68 Improving Diagnostic Reasoning to Improve Patient Safety. Alvin Rajkomar, MD; Gurpreet Dhaliwal, MD

Both clinicians and patients rely on an accurate diagnostic process to identify the correct illness and to craft a treatment plan. It is frequently assumed that clinical experience and knowledge are sufficient to improve diagnostic ability, but studies from fields where decision making and judgment are optimized suggest that additional effort beyond daily work is required for excellence. This article reviews the cognitive psychology of diagnostic reasoning and proposes steps to improve diagnostic accuracy.

NARRATIVE MEDICINE

74 Retinal Drawing: A Lost Art of Medicine. LuAnn Dvorak, PhD, LPN; Stephen R Russell, MD

From 1958 to 1988, ophthalmologists created formal retinal (ocular fundus) drawings, a form of preoperative documentation. Drawings took from 30 minutes to 3 hours each to map retinal tears, detachments, and landmarks before surgical retinal detachment repair, and to rigorously educate the examiners in ocular anatomy and the use of the binocular indirect ophthalmoscope. Four of these recently found color drawings are presented.

CASE STUDIES

76 The Treatment of Black Widow Spider Envenomation with Antivenin Latrodectus Mactans: A Case Series. Steven R Offerman, MD, FACEP, FACMT; G Patrick Daubert, MD, FACEP; Richard F Clark, MD, FACEP, FACMT

American poison control centers annually report over 2500 black widow spider bites, which cause severe pain, muscle cramping, abdominal pain, and back pain, often refractory to traditional analgesics. One of the four cases reported here was managed without antivenom, and three were successfully treated with antivenin, demonstrating safe and effective use.

82 Acute Myocardial Infarction due to Coronary Artery Embolism in a Patient with a Tissue Aortic Valve Replacement. Joel T Levis, MD, PhD, FACEP, FAAEM; Geoffrey Schultz, MD; Philip C Lee, MD, FACC

This case presents a 50-year-old man who underwent a tissue aortic valve repair 4 years before presenting to the Emergency Department with an ST-segment elevation myocardial infarction. The patient was successfully treated with percutaneous transluminal coronary angioplasty and aspiration thrombectomy.

CLINICAL MEDICINE

87 Image Diagnosis: Pneumomediastinum. Charlene Kiang, MD; Gus Garmel, MD, FACEP, FAAEM

An adolescent girl, age 14 years, presents to the Emergency Department after one week of cough with chest pain, neck pain, and shortness of breath. Pneumomediastinum can occur because of the increased pressures seen with sneezing, coughing, vomiting, and the Valsalva maneuver.

EDITORIAL

88 Climate Change: It's Not About the Weather—Continuing Medical Education and Maintenance of Certification and Licensure. Carol Havens, MD; Jeffrey Mallin, MD

A drastic climate change has occurred in health care with effects visible on the education, training, certification, and accreditation systems of physicians throughout the US. Continuous professional development and assessment are the basis of new faces in these areas. New forms of CME include: “just-in-time learning” in the work setting or online; problem-based, team and systems learning; and change; and multi-interventional, experiential, and/or self-assessed curricula for complex areas of practice.

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Mohamed Osman, MD

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Thomas Paluch, MD

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Prose
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The Mustang by Kris Ferguson

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Black Men Have Lower Rates Than White Men of Biochemical Failure with Primary Androgen-Deprivation Therapy

Pejvak Sassani, MD
Jeremy M Blumberg, MD
T Craig Cheetham, PharmD, MS
Fang Niu
Stephen G Williams, MD
Gary W Chien, MD

Abstract

Introduction: Black men have a higher incidence of advanced stage at diagnosis and mortality from prostate cancer than do men in other racial groups. Given that androgen-deprivation therapy (ADT) is one of the mainstays of treatment for advanced prostate cancer, we investigated the development of biochemical failure, or recurrence of elevated prostate-specific antigen (PSA) levels, among different races in men receiving ADT.

Methods: Patients with prostate cancer who received ADT in the Kaiser Permanente Southern California Cancer Registry between January 2003 and December 2006 were eligible for inclusion in our study. Patients who had prior treatment for their cancer with surgery or radiation were excluded. Treatment failure was defined as an increase in PSA of >2 ng/mL from PSA nadir, with no subsequent decrease in PSA. We compared the biochemical failure rate in white patients to those in black, Hispanic, and Asian/other patients. The Cox proportional hazards regression model was used to estimate hazards ratios.

Results: Our study population consisted of 681 patients: 416 (61%) were white; 107 (16%) were black; 107 (16%) were Hispanic; and 51 (7%) were Asian or another race. After we controlled for all demographic variables and for variables related to prostate cancer, blacks were the only group with a lower risk of treatment failure compared with whites. The hazard ratios for treatment failure were as follows: black versus white, 0.66 (p = 0.03); Hispanic versus white, 1.00 (p = 0.8); Asian/other race versus white, 1.5 (p = 0.1). In this multivariate analysis, pretreatment PSA level and cancer stage were the only other variables associated with a higher risk of treatment failure.

Conclusion: Among patients receiving ADT as primary monotherapy for prostate cancer, blacks may have a lower rate of biochemical failure compared with whites. Although the etiology of this finding is unclear, it suggests the possibility that prostate cancer in black men may be more androgen sensitive than it is in white men.

Introduction

Prostate cancer is one of the most common cancers among men and the second most common cause of cancer death in the US. However, its incidence is markedly different among various races and countries. Prostate cancer is diagnosed in black men at a higher frequency, at a higher grade of disease, and at a younger age than in white men. Black men are 2.5 times more likely to die of prostate cancer than white men are. Epidemiologic studies have attributed this higher mortality to the advanced stage at presentation and higher grade at diagnosis. Several factors, such as low income, lower literacy rate, and poor health insurance, in black men have been implicated in the increased proportion of advanced stage at presentation and subsequent greater mortality.

Androgen-deprivation therapy (ADT) using luteinizing hormone-releasing hormone (LHRH) agonist is one of the mainstays of prostate cancer treatment. It is based on the castration of a hormonally sensitive prostate cancer. Although differences in prostate cancer incidence and mortality between black and white men are widely accepted, the existence of racial differences in treatment outcomes remains controversial. We conducted a study to determine the
impact of race on the development of biochemical failure, or recurrence of elevated prostate-specific antigen (PSA) levels, after ADT therapy. Because Kaiser Permanente Southern California (KPSC) has a racially diverse patient population and all of the patients it serves have equal access to health care, our patient population was an ideal setting in which to evaluate the effectiveness of ADT among different racial groups. KPSC is a large multispecialty, managed-care organization that covers the area from Bakersfield to San Diego, CA. In 2006, KPSC had more than 3.2 million members from diverse racial groups.

**Methods**

After obtaining approval from our institutional review board, we performed a retrospective cohort study of patients with prostate cancer who received ADT and were part of the KPSC Cancer Registry; 1617 patients were considered for study participation. Inclusion criteria included receiving an initial diagnosis of prostate cancer between January 2003 and December 2006, receiving primary ADT monotherapy, and undergoing a minimum of two PSA tests after starting leuprolide. Exclusion criteria were: having an unknown treatment type, having an unknown baseline PSA level, and having an unknown baseline cancer stage. Patients who had undergone previous radical prostatectomy and/or radiation therapy for prostate cancer were also excluded. The remaining 681 patients who received primary ADT comprised our study participants and were grouped according to their respective race; white, black, Hispanic, and Asian/other.

ADT is achieved by using an LHRH agonist, leuprolide acetate (Lupron Depot). Patients were treated with the following dosing regimens: calendar-based, testosterone-based, and intermittent. Calendar-based therapy has long been the standard and is defined as redosing patients with an LHRH agonist according to a preset schedule determined by the manufacturer. In our study, doses were administered every three months. Testosterone-based therapy is a newer method of administering an LHRH agonist that we adopted in 2006 and is based on previously published results.11 Testosterone-based therapy is defined as redosing patients with an LHRH agonist whenever serum testosterone levels increase to >50 ng/dL. (The castrate level of testosterone, 50 ng/mL, in our study was based on the phase

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>White</th>
<th>Black</th>
<th>Hispanic</th>
<th>Other</th>
<th>Total</th>
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<tbody>
<tr>
<td>No. of patients (%)</td>
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<td>107 (16)</td>
<td>107 (16)</td>
<td>51 (7)</td>
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<td>Age at diagnosis: mean ± SD (median)</td>
<td>75.5 ± 9.0 (77)</td>
<td>73 ± 9.2 (74)</td>
<td>71 ± 8.6 (72)</td>
<td>74 ± 8.9 (75)</td>
<td>74 ± 9.1 (75)</td>
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<td>≤75 years (%)</td>
<td>178 (43)</td>
<td>66 (62)</td>
<td>72 (67)</td>
<td>27 (53)</td>
<td>343 (50)</td>
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<td>&gt;75 years (%)</td>
<td>238 (57)</td>
<td>41 (38)</td>
<td>35 (33)</td>
<td>24 (47)</td>
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<td>Testosterone level before use of leuprolide acetate (%)</td>
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<td>≤280 ng/mL</td>
<td>74 (18)</td>
<td>18 (17)</td>
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<td>23 (45)</td>
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<td>Gleason score (%)</td>
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<td>Cancer stage (%)</td>
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<td>12 (24)</td>
<td>190 (28)</td>
<td></td>
</tr>
<tr>
<td>Level of prostate-specific antigen before use of leuprolide acetate (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.3</td>
</tr>
<tr>
<td>&lt;10 ng/mL</td>
<td>138 (33)</td>
<td>29 (27)</td>
<td>33 (31)</td>
<td>15 (30)</td>
<td>215 (32)</td>
<td></td>
</tr>
<tr>
<td>10–19.99 ng/mL</td>
<td>103 (25)</td>
<td>26 (24)</td>
<td>17 (16)</td>
<td>14 (27)</td>
<td>160 (23)</td>
<td></td>
</tr>
<tr>
<td>≥20 ng/mL</td>
<td>175 (42)</td>
<td>52 (49)</td>
<td>57 (53)</td>
<td>22 (43)</td>
<td>306 (45)</td>
<td></td>
</tr>
</tbody>
</table>

*Patients were identified through the Kaiser Permanente Southern California Cancer Registry. SD = standard deviation.
... prostate cancer presents the highest disparity in mortality between blacks and whites of any cancer in the US.\textsuperscript{10}

III study\textsuperscript{12} conducted to obtain approval from the US Food and Drug Administration for the 22.5-mg formulation of Lupron.) Intermittent dosing was defined as redosing patients with LHRH on the basis of their PSA level, without regard to testosterone levels or elapsed time.

Because no definition of biochemical failure currently exists, we sought a definition that could readily apply to any method of administering LHRH-agonist therapy. Therefore, we chose to define failure as an increase in PSA of $>2$ ng/mL from PSA nadir, with no subsequent decrease in PSA. Cox proportional hazards regression was used to perform a multivariate analysis and to calculate the hazard ratios for treatment failure for all groups.

### Results

Baseline characteristics were similar among groups with respect to pretreatment PSA level, Gleason score, pretreatment testosterone levels, and cancer stage. The racial composition of our population was as follows: white, 416 (61%); black, 107 (16%); Hispanic, 107 (16%); and Asian/other, 51 (7%). Prostate cancer was diagnosed at a younger age in black and Hispanic patients than in white patients (Table 1).

Table 2. Proportional hazard model comparing biochemical failure rate among races\textsuperscript{a}

<table>
<thead>
<tr>
<th>Variable</th>
<th>Hazard ratio (95% confidence limits)</th>
<th>Pr &gt; ChiSq</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age $&gt;$75 years vs age $\leq$75 years</td>
<td>1.0 (0.7–1.3)</td>
<td>0.8</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black vs white</td>
<td>0.66 (0.45–0.97)</td>
<td>0.03</td>
</tr>
<tr>
<td>Hispanic vs white</td>
<td>1.00 (0.7–1.5)</td>
<td>0.8</td>
</tr>
<tr>
<td>Asian/other/unknown vs white</td>
<td>1.5 (0.9–2.4)</td>
<td>0.1</td>
</tr>
<tr>
<td>Cancer stage 3 or 4 vs stage 1 or 2</td>
<td>2.1 (1.6–2.8)</td>
<td>$&lt;$0.01</td>
</tr>
<tr>
<td>Prostate-specific antigen level before androgen-deprivation therapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Median risk (10–19.99 ng/mL) vs low risk ($\leq$10 ng/mL)</td>
<td>1.8 (1.2–2.9)</td>
<td>0.01</td>
</tr>
<tr>
<td>High risk ($\geq$20 ng/mL) vs low risk ($\leq$10 ng/mL)</td>
<td>2.4 (1.7–3.5)</td>
<td>$&lt;$0.01</td>
</tr>
</tbody>
</table>

\textsuperscript{a}N = 681.

Cox proportional hazards regression was performed, controlling for all demographic variables and variables related to prostate cancer, to determine the hazard ratios for developing biochemical failure in each ethnic group compared with whites (reference group; Table 2): blacks versus whites, 0.66 (p = 0.03); Hispanics versus whites, 1.0 (p = 0.8); African/other versus whites, 1.50 (p = 0.1). The median number of days to PSA biochemical failure for each group was as follows (start time was the date of prostate cancer diagnosis): blacks, 942.5; whites, 781; Asians/other, 745; and Hispanics, 664.5 (Table 3).

In this multivariate analysis, as expected, pretreatment PSA and stage were also associated with higher rates of treatment failure (Table 2).

### Discussion

The incidence of prostate cancer differs among various races, being highest in blacks. In addition, age-adjusted mortality secondary to prostate cancer is higher for blacks than for whites.\textsuperscript{13} Considering absolute and relative mortality, prostate cancer presents the highest disparity in mortality between blacks and whites of any cancer in the US.\textsuperscript{10} Tewari et al\textsuperscript{14} suggested that the lower prostate cancer survival rate for blacks can be explained by differences in socioeconomic status among races and by lower surgical treatment rates for blacks. Other studies have suggested that higher prostate cancer mortality in black men may be secondary to higher tumor grades, younger age at diagnosis, and higher cancer stage. Our population is unique in that all patients, regardless of their ethnicity, have equal access to all components of health care screening and treatments. Therefore, many of the potential confounding factors that have been proposed for racial differences in prostate cancer outcomes were not present in our study. Our findings confirmed that age at prostate-cancer diagnosis is lower in blacks than in other racial groups. However, we found no intergroup differences in Gleason grade or cancer stage at diagnosis. This may have been because of the aggressive screening and easier access to medical care with KPSC.

We found that blacks with prostate cancer have a 34\% lower risk of treatment failure when treated with ADT as primary therapy, compared with whites. One possible explanation for this result is different levels of serum testosterone and androgen-receptor expression in blacks compared with whites. Ross et al\textsuperscript{15} reported 15\% higher mean serum testosterone levels in young black men compared with white men. Determining whether this difference in testosterone level leads to better response to hormonal therapy requires further investigation. Our study did not show a difference in pretreatment testosterone levels between blacks and whites. This could be secondary to small sample size, as data on pretreatment testosterone levels were available for only 42\% of patients in our study.
Multiple studies have investigated the racial differences in prostate cancer outcome after hormonal therapy. However, we are aware of only 5 studies that specifically addressed outcomes among blacks and whites. Three of those studies measured overall survival, 1 measured disease-free survival, and the other measured biochemical failure. Four studies showed no association between race and treatment outcome. A study by Thompson et al showed lower overall survival for blacks compared with whites. All patients in the 5 studies just mentioned had metastatic prostate cancer. The majority of reports on the studies did not comment on whether variables such as socioeconomic factors and access to health care were controlled for in the study. These factors have frequently been used to explain racial differences in prostate cancer. All members of our managed-care population have equal access to health care. Thus, we believe that our results are more reflective of the true biologic disease progression in the two populations. In addition, our black and Hispanic populations are younger than those for the 5 studies, reflecting the American Cancer Society guideline that PSA levels in blacks and Hispanics should be checked starting when these men reach age 40 years. Further, we believe that using our strict inclusion and exclusion criteria, particularly the fact that we included only those patients receiving primary monotherapy, allowed for a cleaner analysis of biochemical failure in this population.

In addition, higher androgen-receptor expression in black men may play an important role. Gaston et al analyzed androgen-receptor protein expression in prostatic tissue from 25 black men and 25 white men who underwent radical prostatectomy for clinically localized prostate cancer. Androgen-receptor expression was 81% higher in prostate cancer in black men than in white men. The higher expression of androgen receptors in blacks could explain the better response to ADT.

Additionally, recent evidence has demonstrated that castrate-resistant prostate cancer is still very much a hormone-dependent cancer. Racial differences have also been found among variants of the genes of the enzymes involved in androgen biosynthesis and metabolism. It is possible that there is delayed and/or less upregulation of the paracrine/autocrine steroidogenesis enzymes in black men receiving ADT.

One shortcoming of our study is the use of different dosing regimens in our patient population (calendar-based, testosterone-based, and intermittent). However, these three methods of administering LHRH agonists have thus far not shown any differences in outcomes. Furthermore, all three methods are employed by urologists in everyday clinical practice. Thus, our patient population may reflect more of a real-world scenario than other studies’ populations. It is important to note as well that the definition we used as evidence for early development of biochemical failure is applicable to any dosing regimen. What remains unclear is whether the lower rate of PSA biochemical failure in our black population will lead to decreased morbidity and mortality. With longer follow-up periods, we will be able to assess whether early biochemical failure is a prognostic factor for developing metastatic disease.

**Conclusion**

Of patients receiving ADT primarily monotherapy for prostate cancer, black men may have a lower rate of biochemical failure than white men. Although the etiology of this finding is unclear, it suggests the possibility that prostate cancer in black men may be more androgen-sensitive than in white men.

**Disclosure Statement**

The author(s) have no conflicts of interest to disclose.

**Acknowledgment**

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**References**


Studies in Prostate Cancer

In prostatic cancer with marked elevation of acid phosphatase, castration or injection of large amounts of estrogen caused a sharp reduction of the enzyme to or towards the normal range . . . .

In three patients with prostatic cancer, androgen injections caused a sharp rise of serum acid phosphatase.

Building Teams in Primary Care: What Do Nonlicensed Allied Health Workers Want?

Abstract

Introduction: Nonlicensed allied health workers are becoming increasingly important in collaborative team care, yet we know little about their experiences while filling these roles. To explore their perceptions of working as health coaches in a chronic-disease collaborative team, the teamlet model, we conducted a qualitative study to understand the nature and dynamics of this emerging role.

Methods: During semistructured interviews, 11 health coaches reflected on their yearlong experience in the teamlet model at an urban underserved primary care clinic. Investigators conducted a thematic analysis of transcriptions of the interviews using a grounded theory process.

Results: Four themes emerged: 1) health-coach roles and responsibilities included acting as a patient liaison between visits, providing patient education and cultural brokering during medical visits, and helping patients navigate the health care system; 2) communication and relationships in the teamlet model of care were defined by a triad of the patient, health coach, and resident physician; 3) interest in the teamlet model was influenced by allied health workers’ prior education and health care roles; and 4) factors influencing the effectiveness of the model were related to clinical and administrative time pressures and competing demands of other work responsibilities.

Conclusion: Nonlicensed allied health workers participating in collaborative teams have an important role in liaising between patients and their primary care physicians, advocating for patients through cultural brokering, and helping patients navigate the health care system. To maximize their job satisfaction, their selection should involve strong consideration of motivation to participate in these expanded roles, and protected time must be provided for them to carry out their responsibilities and optimize their effectiveness.

Introduction

The high-functioning health care system, based on the chronic care model, hinges on a team-based approach to care. Health care teams, though, are broadly defined and vary tremendously in how much each member interacts directly with the patient and collaborates with other members. As primary care practices consider how best to configure such teams, they have increasingly turned to nonlicensed allied health workers to play a significant role.

One method of incorporating these workers in collaborative care practice is to involve them as health coaches, such as in the teamlet model. Thomas Bodenheimer coined the term teamlet to describe the smallest, most patient-centric model that pairs a clinician with a medical assistant (MA) or a community health worker. This teamlet works to provide a variety of services for a panel of patients and to help patients and their families manage their own chronic conditions within the context of their daily lives.\textsuperscript{1,2} Figure 1 describes how health coaches enact their roles within the teamlet model both during and between clinic visits.

Although the functioning of a teamlet has been previously described,\textsuperscript{3,4} we know very little about what nonlicensed allied health workers experience when working as a health coach within this model. Involvement in such a collaborative team requires nonlicensed allied health workers to significantly expand their traditional job responsibilities.\textsuperscript{5,6} To optimize patient care and job satisfaction, it would be important for those involved in practices to understand what nonlicensed allied health workers identify as important issues to consider when they assume new roles in the collaborative care of chronically ill patients and their families.

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Stephanie Taché, MD
Lisa Ward, MD, MScPH
Ellen H Chen, MD
Hali Hammer, MD

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Methods

Aim

To examine how nonlicensed allied health workers—specifically MAs and community health workers—experience the role of health coach, we designed a qualitative study and conducted in-depth individual interviews with the 11 health coaches who participated in a 1-year pilot intervention based on the teamlet model of care.7 We did not intend to assess which of the 2 types of nonlicensed allied health workers gave better health coaching but rather to gather the perceptions of both types of workers of filling the new role of health coach. The study was approved by the institutional review board of the University of California, San Francisco.

Setting

The San Francisco General Hospital Family Health Center (FHC), a family medicine teaching clinic, is the largest primary care clinic within the San Francisco Community Health Network, serving more than 10,000 active patients. The patient population is racially and ethnically diverse (39% Latino, 27% Asian, 17% white, 13% African American), with 83% uninsured or covered by Medicaid. Patients speak 29 different languages: Most common are English (42%), Spanish (25%), and Cantonese/Mandarin (8%). The FHC is the primary ambulatory training site for the 41 resident trainees in the Family and Community Medicine Residency Program at the University of California, San Francisco. Residents in our practice all have a continuity panel of patients whom they monitor throughout their 3 years of training. They have between 1 and 4 half-day clinic sessions each week of residency, and their patients see them as their primary provider for the large majority of their clinic visits.

Participants

Eleven health coaches participated in the program for the entire academic year. Before the study, they were working in the FHC as either MAs or community health workers, two groups that represent different health care disciplines with variations in training and roles in the clinic. At the FHC, MAs are trained to carry out clinical care, including measurement of vital signs, vaccination administration, point-of-care testing, and varied administrative tasks. In contrast, community health workers in our system are paraprofessionals, usually with a background in health education and community health (eg, advocacy, outreach). They are unlicensed, are required to have a high school diploma, and frequently are similar to our patient population in ethnicity, language, and socioeconomic status.8 They are clinic based and do not monitor patients outside the health center. They are trained in administrative skills, such as billing and clerical tasks and patient education, but they lack clinical training. Community health workers are also more likely than MAs to have received some training in collaborative communication skills.

Program Description

We implemented the teamlet model with 13 first-year family medicine residents, 11 health coaches, and 150 patients. This implementation coincided with our participation in an improvement collaborative involving teaching clinics throughout California. The FHC Medical Director and Nurse Manager assigned all available MAs and community health workers (n = 11) to be health coaches with the first-year family medicine residents. A key component of this teamlet model intervention was to ensure a high degree of cultural and linguistic

<table>
<thead>
<tr>
<th>Table 1. Health coach (n = 11) and patient demographics (n = 10,000)</th>
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<tbody>
<tr>
<td><strong>Demographics</strong></td>
</tr>
<tr>
<td>Health-coach previous training</td>
</tr>
<tr>
<td>Community health worker</td>
</tr>
<tr>
<td>Medical assistant</td>
</tr>
<tr>
<td>Health-coach sex</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Health-coach race</td>
</tr>
<tr>
<td>White</td>
</tr>
<tr>
<td>Asian</td>
</tr>
<tr>
<td>African American</td>
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<tr>
<td>Latino</td>
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</table>
concordance among the health coach, physician, and patients. Sharing language and cultural identity was considered important for optimizing team functioning, with patients’ access and engagement in their care. Table 1 demonstrates how the health coaches’ race or ethnicity reflected that of our active patient panel.

All FHC nursing staff, including MAs and community health workers, participated in health-coach training. The training helped workers develop an understanding of cardiovascular risk factors, including diabetes, and acquire knowledge about and skills for developing collaborative partnerships with patients and families to come up with action plans for healthy behavior changes and make medication adherence easier. Training required active participation through role-plays to develop skills for negotiation of behavior-change action plans, medication reconciliation, and patient-centered communication. Health coaches were trained to identify low literacy as it related to medication adherence and learned strategies to help patients track their medications. They were trained to constantly assess for health literacy by asking patients what they want to learn about and checking for understanding, having been instructed in “Closing the Loop” strategies.

Health coaches took part in 6 training sessions before taking on their new role with patients. Ongoing training involved live observations, mentoring, and case discussions to further build patient-communication skills. Total training time ranged from 14 to 16 hours, and competency was determined through direct observation by the trainers. The health coaches also met regularly throughout the year with teamlet model faculty members to provide input about their experience, which helped shape the model during its implementation.

During the intervention year, the physician–health coach teamlets cared for 150 patients who had cardiovascular risk factors. The patients were part of the continuity practices of the family medicine residents. The health coaches participated in 16 to 18 clinics and were involved with 5 to 10 patients. The frequency that health coaches had contact with patients, whether by telephone or in person, varied according to patients’ needs and interests. Some patients did not engage after 1 contact and others had as many as 20 over the year. The role of these nonlicensed allied health workers as health coaches was seen as separate from their regular job duties and, at times, required them to move geographically to another clinical team within the FHC.

Study Instrument

The study instrument, a semistructured interview, was developed by the research team. Questions for the qualitative study instrument for staff who participated in the chronic-care clinics were articulated around four major areas of inquiry:

- Description of individual roles and responsibilities as a health coach
- Perceptions about effectiveness of new role in relation to patient care
- Perceived advantages and disadvantages of this role from a health-coach standpoint
- Recommendations to improve the health-coach role in the future.

Table 2 displays the complete health-coach interview instrument.

<table>
<thead>
<tr>
<th>Table 2. Health-coach interview instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>• What was your role in the chronic care clinics? Please describe your activities during a typical clinic session. How was this role different from your regular work in clinic?</td>
</tr>
<tr>
<td>• In what ways do you think the clinics affect patient care? How did your role affect patient care? If you can remember, please describe a specific example of how patient care was affected.</td>
</tr>
<tr>
<td>• What aspect of your new role did you like most? What aspect did you like least?</td>
</tr>
<tr>
<td>• Did you feel you received enough training to perform the tasks required of you? What kind of additional training, if any, would be needed?</td>
</tr>
<tr>
<td>• How was the communication among team members? Did you feel that you and your resident physician were working as a team? Why or why not? If you can remember, please give an example of joint decision making.</td>
</tr>
<tr>
<td>• What were the major obstacles for you to be successful as a health coach? (Probe for time, training, motivation …)</td>
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<tr>
<td>• How did you cope with the pressures of having this new role with your other roles? How did your new role affect other staff at the FHC?</td>
</tr>
<tr>
<td>• What recommendations would you have to improve the health-coach role? What would need to change to make your role in chronic care at the FHC better?</td>
</tr>
<tr>
<td>• Would you want to continue this role in future clinics? Why or why not?</td>
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</tbody>
</table>

FHC = Family Health Center

Data Collection

In-depth individual interviews with the 11 health coaches participating in the teamlet model of care were conducted during a 2-month period. The same investigator (ST), who was not involved in the teamlet project or in employee evaluation, conducted all interviews in
private, away from the participants’ workplace. Interviews were developed to elicit personal experiences working as a health coach. All 11 health coaches in the study were approached by the research investigator regarding participation in the individual interviews. They were informed that their responses would remain anonymous, be reported only in aggregate, and not influence their employment. All agreed to be interviewed. After participants signed consent forms, interviews lasting 45 to 60 minutes and carried out in English were audiotaped. The audiotapes were transcribed, and any identifying information was removed from the transcriptions. The audiotapes were then destroyed. Data analysis was performed concurrently with data collection.

Data Analysis
Grounded theory methodology\(^{10}\) was used to understand the perceptions of the health coaches. The constant comparative method of grounded theory involved continual comparison of the data and the themes that emerged. Multistaged coding was used and began with open coding of raw data to develop key ideas. Axial coding then organized these categories into patterns, and finally selective coding was used to develop theoretical formulation that linked key variables to themes. Three investigators (ST, IW, and GS) read one transcript to identify and to develop initial descriptive codes. All 11 transcripts were then reread individually by each investigator using this initial list of codes. ATLAS\textregistered \textsuperscript{TM} scientific software (version 5.2, ATLAS\textregistered \textsuperscript{TM} GmbH, Berlin, Germany) was used to code the interviews using these descriptive codes and identified patterns. The 3 investigators discussed initial coding, and then interpretative codes were created to better describe meanings generated from the data. Discrepancies in analysis were resolved through discussion and reaching consensus among all 3 investigators.

### Table 3. Themes of health-coach experience: quotes from health-coach interviews

<table>
<thead>
<tr>
<th>Themes</th>
<th>Examples of themes from health-coach interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsibilities and roles varied from theoretical expectations of model</td>
<td>“And I noticed with the Spanish-speaking patients when you speak the same language, they feel more comfortable. They open [up]: ‘Oh, you know, I want to tell you something.’” (HC.01)</td>
</tr>
<tr>
<td></td>
<td>“I think the doctor didn’t notice it, but this patient was having problems. The doctor stepped out to talk to the attending. The patient and I were just sitting there when he said, ‘I don’t know, but I feel I can trust you.’ And I responded, ‘And I feel that something is going wrong with you.’ … He was concerned about drugs and worried about his little seven-year-old niece because a lot of gang members were coming into their neighborhood. So we started talking about that.” (HC.02)</td>
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<td></td>
<td>“From the patient’s point of view [health coaching] was very good; they get more attention, easier access with the hospital and scheduling appointments.” (HC.10)</td>
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<td>“It’s difficult for me because the resident is very busy and I don’t want to bother her. I’ll decide to talk to her later about the patients. But then sometimes it gets [to be] 5:00 and … still can’t talk to her. I feel more like I’m doing it myself, because she really doesn’t have the time to spend with me about patients.” (HC.09)</td>
</tr>
<tr>
<td>Communication and relationships were key to health-coach experience</td>
<td>“This lady didn’t want to tell the doctor that she was drinking so much soda every day. And I had a couple of other male patients who didn’t want to tell [the doctor] how much they were eating. He speaks beautiful Spanish, so [it isn’t] a language [barrier]—I think it’s [that he’s the] physician … with [me] it’s more buddy—buddy.” (HC.03)</td>
</tr>
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<td></td>
<td>“Look, the doctor is like an authority figure to the patients. I try to change that. I tell the patient, ‘The doctor is helping us, but you are the authority. You decide [it] you want to fight this war or not. If you don’t want to fight this war, we all lose. You are the commander in front.—So we are all helping you—me and the doctor, the nutritionist, the diabetic nurse, all of us—we are helping you. We provide you medicine. We support your war. But you have to fight it.’ First, I want to change their concept of: ‘I took my medicine and then I can eat whatever I want.’ It doesn’t work that way. You have to motivate them. And for the diabetic patients, I can support them differently than the doctor.” (HC.04)</td>
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<tr>
<td></td>
<td>“I think that part [communicating with doctor] went well … we had a good working relationship with one another. I’m approachable, he’s approachable. I felt that a lot of suggestions that I made, or things that I brought to his attention, were taken seriously; he listened. And he really gave me a lot of leeway of how I wanted to coach, and with some ideas that I wanted to implement. He allowed me to go forth and put it into action. I enjoyed that part a lot.” (HC.05)</td>
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<td>“So, at the beginning we were kind of testing the waters to see what would work. I asked, ‘What would be the best way for me to communicate with you?’ And, we decided that it was e-mail. If there was any urgent need, I would page her so I could talk to her. That’s worked pretty well. Communication’s really key—any aspect of the health care system; that’s when you’re working together.” (HC.07)</td>
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(Continued on next page.)
Results
Qualitative analysis of the interviews revealed four themes. Table 3 displays sample quotes from the health coaches for each of the themes.

Responsibilities and Roles Varied from Theoretical Expectations of Model Health-Coach Responsibilities
Health coaches described some variation between what was defined conceptually in the teamlet model1 and what occurred in its real-world application:
• In general, health coaches could delineate the responsibilities outlined in the teamlet model:
  - Previsit planning (review laboratory tests and medications before visits)
  - During clinical visit (develop action plan, do medication reconciliation, provide patient health education, close the loop)
  - Follow-up with patient between visits (remind patient of future appointments for all medical care, review action plan, schedule appointments).
However, not all of the health coaches consistently assumed the responsibilities, and variations depended on individual health coaches’ perceptions of available time, interest in the particular responsibility, and patient need.

Health-Coach Roles
Beyond duties and responsibilities, the health coaches identified three primary roles that they assumed:
• Facilitators of access to health services by acting as a liaison between patient and physician resident, helping the patient navigate the system, and enhancing continuity of care
• Health and culture brokers by assessing health literacy, using understandable analogies to explain medical concepts, and addressing language barriers and cultural norms
• Emotional supporters by providing extended contact time and a listening ear to patients.

(Continued from previous page.)

<table>
<thead>
<tr>
<th>Themes</th>
<th>Examples of themes from health-coach interviews</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple factors influenced health coaches’ experience of the model of care</td>
<td>“So if you can get people who genuinely want to be a health coach, it can be effective. Some patients are stubborn and don’t want to change. Some people feel like, ‘I’ve been like this for years, why change now?’ That’s fine, but if you can help them in some other aspect, it could help their chronic illness. So I think that can make a difference. I think the big thing—the biggest thing to me—is having people who really want to do it. Then the morale is better and you can accomplish more.” (HC.06)</td>
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<td></td>
<td>“It’s humbling to have patients talk about their lives because I know I wouldn’t if I didn’t trust somebody. I’ve seen that in patients, as we saw them more and more, they began to open up. We’re building trust—and that’s really important. Not to try to diagnose, but just to be there for them.” (HC.07)</td>
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<tr>
<td></td>
<td>“My other health coaches and I really do a lot: we do these action plans, we follow-up, we make appointments, we have patients come in, schedule them for nurse visits, for blood pressure checks, for blood draws. And the patients love it, and you know, in the end, we feel good about it. We have these meetings where there’s a general ‘hurrah,’ for all the extra work that—and the good work—that you’re doing.” (HC.08)</td>
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<td></td>
<td>“What did I like the least? They don’t give us enough time to spend with these patients. Because I felt bad one time, I spent all my time with two patients, then another patient called, and told me, ‘Oh, you told me you were going to call back to follow-up, but you never called. What happened?’” (HC.09)</td>
</tr>
<tr>
<td>Systems and personnel obstacles to model effectiveness</td>
<td>“It’s really hard [managing the roles of health coach and medical assistant] because … We always have our papers with the phone numbers and everything. So I’ll call patients from my car or from home and things like that.” (HC.03)</td>
</tr>
<tr>
<td></td>
<td>“I think a little more organization would be nice and if the roles were clearer—the residents, faculty, health coaches, everybody. I think it could be more effective if it was a little more consistent.” (HC.06)</td>
</tr>
<tr>
<td></td>
<td>“Some people aren’t as comfortable doing the one-on-one thing; they aren’t as educated or their skill level as far as communicating, recognizing certain medications, like knowing how to give certain information; vary. So, first I would say ask if they want to participate. Second, I thought it would be a good idea if the health coaches and the patients could be observed … could be videotaped.” (HC.05)</td>
</tr>
<tr>
<td></td>
<td>“I would probably make the health coaches be the panel managers. The roles wouldn’t be separate; they would be combined. I would have the health coaches come to work at the clinic a little later and stay later to do the follow-up. Or have one to two hours a day to call at least one patient back. As far as patient scheduling, maybe alternate a collaborative patient with a follow-up, or a new patient appointment.” (HC.08)</td>
</tr>
</tbody>
</table>

HC = health coach
Communication and Relationships Were Key to Health-Coach Experience

Communication and relationships were essential to how the health coaches valued their participation in the teamlets. They identified a triad of important relationships that developed among the three members of the team (patient, clinician, and health coach).

Patient–Health Coach Relationship

The aspects of communication between health coaches and patients that the health coaches valued included:

- Having time between visits for telephone calls to follow-up
- Relating to patients with understanding and responsiveness.

What they described indicated that a special and strong emotional patient–health coach bond often existed in which patients believed that someone cared for them (i.e., “being there for them”). They expressed that this bond was enhanced by virtue of the extended patient contact time and availability of the health coach (focal person). Participants described a high level of trust between patients and health coaches because the patients saw the health coaches as their equals and not as authority figures like their physicians.

Health coaches reported that they often gathered patient information that might not be routinely revealed to the clinician and that affected treatment plans. For example, health coaches described how patients would tell them of their involvement in gangs, not taking the right medication, and feeling depressed. As one health coach said, “The relationship between the coach and the patient … is the key [to] this program working or not.”

Teamwork Approach That Includes the Patient

Health coaches spoke about wanting to create a well-functioning health care team that included the physician, patient, and themselves:

- Some appreciated being respected and influencing the treatment. One health coach described eliciting information from the patient that the physician had not obtained that significantly changed the treatment plan
- Others stressed the importance of the patient as an active member of the team; as one health coach put it, “The doctor, to the patient, is an authority figure. I try to change that. [The patient] is the authority. If the [patient] doesn’t want to fight this war, we all lose”
- Conveying that the physician and the health coach cared about the patient was frequently identified as a key aspect of developing a healing relationship; one health coach said: “Our main purpose is, I think, that you show your heart to them. We care.”

Multiple Factors Influenced Health Coaches’ Experience of the Model of Care

Overall Experience of Health Coaches

The positive attributes of the teamlet model pilot included the following:

- Making a difference through the relationship by addressing patients’ emotional needs and expressing care
- Helping patients in a tangible way to access health care
- Learning new professional information and skills.

The negative attributes of the teamlet model pilot included the following:

- Having inadequate time to carry out activities
- Experiencing the role of health coach as disjointed from other clinic responsibilities
- Feeling frustrated with patients’ unwillingness to change
- Taking too much of patients’ time with the added communication required by the teamlet-model tasks
- Receiving insufficient recognition from clinic managers for extra work required as part of their health coach duties.

Prior Roles of Nonlicensed Allied Health Workers

Whether a health coach had been trained as an MA or as a community health worker had considerable influence on how satisfied they were with being a health coach. MAs reported less of a benefit for themselves from being a health coach compared with their usual roles and clinical duties. New responsibilities in patient education or in navigation of the health care system were least satisfying. Some described the feeling of being “stuck in the room” and not being available to manage patient flow outside of the room for other patients. There was a perceived loss of autonomy in addressing patient needs because the health-coach role was seen as more formulaic. Participants trained as community health workers, however, uniformly enjoyed the one-on-one patient interaction and wanted to have more dedicated time for health coaching. All six of the community health workers were interested in continuing this role in the future. Only one of the five medical assistants could foresee continuing as health coaches in the future. The most common reason the other four gave for not wanting to continue health coaching was a lack of interest in providing one-on-one, in-depth patient education and motivation. These MAs preferred managing patient flow and carrying out discrete clinical tasks to help patients move efficiently through their clinic appointments.
Building Teams in Primary Care: What Do Nonlicensed Allied Health Workers Want?

Systems and Personnel Obstacles to Model Effectiveness

Two obstacles were identified that have significant implications to practice improvement.

Systems-Level Obstacles

Systems-level obstacles included not having enough protected time to schedule appointments, complete treatment authorization requests, or conduct follow-up phone calls. Health coaches consequently had to complete calls to patients outside of work hours. They felt pressure to respond to patient clinical demands, particularly when there was insufficient availability in primary care clinicians’ follow-up appointments and insufficient time during the visit to do all health-coaching tasks (ie, medication reconciliation, creation of an action plan, patient education, and closing the loop). They also felt that there was insufficient protected time to review their patient panel with physicians.

Health-Coach Obstacles

Health-coach obstacles included a lack of knowledge for use in answering patient questions and a feeling of insecurity when compared with physicians. Finally, the influence of prior training and experience for MAs significantly reduced their motivation to carry out health-coaching tasks.

Discussion

Limitations

Our study had several limitations that affect the generalizability of its findings. It explored the experiences of nonlicensed allied health workers trained as health coaches working in a pilot intervention based on the teamlet model. The nature of that intervention presented certain limiting factors: a small number of health coaches, health coaches working in only one clinic that was an academic training center, and a pilot that was conducted for only one year.

The pilot intervention focused only on one form of collaborative team care—the teamlet model. It was not powered to be statistically significant, which limited our ability to examine whether the teamlet model improved the primary care of patients. This also did not permit exploration of any differences in patients’ outcomes related to whether their health coaches were MAs or nonlicensed allied health workers. A separate analysis of clinical and process outcomes of this pilot intervention did reveal trends toward improvement.7 Other sites using MAs in diabetes care have also shown significant improvement in clinical outcomes such as control of blood sugar levels, blood pressure, and cholesterol level.11

Although the experiences of the physicians and patients who participated in this pilot intervention based on the teamlet model were recorded, their analyses will be forthcoming in a future study. The pilot implementation did not test for optimal panel sizes or case loads for health coaches. Rather, its focus was exploring the acceptability of a very new role for these allied health workers. Regarding training, the health coaches were observed during role-play sessions and directly observed with patients in the clinic to assess competency. However, no formalized competency testing was conducted in either knowledge or communication skills. Potential variation in competency could have affected health coaches’ experiences of the teamlet model.

In addition, health coaches’ experience of the teamlet model was limited to their work within an academic training center, which may affect generalizability to other practice settings. Some benefits might be less significant in nonacademic settings or settings involving nonpublic hospitals. For example, the cultural concordance may be especially important for a culturally diverse patient population. The focus on health literacy, communication, navigation, and health education may be more effective when used with a less literate and/or immigrant population. Perhaps most important, the value that the health coaches attributed to their role in eliciting and conveying information that the patient might not feel comfortable discussing with a physician may be most powerful in settings where most physicians are less accessible to their primary care patients (eg, academic settings, community practices with part-time clinicians).

Generalizability of the findings must consider these significant limitations. However, given the burgeoning nature of the field, this case-study experience can provide direction for future research into the selection, training, roles, and impact of nonlicensed allied health workers assuming roles as health coaches in primary care redesign and in the patient-centered medical home. For example, randomized, controlled trials are currently being conducted that take into consideration the limitations identified in this study (eg, clinical outcome, competency training, nonacademic practice settings, clinician and patient satisfaction with the teamlet model, optimal panel size and case-load ratios).

Implications

The use of nonlicensed allied health workers as part of a collaborative team with physicians to improve the primary care of patients shows great promise, as it offers increased accessibility, continuity, and advocacy in the care of the chronically ill. The health coaches we
interviewed felt that they had a significant impact on patients’ health and enhanced patient–physician communication through the cultural and language skills that they brought to their role. Interestingly, they believed they had fostered trust and democratized the hierarchy in the clinical relationship, which led to important revelations by patients that otherwise would not have been uncovered.

Importantly, participants indicated that for nonlicensed allied health workers to feel successful and satisfied, they must be motivated to have the new role of health coach as part of their jobs. For some, this may require them to relinquish some of the skills, responsibilities, and job satisfaction they worked hard to achieve in their previous training and certifications. MAs and other health care staff may be trained and function very differently from physicians and other health professionals—they may work best while multitasking and maintaining flexibility to move quickly from one task to another.12,13 One of the issues that perhaps led to the MAs in our study reporting lower enthusiasm in carrying out the duties of health coaches was their more clinically oriented training. MAs are trained to carry out concrete clinical tasks such as measuring blood pressures, conducting a focused patient history, and managing patient flow.

The duties of our MAs in their roles as health coaches consisted of extended one-on-one time spent with patients, providing education and motivational talks, which interfered with what they saw as their primary responsibilities—managing patient flow and conducting time-limited clinical tasks.

Health coaching may or may not suit all of the staff who might be recruited for the expanded role. It may place some of them in greater emotional proximity with patients, requiring interactions that go beyond what they would find desirable in patient care. Although all participants endorsed the value of the model, they emphasized that finding the right person for the job of health coach is paramount to its long-term success. In the words of one health coach, “Get people that genuinely want to be a health coach.”

The operational challenges of implementing the teamlet model using nonlicensed allied health professionals will be intimately linked to the structure of the medical office where it is being implemented. Given that our study was not structured to determine the optimal ratio of health coaches to clinicians, we remain cautious in drawing generalizable recommendations.

However, the experiences of these health coaches suggest that this model of team care will not survive without clear administrative and financial support. At a basic level, these health coaches wanted physical space to meet with patients and telephones for making calls between visits. Also, they recommended ongoing training and supervision, the opportunity to learn with and receive feedback from physicians, and better standardization of health-coach roles.

Most clearly, they reported that without the time to accomplish tasks already assigned, particularly for the MAs, the added responsibilities of health coaching often felt unmanageable and led to greater dissatisfaction. This highlights the importance of having a sufficient number of staff to accomplish all of the tasks essential for patient care—both the traditional ones (measuring vital signs, rooming patients, giving immunizations, and drawing blood) and those of health coaching (using protected time to do phone follow-up with patients, meeting with physicians to discuss patients’ care). The health-coach role must be fully integrated into staff members’ identity, job description, performance expectations, and daily activities. As one health coach said, “The other responsibilities in the clinic … were overshadowing the things that I do for the teamlet.”

Even though we found less engagement from MAs in the teamlet model during this pilot intervention, that does not preclude MAs from functioning in the role of health coaches. However, our findings suggest that if the principals of a reconfigured practice want to use MAs as health coaches, they would do better by hiring more of them to accomplish both sets of tasks rather than asking one person to simply expand his or her role.” Another variable to consider is the size of the patient caseload for health coaches, because practices would have to allow adequate time for panel management and between-session contacts. More studies are needed to quantify the optimal caseload and the time needed for experienced health coaches to integrate health coaching into MAs’ work. At that point, cost and economic sustainability would have to be considered alongside the clear demonstration that such a model improves patient outcomes and helps address the crises of patient access and physician job satisfaction currently facing the field of primary care.

**Conclusion**

For those primary care practices considering health coaches as key members of collaborative teams, the experiences of a cohort of well-trained,
Building Teams in Primary Care: What Do Nonlicensed Allied Health Workers Want?

nonlicensed allied health workers suggests three key requirements for success:
• Consideration of the motivation and desire of nonlicensed allied health workers to take on this role
• Provision of specific training of the nonlicensed allied health workers to assume a new role
• Clearly defined expectations and provision of adequate protected time and space to carry out responsibilities.

Disclosure Statement
The author(s) have no conflicts of interest to disclose.

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References

Get the Task Done
The leaders who work most effectively, it seems to me, never say ‘I.’
And that’s not because they have trained themselves not to say ‘I.’
They don’t think ‘I.’ They think ‘we’; they think ‘team.’
They understand their job to be to make the team function.
They accept responsibility and don’t sidestep it, but ‘we’ gets the credit …
This is what creates trust, what enables you to get the task done.

— Peter Drucker, 1909-2005, writer, management consultant, and “social ecologist”
A variety of evil possession cults are practiced in many regions of the world. In such cultures, people believe that many spirits live in the world. In contrast to good spirits, the evil spirits carry sickness by possessing their victims. In an attempt to appease such evil spirits, healers conduct extensive ceremonies that involve dancing to a level of ecstasy. In Somalia such cults include Mingis, Wadaabo and so on. Mingis is an Amharic word. It is reported that possessed individuals often speak in Oromo, a language spoken in Ethiopia.

Dr Osman is formerly a physician from Group Health Cooperative. He is a self-taught artist and credits his early life in Somalia, his medical education in Russia, and his medical experiences in Kenya and Somalia as major influences on his art. More of Dr Osman's artwork can be seen on his Web site: www.osmanart.net.
Coffee, Caffeine, and Risk of Hospitalization for Arrhythmias

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Mary Anne Armstrong, MA
Natalia Udaltsova, PhD
Cynthia Morton, MD

Abstract

Context: Population study data about relations of coffee drinking to arrhythmia are sparse.

Objective: To study relations of coffee drinking to risk of cardiac arrhythmia in 130,054 persons with previous data about coffee habits.

Design and Outcome Measure: We used Cox proportional hazards models with 8 covariates to study coffee-related risk in 3137 persons hospitalized for cardiac arrhythmia. We conducted a similar analysis of total caffeine-related risk in a subgroup with data about other caffeine intake (11,679 study participants; 198 hospitalized).

Results: With non-coffee-drinkers as the referent, the adjusted hazard ratio (HR) for any arrhythmia at the level of <1 cup of coffee per day was 1.0 (95% confidence interval [CI] = 0.9–1.1; p = 0.7); for 1–3 cups/day, it was 0.9 (CI, 0.8–1.0; p = 0.2), and for ≥4 cups/day, it was 0.8 (CI, 0.7–0.9; p = 0.002). With coffee intake as a continuous variable, the HR per cup per day was 0.97 (CI, 0.95–0.99; p = 0.001). Results were similar for several strata, including persons with history or symptoms of possible cardiorespiratory disease and those without such history or symptoms. Coffee had similar relations to atrial fibrillation (48% of participants with arrhythmia) and most other specific arrhythmia diagnoses. Controlled for number of cups of coffee per day, total caffeine intake was inversely related to risk (HR highest quartile vs lowest = 0.6; p = 0.03).

Conclusion: The inverse relations of coffee and caffeine intake to hospitalization for arrhythmias make it unlikely that moderate caffeine intake increases arrhythmia risk.

Background

Cardiac rhythm disturbances are among the toxic effects from very large doses of caffeine administered in animal studies and taken in human suicide attempts. Patients frequently report palpitations after caffeine ingestion, and physicians often advise patients with arrhythmias to avoid caffeinated coffee. However, human experimental and prospective population study data about relations of commonly ingested amounts of coffee and caffeine to arrhythmia have yielded inconsistent results. Controlled experiments in humans have shown no relation to ventricular premature beats (VPBs), including data about caffeine restriction in persons with symptomatic VPBs. Caffeine administration in patients with recent myocardial infarction, and inducibility of VPBs. A controlled experiment of ingestion of the caffeine equivalent of 4 to 5 cups of coffee showed no relationship to heart rate and number of atrial or VPBs on taped electrocardiograms. Two earlier population studies of coffee drinking and incident atrial fibrillation risk showed no association; another showed a weak positive association but with an inconsistent dose-response relationship.

In view of the need for more data about the association of arrhythmia risk with commonly ingested amounts of coffee, we examined and report here data about relations of reported coffee intake to subsequent risk of hospitalization for various arrhythmias in a large free-living population.

Methods

Study Participants and Data

The study protocols were approved by the institutional review board of the Kaiser Permanente Medical Care Program. Study participants were 130,054 members of a Northern California comprehensive health care plan who voluntarily underwent a health examination between 1978 and 1985. For many...
years, the examination was offered to adult members as a way to have a routine health checkup. Examination questionnaire items included ethnicity, other demographics, habits, and medical history. One query was “Do you drink coffee?” Options for answers to that question were “more than 6 cups/day, 4–6 cups/day, 1–3 cups/day, less than 1 cup/day, and never or seldom.” The questionnaire included a similar query about tea intake. Coffee and tea consumption were ascertained one time only. Measurements included body mass index (BMI), blood pressure, fasting blood glucose level, total blood cholesterol level, and leukocyte count. Total coffee and tea intake were ascertained for all 130,054 participants.

Examinees in 1984–1985 (n = 11,679, or 9.3% of all participants) answered queries about type of coffee, with answer options being “none, caffeinated only, decaffeinated only, both caffeinated and decaffeinated.” These persons also supplied data about caffeine in tea, soft drinks, and medications, enabling estimation of total caffeine intake. Caffeine intake was studied among these 11,679 participants.

### Analytic Methods

Participants were monitored until December 31, 2008, death or other cause for Health Plan termination, or first hospitalization in a program facility with a primary discharge diagnosis of cardiac dysrhythmia, code 427 in the International Classification of Diseases, 9th Revision. Incompleteness of comprehensive computerized data about outpatient arrhythmia diagnoses plus the impracticality of reviewing >130,000 paper records precluded study of arrhythmia events not resulting in hospitalization. The average duration of follow-up monitoring was 17.64 years, with a total of 2,224,214 person-years of observation. There were 3137 persons with an arrhythmia diagnosis. Table 1 shows selected unadjusted distributions.

We used Cox proportional hazards models determined by the PHREG procedure described in version 8 of the user’s guide for SAS Analytics (SAS Institute Inc, Cary, NC). Coffee was studied categorically, with never/seldom as referent and <1, 1–3, 4–6, ≥6 cups/day or <1, 1–3, ≥4 cups/day. With an assumption of linearity, coffee was also studied as a continuous per-cup-per-day variable with these assigned numbers: 0 for never/seldom, 0.5 for <1 cup/day, 2.0 for 1–3 cups, 5.0 for 4–6 cups, and 7 for ≥6 cups. Most multivariate models included age (continuous), sex, ethnicity (white as referent, with black, Asian, Hispanic, and other as additional groups), BMI (<25 kg/m² as referent, with 25–29 kg/m², ≥30 kg/m² as additional groups), education (no college as referent, with some college and college graduate as additional groups), cigarette smoking (never as referent, with ex-smokers, <1 pack/day, and ≥1 pack/day as additional groups), alcohol intake (never as referent, with ex-drinkers and 4 current drinking categories as additional patients), and a cardiorespiratory (CR) composite covariate.

The CR baseline risk covariate was considered positive if the participant answered yes to any of 27 queries involving current or past possible cardiovascular conditions (heart attack, angina, stroke, high blood pressure, diabetes, abnormal findings on electrocardiography, chest pain, palpitations, shortness of breath, blackouts, etc). The participants with a positive CR variable

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### Table 1. Selected baseline traits of study population and participants with arrhythmia

<table>
<thead>
<tr>
<th>Trait</th>
<th>Percentage of study population (n = 130,054)</th>
<th>Percentage of participants with arrhythmia (n = 3137)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographics</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Men</td>
<td>44.1</td>
<td>47.2</td>
</tr>
<tr>
<td>Women</td>
<td>55.9</td>
<td>52.8</td>
</tr>
<tr>
<td>&lt;60 years old</td>
<td>83.2</td>
<td>56.6</td>
</tr>
<tr>
<td>≥60 years old</td>
<td>17.8</td>
<td>43.4</td>
</tr>
<tr>
<td>White</td>
<td>55.7</td>
<td>63.2</td>
</tr>
<tr>
<td>Black</td>
<td>26.8</td>
<td>21.0</td>
</tr>
<tr>
<td>Asian</td>
<td>10.6</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Coffee</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>26.9</td>
<td>18.8</td>
</tr>
<tr>
<td>&lt;1 cup/day</td>
<td>14.0</td>
<td>11.9</td>
</tr>
<tr>
<td>1–3 cups/day</td>
<td>41.6</td>
<td>51.4</td>
</tr>
<tr>
<td>4–6 cups/day</td>
<td>12.0</td>
<td>14.4</td>
</tr>
<tr>
<td>≥6 cups/day</td>
<td>4.3</td>
<td>6.5</td>
</tr>
<tr>
<td><strong>Smoking</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>46.4</td>
<td>43.0</td>
</tr>
<tr>
<td>Ex-smoker</td>
<td>21.4</td>
<td>24.6</td>
</tr>
<tr>
<td>Current smoker</td>
<td>25.0</td>
<td>28.8</td>
</tr>
<tr>
<td><strong>Cardiorespiratory composite (&quot;yes&quot; to any of 27 queries; see text for details)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cardiorespiratory &quot;yes&quot;</td>
<td>56.0</td>
<td>73.2</td>
</tr>
<tr>
<td>Cardiorespiratory &quot;not yes&quot;</td>
<td>44.0</td>
<td>26.8</td>
</tr>
</tbody>
</table>
comprised 56.0% of the total study population and 73.2% of participants with arrhythmia.

The subset of 11,679 participants that supplied information about coffee types was also studied by comparing persons taking specific coffee types to non-coffee-drinkers as referent. In the same subset, total caffeine intake was studied as a continuous (per decile) variable. These were studied both with and without control for total amount of coffee intake.

For coffee intake, we studied risk of any arrhythmia and of specific diagnoses. The latter included supraventricular tachycardia (code 427.0; n = 257), paroxysmal ventricular tachycardia (code 427.1; n = 232), atrial fibrillation (code 427.31; n = 1512), atrial flutter (code 427.32; n = 273), ventricular fibrillation/flutter/cardiac arrest (code 427.4–5; n = 91), premature beats (code 427.6; n = 91), and other arrhythmia (code 427.8; n = 755). Analyses yielded estimates of hazard ratios (HRs), 95% confidence intervals (CIs), and p values. We performed similar analyses of the relation of tea to arrhythmia risk.

Similar analyses of total coffee intake were performed, including—one at a time—systolic blood pressure, diastolic blood pressure, total blood cholesterol, glucose, and leukocyte count.

Finally, we used similar models to examine risk of hospitalization for the three most numerous cardiovascular diagnostic groups. These were coronary artery disease (ICD codes 410–414; n = 7658), cerebrovascular disease (codes 430–438; n = 5108), and heart failure (code 428; n = 3418).

### Results

In adjusted models (Table 2), we observed an inverse relation of coffee intake to risk of hospitalization for arrhythmia, especially supraventricular arrhythmias, that was statistically significant for heavier coffee drinkers (≥4 cups/day) and for coffee as a continuous variable. This inverse relation was progressive in the largest intake categories: for example, at 4–6 cups/day, the HR for all arrhythmias was 0.84 (p = 0.05), and at ≥6 cups/day, it was 0.73 (p = 0.02). The results were similar for most of the specific supraventricular arrhythmia diagnoses. The HR for heavy coffee drinkers was >1.0 for paroxysmal ventricular tachycardia, but it was 0.5 for the composite of “ventricular fibrillation/flutter/cardiac arrest.”

The inverse relation of coffee drinking to arrhythmia was consistent in men, women, whites, blacks, and persons younger than or older than 60 years of age at baseline (Table 3). The association was nearly identical in persons with a yes for CR composite and those without a yes for the composite (Table 3). The inverse coffee relation was slightly stronger for risk within 10 years of examination (vs ≥10 years) and for risk of never-smokers (vs ex-smokers or current smokers). Tea drinking was less prevalent in our study population and was unrelated to any endpoint. For the 24,945 persons reporting intake of ≥1 cup/day of tea (vs none), the HR was 1.01; the HR per cup per day was 1.00.

We performed most stratified analyses separately for atrial fibrillation, the diagnosis for half of all participants. The results for atrial fibrillation were consistently similar to those for all arrhythmias; for example, the HR of those drinking ≥4 cups/day was 0.83 for men, 0.78 for women, 0.78 for white persons, 0.65 for black persons, 0.79 if <60 years old at baseline, 0.83 if ≥60 years old at baseline, 0.64 if <10 years old, 0.60 if ≥10 years old, and 0.68 if ≥10 years old and ≥60 years old.

### Table 2. Adjusted hazard ratio (95% confidence interval) of arrhythmia diagnoses by coffee intake

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>N</th>
<th>&lt;1 cup/day</th>
<th>1–3 cups/day</th>
<th>≥4 cups/day</th>
<th>Per cup per day*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any arrhythmia</td>
<td>3137</td>
<td>0.97 (0.85–1.11)</td>
<td>0.93 (0.84–1.02)</td>
<td>0.82 (0.73–0.93)</td>
<td>0.97 (0.95–0.99)</td>
</tr>
<tr>
<td>Paroxysmal supraventricular tachycardia</td>
<td>257</td>
<td>0.85 (0.54–1.34)</td>
<td>1.01 (0.72–1.40)</td>
<td>0.63 (0.41–0.98)</td>
<td>0.94 (0.88–1.02)</td>
</tr>
<tr>
<td>Paroxysmal ventricular tachycardia</td>
<td>232</td>
<td>0.89 (0.59–1.36)</td>
<td>1.04 (0.71–1.53)</td>
<td>1.22 (0.79–1.87)</td>
<td>1.05 (0.98–1.12)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>1512</td>
<td>0.82 (0.67–1.00)</td>
<td>0.88 (0.76–1.01)</td>
<td>0.81 (0.69–0.96)</td>
<td>0.97 (0.94–1.00)</td>
</tr>
<tr>
<td>Atrial flutter</td>
<td>273</td>
<td>0.99 (0.65–1.43)</td>
<td>0.86 (0.62–1.20)</td>
<td>0.80 (0.54–1.19)</td>
<td>0.97 (0.91–1.04)</td>
</tr>
<tr>
<td>Ventricular fibrillation/flutter/cardiac arrest</td>
<td>91</td>
<td>0.62 (0.28–1.34)</td>
<td>0.72 (0.42–1.22)</td>
<td>0.47 (0.23–0.96)</td>
<td>0.88 (0.78–1.00)</td>
</tr>
<tr>
<td>Premature beats</td>
<td>91</td>
<td>1.98 (1.02–3.84)</td>
<td>0.98 (0.54–1.79)</td>
<td>0.62 (0.28–1.35)</td>
<td>0.87 (0.77–0.99)</td>
</tr>
<tr>
<td>Other arrhythmia</td>
<td>755</td>
<td>1.02 (0.79–1.32)</td>
<td>0.93 (0.77–1.14)</td>
<td>0.72 (0.56–0.93)</td>
<td>0.94 (0.90–0.98)</td>
</tr>
</tbody>
</table>

*Versus nondrinkers as referent, with 8 covariates.

**Hazard ratio for 4–6 cups/day = 0.82; hazard ratio for ≥6 cups/day = 0.81.

*p < 0.01.

*p < 0.05.

**Per 1.02.
years to diagnosis, 0.84 if ≥10 years to diagnosis, 0.81 if CR “yes,” and 0.84 if CR “not yes.”

In the subset with caffeine data, total caffeine intake was related to lower arrhythmia risk, and the inverse relation to arrhythmia was stronger for persons reporting drinking only caffeinated coffee than for those reporting decaffeinated or both types (Table 4), associations little affected by controlling for total amount of coffee intake.

Among covariate relations, age, male sex, white ethnicity, adiposity (BMI ≥30 kg/m²), and blood pressure were all related to increased risk (data not shown). Cigarette smoking was weakly related to risk. For example, compared with never smokers, the HR for <1 pack/day smokers was 1.08 (CI, 0.96–1.21), and for ≥1 pack/day smokers, the HR was 1.18 (CI, 1.02–1.36; p = 0.03). The CR composite was related to risk with a HR of 1.64 (CI, 1.51–1.78; p < 0.001). Inclusion of total blood cholesterol level, systolic or diastolic blood pressure, blood glucose level, or leukocyte count in models had a negligible effect on the HRs for arrhythmia. Although both systolic and diastolic blood pressures were related to risk, the HR for ≥4 cups of coffee was 0.82 (CI, 0.73–0.93) with or without inclusion of either systolic or diastolic blood pressure.

As detailed in the “Study Participants and Methods” section, there were three broad causes of cardiovascular hospitalizations with greater numbers than arrhythmias. The HRs associated with ≥4 cups/day for these were as follows: CAD, 1.13 (CI, 1.04–1.21; p = 0.002); cerebrovascular disease, 0.95 (CI, 0.87–1.04; p = 0.3); and heart failure, 1.04 (CI, 0.93–1.17; p = 0.5).

**Discussion**

It is unclear what, if any, rhythm disturbances are represented by anecdotal reports of “palpitations” after caffeine ingestion. Yet we are unaware of previous population studies that examine all arrhythmia in relation to coffee drinking.

The validity of the inverse relation of coffee drinking to risk of hospitalization for arrhythmias in

### Table 3. Adjusted hazard ratio (95% confidence interval) of arrhythmia in selected groups by coffee consumption

<table>
<thead>
<tr>
<th>Group (no. hospitalized)</th>
<th>N</th>
<th>≥4 cups/day vs no coffee</th>
<th>Per cup per day (continuous)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>1565</td>
<td>0.84 (0.71–0.99)</td>
<td>0.97 (0.95–1.00)</td>
</tr>
<tr>
<td>Women</td>
<td>1572</td>
<td>0.80 (0.67–0.95)</td>
<td>0.96 (0.93–0.99)</td>
</tr>
<tr>
<td>White</td>
<td>2098</td>
<td>0.84 (0.73–0.97)</td>
<td>0.98 (0.95–1.00)</td>
</tr>
<tr>
<td>Black</td>
<td>697</td>
<td>0.71 (0.59–0.95)</td>
<td>0.93 (0.89–0.98)</td>
</tr>
<tr>
<td>Asian</td>
<td>217</td>
<td>0.92 (0.51–1.65)</td>
<td>0.97 (0.89–1.07)</td>
</tr>
<tr>
<td>Never smoked</td>
<td>1426</td>
<td>0.76 (0.64–0.92)</td>
<td>0.96 (0.93–0.99)</td>
</tr>
<tr>
<td>Ex-smokers</td>
<td>959</td>
<td>0.95 (0.76–1.18)</td>
<td>0.98 (0.99–1.01)</td>
</tr>
<tr>
<td>Current smokers</td>
<td>621</td>
<td>0.86 (0.64–1.14)</td>
<td>0.97 (0.94–1.01)</td>
</tr>
<tr>
<td>&lt;10 years to hospitalization</td>
<td>425</td>
<td>0.72 (0.52–0.99)</td>
<td>0.95 (0.90–1.00)</td>
</tr>
<tr>
<td>≥10 years to hospitalization</td>
<td>2752</td>
<td>0.84 (0.74–0.95)</td>
<td>0.97 (0.89–1.07)</td>
</tr>
<tr>
<td>&lt;60 years old at baseline</td>
<td>1879</td>
<td>0.84 (0.74–0.99)</td>
<td>0.97 (0.95–0.99)</td>
</tr>
<tr>
<td>≥60 years old at baseline</td>
<td>1258</td>
<td>0.82 (0.67–0.99)</td>
<td>0.96 (0.93–0.99)</td>
</tr>
<tr>
<td>Cardiorespiratory composite “yes”</td>
<td>2296</td>
<td>0.83 (0.72–0.95)</td>
<td>0.97 (0.94–0.99)</td>
</tr>
<tr>
<td>Cardiorespiratory composite “not yes”</td>
<td>841</td>
<td>0.83 (0.65–1.05)</td>
<td>0.96 (0.92–0.99)</td>
</tr>
</tbody>
</table>

*p < 0.05.

### Table 4. Adjusted hazard ratio (confidence interval) of arrhythmia by coffee type and total caffeine

| Model                    | No coffee (n = 2837) | Caffeinated only (n = 4409) | Decaffeinated only (n = 1545) | Caffeinated and decaffeinated (n = 3307) | Caffeine continuous
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total coffee uncontrolled</td>
<td>1.0 (referent)</td>
<td>0.70 (0.51–0.98)</td>
<td>0.90 (0.62–1.30)</td>
<td>0.83 (0.59–1.16)</td>
<td>0.96 (0.92–0.99)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p = 0.04</td>
<td>p = 0.6</td>
<td>p = 0.3</td>
<td>p = 0.02</td>
</tr>
<tr>
<td>Total coffee controlled</td>
<td>1.0 (referent)</td>
<td>0.68 (0.42–1.10)</td>
<td>0.87 (0.54–1.39)</td>
<td>0.80 (0.49–1.29)</td>
<td>0.95 (0.90–1.00)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>p = 0.1</td>
<td>p = 0.6</td>
<td>p = 0.4</td>
<td>p = 0.05</td>
</tr>
</tbody>
</table>

Model with 8 covariates, either without or with control for total coffee, among 11,679 study participants who supplied coffee type and caffeine data; 198 of these were hospitalized for arrhythmia.

Per decile of caffeine score.
these data is reinforced by consistency in most strata. Although the pathophysio-logic mechanisms of various rhythm disturbances are not identical, it seems noteworthy that we found similar coffee associations with various supraventricular rhythm diagnoses. It is also important that other common cardiovascular causes of hospitalization, especially CAD and heart failure, did not show similar inverse associations with coffee intake. The relative specificity of the inverse coffee–arrhythmia association may provide further support for the results.

Although of borderline statistical significance, the coffee type and caffeine score data suggest that caffeine is involved. In this population, heavier coffee drinkers drink mostly the caffeinated type. Caffeine from coffee comprised 80% of all caffeine in the subset with caffeine intake. Thus, caffeine intake may be a marker for total coffee consumption. Considerable detail about distributions and traits of persons in this population reporting caffeinated and decaffeinated coffee has been published.44 Tea drinking was unrelated to arrhythmia risk. On average, tea contains less caffeine than coffee,45–46 and tea drinkers in this population consume fewer cups per day than coffee drinkers do. Thus, the absence of a relation to tea does not rule out a role for caffeine.

A study of risk of hospitalization for atrial fibrillation in men 30 reported by Wilhelmsen et al9 showed, in 754 cases, a borderline increase in risk at 1–4 cups/day (odds ratio = 1.24 [CI, 1.00–1.54]) but no significantly increased risk at ≥5 cups/day (odds ratio = 1.09 [CI, 0.87–1.38]).11 Frost and Vestergaard11 presented data from 555 cases of atrial fibrillation/flutter in 160,000 men and women, studying caffeine intake, mostly from coffee, by quintile. The HR of quintile 5 versus quintile 1 was 0.91 (CI, 0.70–1.19). A report by Conen et al13 of 945 incident atrial fibrillation events in relation to caffeine intake in 33,638 women showed an HR of quintile 5 versus quintile 1 of 0.89 (CI, 0.72–1.09).

In view of overlapping CIs and differences in methodology, our results for atrial fibrillation are not incompatible with these reports.

**Potential Confounders**

Persons at increased risk of rhythm disturbances because of symptoms or a diagnosis of heart disease might have quit drinking coffee before giving baseline data. Such a “sick quitter” phenomenon could raise the risk of the non-coffee-drinking referent group and cause a spurious inverse coffee association. The similar inverse relation in CR “yes” and “not yes” strata substantially refutes this explanation. We made the CR composite a broadly inclusive one, with the result that it included a majority of all participants. Some of the CR “yes” participants probably had no CR illness, but the “not yes” stratum is likely to be composed of healthy participants with few sick quitters. The specificity of the relation for arrhythmia also reduces the likelihood of this explanation. The weakening of the inverse relation after ten years could be interpreted as support for the sick-quitter phenomenon. However, it might also be because of reduction of coffee intake by some participants as they aged, thus supporting a true inverse coffee association.

Cigarette smoking is correlated with coffee drinking and is an important potential confounder of studies of coffee and health endpoints.15–17 Smoking was not strongly related to arrhythmias in our data, and the inverse coffee–arrhythmia relation was strongest in never-smokers, points against the likelihood of confounding by smoking. Both nicotine and caffeine are metabolized by the hepatic cytochrome P4501A1 enzyme,18–20 Benowitz et al20 called acceleration of hepatic metabolism of caffeine by cigarette smoking “a well-established observation.” We speculate that more prolonged presence of caffeine in the blood of never-smokers might be a factor in their stronger inverse coffee–arrhythmia relation.

Persons with rhythm problems are often not hospitalized. For the years of follow-up monitoring, we had no data about rhythm disturbances not resulting in hospitalization. Thus, it is likely that our participants disproportionately include persons with arrhythmias causing hemodynamic compromise or other reasons for concern about the rhythm disturbance. It is possible that the relation of coffee drinking to more benign rhythm problems might be different from the results reported here. We have no data that cast light on this possibility.

We have no data about follow-up coffee use, but loss to follow-up monitoring is not systematically related to coffee habits in this population.35 Other limitations of this analysis include incomplete caffeine data; lack of validation of diagnoses by actual paper-chart review; and absence of data about circumstances leading to hospitalization, method of coffee preparation, size of cups, time of day coffee was imbibed, and dietary habits. Strengths include the large multiethnic study cohort, diversity of coffee habits, and presence of data about demographics and smoking.
**Possible Mechanisms**

Biologic mechanisms for a protective effect of coffee are speculative. Caffeine, the most prominent pharmacologically active ingredient in coffee, induces catechol release, but primarily in caffeine-naïve persons and not in regular ingesters. Probably the caffeine action of most hypothetical relevance is antagonism of adenosine by competitive binding to receptors. Pharmacologic doses of adenosine decrease atrioventricular nodal conduction, reduce atrial muscle contractility, decrease sinoatrial node activity, and cause coronary artery dilation. It is unclear how antagonism of these adenosine actions by caffeine might reduce risk of arrhythmias. Adenosine also shortens the refractory period of atrial tissue and can trigger atrial fibrillation and other supraventricular arrhythmias during pharmacologic coronary disease testing; these aspects may more plausibly support a protective effect of adenosine antagonism by caffeine.

Noncaffeine ingredients abound in coffee. Relevant to cardiovascular disease is a diterpene compound, cafestol, in coffee prepared without paper filtering. Cafestol raises low-density lipoprotein cholesterol levels, but if increase of this powerful CAD risk factor translated into more CAD in coffee drinkers, this would be more likely to increase, rather than decrease, arrhythmias. Coffee is a rich source of antioxidants, a possible source of health benefit, but not specifically for arrhythmias. We will not speculate further here.

**Conclusion**

In a large cohort, coffee drinking and caffeine intake are inversely related to risk of hospitalization for arrhythmias, especially atrial fibrillation and other supraventricular arrhythmias. These observational data do not establish causality, and thus a protective effect is not proven. It is highly unlikely that moderate caffeine intake increases arrhythmia risk.

**Disclosure Statement**

The research reported here was supported by the Robert Wood Johnson Foundation’s Program of Research Integrating Substance Use in Mainstream Healthcare (IPRISM) proposal #61512 to Arthur L. Klatsky, primary investigator) and by a grant from the Kaiser Foundation Research Institute. Data collection in 1978–1985 was supported by the Alcoholic Beverage Medical Research Foundation, Inc. (Baltimore, MD). All authors have participated actively in the execution of the study and/or in preparation of the manuscript for this report, and all reviewed the final version. The authors have no conflicts of interest to disclose.

**Acknowledgment**

Katharine O’Moore-Klopf, ELS, of KOK Edit provided editorial assistance.

**References**

Coffee, Caffeine, and Risk of Hospitalization for Arrhythmias


A Useful Medicine

Coffee, though a useful medicine, if drank constantly, will at length induce a decay of health, and hectic fever.

— The Moral Instructor, Pt IV, Sect II, Ch 10; Jesse Torrey, 1787-1834
Optimizing Treatment of Intra-amniotic Infection and Early-Onset Postpartum Endometritis: Advantages of Single-Agent Therapy

Norma Stiglich, MD
Meredith Alston, MD
Simone vanSwam, MD

Abstract

Introduction: Intra-amniotic infection (IAI) and early-onset postpartum endometritis (PPE) require prompt antibiotic treatment and are generally treated by either of two regimens. A complicated multi-agent regimen is most commonly used, despite a lack of clear evidence that it produces better outcomes than a simpler single-agent regimen.

Objective: We compared treatment outcomes between a multi-agent regimen of ampicillin, gentamicin, and clindamycin versus a single-agent regimen of ampicillin/sulbactam for IAI and early-onset PPE.

Methods: We conducted an observational retrospective cohort study by collecting data from the records of all patients at Denver Health Medical Center treated for IAI or PPE during two 6-month periods: a baseline period during which a regimen of ampicillin, gentamicin, and clindamycin was used and a subsequent period when ampicillin/sulbactam was used. Primary outcomes were prolonged antibiotic treatment and readmission for endometritis or wound cellulitis.

Results: Of potential study participants, 323 women met inclusion criteria; 179 were treated with the multi-agent regimen and 144 were treated with the single-agent regimen. The groups were statistically similar for demographic and intrapartum characteristics, except for a lower rate of premature rupture of membranes in the single-agent treatment group. Twelve patients required prolonged treatment, and 2 were readmitted; these subgroups were combined for statistical analyses. The primary outcomes were significantly associated with cesarean delivery and blood loss >500 mL for vaginal deliveries and >1000 mL for cesarean deliveries; however, there was no significant difference in the incidence of the primary outcomes between the 2 treatment groups when adjusted for these variables. Treatment with ampicillin/sulbactam resulted in fewer antibiotic doses administered to patients with an uncomplicated treatment course.

Conclusion: Ampicillin/sulbactam treatment of IAI and early-onset PPE reduces the number of antibiotic doses administered and results in patient outcomes similar to those for the standard multi-agent therapy of ampicillin, gentamicin, and clindamycin.

Introduction

Intra-amniotic infection (IAI) and early-onset postpartum endometritis (PPE) are common infections during the peripartum period. Clinically diagnosed infection is estimated to occur in 1% to 2% of full-term deliveries and in up to 10% of preterm deliveries; the rates are increased by premature rupture of membranes and cesarean delivery. These polymicrobial infections require broad coverage for gram-positive, gram-negative, and anaerobic bacteria; added anaerobic coverage is beneficial when delivery is cesarean. The most commonly recommended antibiotic treatment regimen employs a combination of ampicillin, gentamicin, and clindamycin for patients not allergic to penicillin; the antibiotics used and the length of treatment vary with the route of delivery. Although the need for prompt antibiotic therapy is well proven, there is no clear evidence indicating that this complicated regimen is superior to others.

Denver Health Medical Center (DHMC) is the safety-net hospital for the city and county of Denver, CO. The staff physicians are exclusively employed by DHMC, and all physicians have academic appointments at the University of Colorado School of Medicine. Like many other institutions, DHMC had long used the multi-agent antibiotic regimen summarized in Figure 1. Although effective, these treatment regimens are confusing and difficult to manage. DHMC has been engaged in lean management strategies since 2005 to eliminate waste from operational and health care processes while maintaining quality and safety. These cumbersome treatment algorithms were seen as an opportunity to apply the lean approach to a patient-care process.
Several studies have been published that evaluate single-agent antibiotic regimens for the treatment of IAI and PPE. In August 2009, DHMC adopted the treatment regimen summarized in Figure 2 for IAI and early-onset PPE for all patients not allergic to penicillin, regardless of delivery method (vaginal vs cesarean) and regardless of time of onset of IAI or PPE. Treatment involves intravenous administration of ampicillin/sulbactam until the patient has been afebrile for 24 hours. Additionally, antibiotic therapy is expanded only if the patient remains febrile beyond 48 hours of antibiotic therapy. To ensure that treatment efficacy was not compromised, we compared maternal outcomes from the 6-month period after the protocol change with those of a 6-month baseline period.

**Methods**

After obtaining approval from the Colorado Multiple Institutional Review Board, we performed a retrospective review. Using pharmacy records of medication dispensation, we identified all patients who were treated with either gentamicin or ampicillin/sulbactam while admitted to the labor and delivery unit or the postpartum unit at DHMC during two 6-month periods: 1) October 1, 2008, through March 31, 2009, and 2) August 1, 2009, through January 31, 2010. During period 1, the standard, multi-antibiotic regimen of ampicillin, gentamicin, and clindamycin was used to treat patients without penicillin allergies who had IAI and PPE while at DHMC; during period 2, a single-agent regimen of ampicillin/sulbactam was used. The dose amounts and intervals are provided in Figures 1 and 2.

The inpatient records at DHMC are collected from a combination of electronic systems and paper forms that are then transferred into an electronic data repository. The record in the data repository is the patient's...
permanent medical record. Patients who had cesarean deliveries during both periods routinely received a single dose of cefotetan within one hour of the surgery start for prophylaxis. A total of 367 records were reviewed; 33 were excluded from analysis because of lack of a diagnosis of IAI or PPE, because of an unknown diagnosis, or because of penicillin allergy, and 11 records were excluded from analysis because the patients were not treated according to either of the regimens.

IAI was diagnosed using the clinical criteria of a temperature of ≥38.0°C plus sustained maternal or fetal tachycardia (maternal rate of >100 beats/min; fetal rate of >160 beats/min), uterine tenderness, maternal leukocytosis (white blood cell count of >15,000 per microliter), or foul-smelling amniotic fluid. PPE was diagnosed by the same clinical criteria, with the addition of foul-smelling lochia and the exclusion of fetal tachycardia and foul-smelling amniotic fluid, occurring within 48 hours of delivery.

The primary outcome variables were an extended course of antibiotic treatment, as defined in the treatment algorithms, or readmission for endometritis or wound cellulitis. The χ² test, Fisher’s exact test, and Student’s t-test were used to compare proportional data, and multiple logistic regression was used to identify potential confounding effects of the intrapartum explanatory variables. The statistical software Minitab (version 16.1.1; State College, PA, USA) was used for the analysis.

Results
DURING THE 2008–2009 PERIOD, THERE WERE 1817 DELIVERIES; DURING THE 2009–2010 PERIOD, THERE WERE 1867. THE PROPORTIONS OF CESAREAN DELIVERIES DURING THE 2 PERIODS, 19.5% AND 19.7%, RESPECTIVELY, WERE STATISTICALLY EQUIVALENT (χ²; P = 0.89). OF THE 323 PATIENTS INCLUDED IN THE ANALYSIS, 179 WERE TREATED BY THE STANDARD MULTI-AGENT REGIMEN OF AMPICillin, GENTAMICin, AND CLINDAMycin, AND 144 WERE TREATED BY THE ALTERNATE SINGLE-AGENT REGIMEN OF AMPICillin/sULBACTAm. COMPLIANCE WITH THE MULTI-AGENT REGIMEN WAS 98.3%; COMPLIANCE WITH THE SINGLE-AGENT REGIMEN WAS 97.3%. TABLE 1 SHOWS THAT THERE WERE NO SIGNIFICANT DIFFERENCES BETWEEN THE TWO GROUPS OF PATIENTS WITH RESPECT TO MATERNAL AGE, HISPANIC ETHNICITY, ROUTE OF DELIVERY, PRETERM DELIVERY, BLOOD LOSS, INDUCTION OF LABOR, PENICILLIN PROPHYLAXIS FOR GROUP B Streptococcus, OR DIABETES; HOWEVER, THERE WERE SIGNIFICANTLY FEWER PATIENTS TREATED WITH THE ALTERNATE REGIMEN WHO HAD RUPTURE OF MEMBRANES BEFORE LABOR ONSET (χ²; P = 0.01).

BECAUSE THERE WERE ONLY 14 CASES OF PROLONGED TREATMENT OR READMISSION, THESE OUTCOMES WERE COMBINED FOR ALL ANALYSES. TABLE 2 SHOWS THE RESULTS OF A BINARY LOGISTIC REGRESSION OF THE PRIMARY OUTCOME OF PROLONGED TREATMENT OR READMISSION FOR ENDOMETRITIS OR WOUND Cellulitis AND THE INDEPENDENT VARIABLES OF DELIVERY ROUTE, PRETERM DELIVERY, INDUCTION OF LABOR, PREMATURE RUPTURE OF MEMBRANES, AND EBL >500 mL FOR VAGINAL DELIVERIES AND >1000 mL FOR CESAREAN DELIVERIES. PROPHYLAXIS FOR GROUP B Streptococcus AND DIABETES WERE EXCLUDED BECAUSE NONE OF THE PATIENTS WITH THESE FACTORS HAD PROLONGED TREATMENT OR READMISSION. PROLONGED TREATMENT AND READMISSION WERE ASSOCIATED WITH CESAREAN DELIVERY (ODDS RATIO, 12.7; 95% CONFIDENCE INTERVAL, 3.3–49.0). EBL >500/1000 mL APPROACHED STATISTICAL SIGNIFICANCE (P = 0.06); HOWEVER, CESAREAN DELIVERY WAS NOT ASSOCIATED WITH AN EBL >500/1000 mL WHEN COMPARED WITH PATIENTS WHO HAD VAGINAL DELIVERIES (χ²; P = 0.33).

Table 1. Comparison of group characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Cases included for analysis (n = 323)</th>
<th>Multi-agent regimen (%)</th>
<th>Single-agent regimen (%)</th>
<th>p value (χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases included for analysis</td>
<td></td>
<td>178</td>
<td>145</td>
<td></td>
</tr>
<tr>
<td>Mean age of patients (years)</td>
<td></td>
<td>24.0</td>
<td>24.7</td>
<td>0.35*</td>
</tr>
<tr>
<td>Hispanic ethnicity</td>
<td></td>
<td>143 (80.3)</td>
<td>112 (77.2)</td>
<td>0.5</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td></td>
<td>53 (30.0)</td>
<td>36 (24.8)</td>
<td>0.4</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td></td>
<td>18 (10.1)</td>
<td>11 (7.6)</td>
<td>0.45</td>
</tr>
<tr>
<td>Induction of labor</td>
<td></td>
<td>47 (26.4)</td>
<td>36 (24.8)</td>
<td>0.7</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td></td>
<td>36 (20.2)</td>
<td>12 (8.3)</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Diabetes (preexisting or gestational)</td>
<td></td>
<td>10 (5.6)</td>
<td>9 (6.2)</td>
<td>0.8</td>
</tr>
<tr>
<td>Estimated blood loss &gt;500 mL (vaginal delivery) or &gt;1000 mL (cesarean delivery)</td>
<td></td>
<td>30 (16.9)</td>
<td>28 (19.3)</td>
<td>0.53</td>
</tr>
<tr>
<td>Received penicillin for group B Streptococcus prophylaxis</td>
<td></td>
<td>19 (10.7)</td>
<td>16 (11.0)</td>
<td>0.89</td>
</tr>
</tbody>
</table>

*Student’s t-test.
Optimizing Treatment of Intra-amniotic Infection and Early-Onset Postpartum Endometritis: Advantages of Single-Agent Therapy

Table 2. Binary logistic regression of independent variables associated with prolonged treatment or readmission

<table>
<thead>
<tr>
<th>All cases of intra-amniotic infection and postpartum endometritis (n = 323)</th>
<th>Prolonged treatment or readmission</th>
<th>p value</th>
<th>Odds ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Absent* (n = 309; 94.7%)</td>
<td>Present (n = 14; 5.3%)</td>
<td></td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>78 (25.2)</td>
<td>11 (78.6)</td>
<td>&lt;0.00</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>28 (9.1)</td>
<td>1 (7.1)</td>
<td>0.76</td>
</tr>
<tr>
<td>Induction of labor</td>
<td>78 (25.2)</td>
<td>5 (35.7)</td>
<td>0.53</td>
</tr>
<tr>
<td>Premature rupture of membranes</td>
<td>45 (14.6)</td>
<td>3 (21.4)</td>
<td>0.85</td>
</tr>
<tr>
<td>Estimated blood loss &gt;500 mL (vaginal delivery) or &gt;1000 mL (cesarean delivery)</td>
<td>53 (17.2)</td>
<td>5 (35.7)</td>
<td>0.06</td>
</tr>
</tbody>
</table>

*Reference category.

Table 3. Binary logistic regression of rates for prolonged treatment or readmission by antibiotic regimen

<table>
<thead>
<tr>
<th>Group of patients</th>
<th>Multi-agent regimen* (%)</th>
<th>Single-agent regimen (%)</th>
<th>p value</th>
<th>Adjusted odds ratio (95% confidence interval)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients with IAI and PPE (n = 323)</td>
<td>8/178 (4.5)</td>
<td>6/145 (4.1)</td>
<td>0.86</td>
<td>0.9 (0.3–3.0)</td>
</tr>
<tr>
<td>Patients with IAI only (n = 223)</td>
<td>6/120 (5.0)</td>
<td>3/103 (2.9)</td>
<td>0.22</td>
<td>0.33 (0.1–1.9)</td>
</tr>
<tr>
<td>All patients with IAI and PPE (n = 89)</td>
<td>6/53 (11.3)</td>
<td>5/36 (13.9)</td>
<td>0.64</td>
<td>0.67 (0.1–3.6)</td>
</tr>
</tbody>
</table>

*Reference category.
*Adjusted for cesarean delivery, prematurity, induction, PROM, and EBL >500 mL (vaginal) or >1000 mL (cesarean delivery).
*Adjusted for cesarean delivery, diagnosis-to-delivery interval, and EBL >500 mL (vaginal delivery) or >1000 mL (cesarean delivery).
EBL = estimated blood loss; IAI = intra-amniotic infection; PPE = postpartum endometritis; PROM = premature rupture of membranes.

Discussion

The prevalence of IAI is as high as 10.5% among laboring women; during the 12-month period of analysis of cases for this study, approximately 9% of the patients who gave birth at DHMC were treated for clinical IAI or endometritis within 48 hours of delivery. The antibiotic combination of ampicillin and gentamicin in laboring patients and after birth in those who have vaginal delivery, with substitution of clindamycin for ampicillin after birth for patients who have cesarean deliveries, is consistently recommended as the treatment of choice, largely on the basis of clinical consensus and extensive study over many years. However, extended-spectrum cephalosporins and penicillins and, more recently, carbapenems have also been shown to be effective single-agent treatments. Studies comparing the effectiveness of the single-agent regimens to the standard, multidrug regimen of ampicillin-gentamicin-clindamycin did not show superiority of the single-agent treatments as these medications became available from 1980 to 2000. Because the cost of these newer medications was greater during that period, owing to patent protection, there was no compelling reason to consider routine use of these regimens over the standard treatment. A review published in 2009 in the Cochrane Library concluded that no recommendations could be made with respect to the...
most appropriate antibiotic regimen for the treatment of IAI and PPE. Cost was not considered in that analysis.

The obstetrical clinicians at DHMC considered length of treatment, the number of doses of medication administered, and complexity of the treatment algorithm to be important considerations with respect to IAI and early-onset PPE. Inpatient medication-administration error rates are reported to be between 2.4 and 11.1 per 100 doses, with up to 7.5% judged as serious. Minimizing the number of doses per treatment regimen decreases medication-error exposure in addition to saving the direct costs of the drugs and saving pharmacy and nursing time. Ampicillin/sulbactam, originally released under the brand name Unasyn, has been a low-cost alternative since the loss of patent protection in 1999. During the two 6-month periods analyzed, more than 96% of the patients who were treated for IAI and early-onset PPE had uncomplicated treatment courses. Although patients with IAI who had vaginal deliveries were treated for 24 hours after delivery under both regimens, the single-agent treatment group received 3 fewer antibiotic doses than the multi-agent group did. For patients who had cesarean deliveries, the length of treatment after delivery was shortened by 24 hours using the single-agent regimen; 8 post-delivery antibiotic doses were eliminated from the treatment course in each uncomplicated episode.

Our observational retrospective cohort study has several limitations. The diagnoses of IAI and PPE are made by observation of clinical signs and symptoms that are nonspecific, which can result in variation in interpretation from one clinician to the next. Additionally, these two cohorts had their conditions diagnosed and were treated during different periods, so there could be a greater likelihood of inconsistency in making the diagnosis. The Department of Obstetrics physicians, who are all exclusive employees of DHMC, collectively research and create diagnostic and treatment guidelines for common conditions; deviation from the guidelines is unusual. During these two periods, the diagnostic criteria for IAI and PPE did not change, and there was no significant difference in the rate at which the diagnoses were made.

The purpose of our study was to determine whether there was any loss of treatment efficacy by switching to an alternate antibiotic regimen. With a sample size of 145 and a baseline rate of prolonged treatment or readmission of 4.5% for multi-agent treatment, our study had a power of 0.77 to detect a doubling of the rate to 9% at the level of $\alpha = 0.05$. We did not demonstrate a statistically significant difference in the incidence of the primary outcome of prolonged treatment or readmission; however, the sample size limits the reliability of our study to detect a change in the rate to <9%. Neonatal outcomes were not reviewed.

**Conclusion**

The results of our study support the use of a single-agent antibiotic, specifically ampicillin/sulbactam, for the treatment of patients without penicillin allergy who have IAI and early-onset PPE. The single-agent treatment algorithm is less complex and results in fewer antibiotic doses administered without a loss of treatment efficacy when compared with the traditional multi-agent regimen.

**Disclosure Statement**

The author(s) have no conflicts of interest to disclose.

**Acknowledgment**

Katharine O’Moore-Klopf, ELS, of KOK Edit provided editorial assistance.

**References**

A surgeon contemplates the only part of the operation the patient will ever see.

Dr. Paluch is a Staff Surgeon at the San Diego Medical Center where he has practiced for 21 years, specializing in minimally invasive surgery. He has been taking and making pictures for over 25 years. Originally focused on underwater photography, his latest passion is sports photography and action portraiture. Occasionally his camera accompanies him to the operating room. This photograph was taken with available light using a Nikon D700 using a 17-55 f2.8 lens.
**Virtual Visitation in the Neonatal Intensive Care: Experience with the Use of Internet and Telemedicine in a Tertiary Neonatal Unit**

**Abstract**

**Introduction:** Globally about 8% to 10% of newborns require neonatal intensive care (NICU) care. Families face emotional and financial difficulties when their sick newborns are hospitalized for prolonged periods in a NICU.

**Methods:** We conducted a study to assess the feasibility and acceptance of an Internet-based telemedicine program in an intensive care setting and to evaluate its impact on newborns’ length of stay (LOS) in hospitals. We identified eligible newborns and obtained their parents’ written consent before installing a Web camera by the babies’ beds. Using child-specific, confidential passwords, families viewed real-time video images of their newborns through a secure portal via an Internet browser or 3G (third-generation) cell phone. Parents of study subjects completed a survey that detailed the performance of the system. Frequency of parental visits and LOS of babies were tracked and compared with the same data for similar high-risk newborns matched for gestation and birth weight.

**Results:** Parents responded favorably to the stability of the system and clarity of the image. Eighty percent requested a larger image frame. Frequencies of hospital visits made by parents of newborns in the study group and of those made by parents in the control group were not statistically different. LOS and postmenstrual age on discharge of study infants were not statistically different compared with infants in the control group.

**Conclusion:** Virtual visitation is well accepted by families with sick newborns requiring prolonged hospitalization. Inclusion of information technology to optimize NICU visitation resulted in no significant decrease in duration of hospitalization; however, its role in improving post-discharge transition care must be evaluated further.

**Introduction**

Telemedicine has been used to facilitate patient care delivery, to improve accessibility of health care services, and to optimize compliance with treatment plans, reducing the need for hospital visits, thereby reducing cost of health care.\(^1\)\(^2\)\(^3\) It is estimated that globally about 8% to 10% of babies delivered in the hospital require care in a neonatal intensive care unit (NICU).\(^4\) Fifty percent of these high-risk babies spend a significant portion of their stay in the NICU and subsequently continue to require a prolonged hospital stay. Families face financial and emotional difficulties when a newborn is not medically stable and has to stay in a NICU for a prolonged period of time. As part of infection-control measures in NICUs, only parents are granted visitation rights. Given the threats to these infants from infectious diseases, parents’ visits to the NICU may be further restricted, thus compounding their

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**Figure 1. Picture of cot-side Web camera and Web image on cell phone.**
(Permission for publication granted by parents.)
Virtual Visitation in the Neonatal Intensive Care: Experience with the Use of Internet and Telemedicine in a Tertiary Neonatal Unit

anxiety. With globalization and the demands of jobs, parents may not be together to support each other throughout the baby’s NICU stay. This is especially difficult for first-time parents when faced with the need to make critical decisions about the care of their sick newborns. Very often, when such babies are medically stable and able to go home, parents frequently have little confidence in their own ability to look after their babies, thus prolonging their stay in the hospital further.

We hypothesized that parents are receptive to the use of the Internet and telemedicine technology in an acute NICU setting and that its availability may lower health care costs through reduction in avoidable readmissions after discharge from primary hospitalization. In this article, we describe our study design and our high-tech approach to providing individualized support to the families of very-low-birth-weight infants.

Methods
To facilitate Internet access, we installed three broadband points and three cameras in the NICU at our institution. The connections were linked to a centralized computer located at the central nursing station. Installation of the cameras and technical connections were sponsored by our local telecommunications company, SingTel. The institution initiated the broadband subscription and maintained the service contract throughout the study period.

Very-low-birth-weight infants with an expected length of stay (LOS) of more than three weeks in the NICU were eligible for study enrollment. Parents of eligible infants were informed of the availability of Web camera service before the mother’s discharge from the maternity ward. Parents with knowledge of Internet use and access to Internet service who agreed to abide by the access guidelines were enrolled in our study. Enrolled families were required to stop using their user identification number and password when their babies were discharged to step-down care or when their newborns were discharged from the hospital, whichever happened first. We obtained written consent from the parents before installing a Web camera by their babies’ beds. Each enrolled family was issued a child-specific, confidential password that enabled them to view real-time video images of their newborns through a secure portal via an Internet browser or 3G (third-generation) cell phone (Figures 1 and 2). A security number for each newborn, which included a user identification number and a password, was released on confirmation of agreement in writing. The same security number remained in place for the newborn for the entire NICU stay.

At every shift, the nurse in charge would check that the assigned camera focused on and was filming the correct baby. The system had a visual indicator to alert the staff when the camera was in action. Characteristics of enrolled babies, severity of their illness, and the mothers’ ages and ethnicities were collected and compared with randomly selected high-risk newborns treated in the NICU in the preceding year. LOS, postmenstrual age at discharge, and readmission within 15 days after discharge were tracked for both cohorts of infants. Parental perceptions of the sys-
system’s stability and feasibility were evaluated through a set of survey questions (Table 1). The cost of implementing this Internet service was computed.

Statistical Analysis
Statistical analysis was performed using SPSS Statistics (version 18.0; SPSS Inc., Chicago, IL, USA). The data are shown here as means ± standard deviation. Analysis of the study versus control cohorts was performed using the Fisher exact test and the independent sample t-test where appropriate. A p value of <0.05 was considered significant.

Results
A total of 46 study participants were recruited for the Internet viewing service between 2005 and 2007. Forty-six infants were identified from the patient database maintained by the NICU to serve as a study control group. Data were controlled for gestation and birth weight. Study participants and control-group members were not significantly different regarding birth weight, duration of gestation, or severity of illness as measured on the Clinical Risk Index for Babies (CRIB) II score.5 Infants in both groups were born to mothers with a mean age of 32.5 years. Infants in both groups were equally distributed among ethnicities (Table 2).

The mean LOS of study participants was 68.3 ± 25.5 days, compared with 74.3 ± 29.0 days in control-group members. Study participants were discharged at a mean postmenstrual age of 38.1 ± 2.3 weeks compared with 38.4 ± 2.6 weeks for control-group members. These trends did not amount to a statistical significant difference between both groups. One control-group infant was re-admitted within 15 days of primary hospital discharge, in contrast with no infants from the study group.

Parents of study participants reported confidence in the Internet viewing service. Ninety-seven percent of families expressed confidence in the safety and security of online video access, and 100% of the parents with Internet access found it useful for them and their family members. All parents of the study cohort expressed interest in recommending the service to potential users (Table 3).

The service required 3 broadband accounts; the cost for maintaining the 3 accounts and the wireless modem was 7500 SGD (Singapore dollars) per year. For the 3-year study period, our institution incurred a total cost of 22,500 SGD to maintain the service.

Discussion
Our study confirmed the feasibility of integrating communication technologies, using the Internet, in the NICU environment. The technology was readily accepted

Table 1. Survey of parental perceptions of Internet viewing service

<table>
<thead>
<tr>
<th>Section A: Personal information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of mother:</strong></td>
</tr>
<tr>
<td>□ &lt;24 years</td>
</tr>
<tr>
<td><strong>Usage pattern—I usually access the video during the following timing:</strong></td>
</tr>
<tr>
<td>□ 1100–1230 hours</td>
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<table>
<thead>
<tr>
<th>Section B: User experience survey</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Statement</strong></td>
</tr>
<tr>
<td>1. I was educated on how to access the video online.</td>
</tr>
<tr>
<td>2. I experienced no technical difficulty in accessing my baby’s video.</td>
</tr>
<tr>
<td>3. It is safe to access my baby’s video online, and there would be no breach of information technology security.</td>
</tr>
<tr>
<td>4. I am confident that my baby will not be wrongly filmed by accident and aired to another user.</td>
</tr>
<tr>
<td>5. The quality of the video is sharp and clear.</td>
</tr>
<tr>
<td>6. The color and contrast of the video is satisfactory.</td>
</tr>
<tr>
<td>7. Overall, I am satisfied with the quality of the video.</td>
</tr>
<tr>
<td>8. None of the access times (1100–1230 hours, 1730–1900 hours, 2300–0030 hours) is convenient for me.</td>
</tr>
<tr>
<td>9. This service is useful for me and my family.</td>
</tr>
<tr>
<td>10. I am likely to recommend this service to another potential user.</td>
</tr>
<tr>
<td>11. How much are you prepared to pay per day for this service?</td>
</tr>
<tr>
<td>12. Any other feedback/area for improvement?</td>
</tr>
</tbody>
</table>
and enthusiastically embraced by parents. Parents used the system to watch their newborn several times each day. With this viewing service, families remained connected with their child and receive second-by-second updates on their child throughout the access period.

The immense interest among parents of our NICU babies in using the service to gather information on their child’s care in the NICU parallels the experience reported from several other studies. The study by Bass et al of patients with Alzheimer disease found that computer support networks were heavily used by patients’ family caregivers and significantly reduced stress among caregivers. The study by Gray et al of the use of Internet and telecommunication to improve care of high-risk infants demonstrated a high Internet-use rate, with the majority initiating viewing sessions from home. Other studies have also identified valuable success with the use of telemedicine technologies in the care of pediatric patients. Karp et al, in their study of a population of children with special health care needs, found the telemedicine system to be well received and well used in providing distance consultation within the US state of Georgia. Miyasaka et al, in their study on use of telemedicine to provide home monitoring and care after a stay in an intensive care unit, documented a reduced need for physician home visits, unscheduled hospital visits, and days of hospitalization.

Despite reported successes, several issues have been raised as hindrance to routine implementation of the system, including the ability of providers to recoup costs associated with providing Internet access, telemedicine consultations, and medicolegal concerns. Similarly, costs of maintaining Internet access restricted our ability to extend the service to all families with newborns at high risk requiring NICU care.

We selected only families with Internet access and with knowledge of how to use the Internet for our study, but it has been shown that families without traditional access to health care derive more benefits from computer-assisted support than do Internet-savvy families. Our study was limited by the small size of our study group. Although LOS was shorter among study participants than among control-group infants, the difference was not statistically significant. Infants in our study cohort were discharged earlier than control-group infants; however, this difference also was not statistically significant. Our small study population possibly limits the power of our analyses to detect differences.

Extending Internet service in the postdischarge period may potentially improve the efficiency of care coordination for these infants, but further work is required to confirm and demonstrate its impact.

**Conclusion**

With advances in neonatal practices, NICU care and support for extremely preterm babies has increased, this translates into an increased emotional toll on families. Our study findings confirm that parents respond favorably to the availability of telemedicine in a NICU and that well-designed virtual access may assist in addressing the emotional and educational needs of families, thereby improving family comfort and providing emotional reassurance to parents of neonates at high risk.

### Table 2. Characteristics of study and control-group populations

<table>
<thead>
<tr>
<th></th>
<th>Study population (n = 46)</th>
<th>Control population (n = 46)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth weight (g)</td>
<td>1039.3 ± 299.7</td>
<td>1011.3 ± 276.9</td>
<td>NS</td>
</tr>
<tr>
<td>Gestation (weeks)</td>
<td>28.1 ± 2.4</td>
<td>28.0 ± 2.4</td>
<td>NS</td>
</tr>
<tr>
<td>CRIB II score</td>
<td>8.2 ± 3.6</td>
<td>8.6 ± 3.3</td>
<td>NS</td>
</tr>
<tr>
<td>Maternal age (years)</td>
<td>32.5 ± 4.9</td>
<td>32.5 ± 4.5</td>
<td>NS</td>
</tr>
<tr>
<td>Maternal ethnicity</td>
<td>Chinese : Malay : Indian : others</td>
<td>31 : 6 : 0 : 9</td>
<td>NS</td>
</tr>
</tbody>
</table>

Values other than maternal ethnicity are means ± standard deviation. CRIB = Clinical Risk Index for Babies; NS = not significant.

### Table 3. Distribution of parents’ responses to survey questions

<table>
<thead>
<tr>
<th>Survey statement</th>
<th>Agree (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I was educated on how to access the video online.</td>
<td>89.5</td>
</tr>
<tr>
<td>I experienced no technical difficulty accessing my baby’s video.</td>
<td>81.6</td>
</tr>
<tr>
<td>It is safe to access my baby’s video online, and there would be no breach of information technology security.</td>
<td>94.7</td>
</tr>
<tr>
<td>I am confident that my baby will not be wrongly filmed by accident and aired to another user.</td>
<td>92.1</td>
</tr>
<tr>
<td>The quality of the video is sharp and clear.</td>
<td>73.7</td>
</tr>
<tr>
<td>The color and contrast of the video is satisfactory.</td>
<td>89.5</td>
</tr>
<tr>
<td>Overall, I am satisfied with the quality of the video.</td>
<td>89.5</td>
</tr>
<tr>
<td>None of the access times (1100–1230 hours, 1730–1900 hours, 2300–0030 hours) is convenient for me.</td>
<td>26.3</td>
</tr>
<tr>
<td>This service is useful for me and my family.</td>
<td>100</td>
</tr>
<tr>
<td>I am likely to recommend this service to another potential user.</td>
<td>100</td>
</tr>
</tbody>
</table>
Virtual Visitation in the Neonatal Intensive Care: Experience with the Use of Internet and Telemedicine in a Tertiary Neonatal Unit

Disclosure Statement
This study was partially funded by SingTel, Singapore. The author(s) have no conflicts of interest to disclose.

Acknowledgments
We thank the staff from the Department of Information Technology, Singapore Health Services, for their guidance during the course of our study as well as the NICU nurses and physicians for their support.

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References

Miracles
There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.
— Albert Einstein, 1879-1955, physicist, 1921 Nobel Laureate in Physics
Implementation Study

Building a System of Care:
Integration across the Heart Failure Care Continuum

Jackie Cawley, DO
Cassandra Cote Grantham, MA

Abstract
Context: MaineHealth provides chronic disease programs using The Planned Care Model as its framework. Over time, programs have evolved from working in silos to integrating across care arenas and organizations, resulting in a coordinated, reliable, and standardized system of care. Nowhere is this more apparent than in the system’s heart failure (HF) programs. For years, disparate HF services existed across MaineHealth. The system lacked a comprehensive, integrated approach to support patients and families transitioning across multiple care environments.

Objective: Develop and implement a systemwide set of interventions to facilitate communication between clinicians in different care environments, consistent approaches to patient and clinician education, and improvement of clinical performance.

Design: An interdisciplinary Joint Heart Failure Workgroup was convened. Relationships were developed between “champions” from diverse care settings and professions. Champions assisted MaineHealth in leading the workgroup, creating a comprehensive set of strategies that better linked HF activities and care settings across the health system.

Main Outcome Measures: Readmission rates, core measures, use of home telemonitoring, patient confidence in self-management.

Results: The impact of collaboration and integration has been substantial, resulting in better communication, coordination, reliability, and standardization of HF care.

Conclusion: Through the use of a comprehensive set of improvement strategies, MaineHealth has been successful in overcoming many cultural and structural barriers to increase communication and integration across programs and care settings, and leveraging resources to improve outcomes in patients with HF.

Introduction
Heart failure (HF) is a chronic, progressive disease characterized by frequent hospital admissions, high mortality rates, and high consumption of medical resources that have made it one of the leading causes of health care expenditures in the US. According to the American Heart Association, HF currently affects well over 5 million people in the US and there are 670,000 new cases diagnosed each year. In 2002, MaineHealth, an integrated health care system that serves 11 of Maine’s 16 counties and 75% of the state’s population of 1.3 million, began recognizing HF as a high-volume diagnostic-related group with a myriad of needs from different clinicians across the health care system.

MaineHealth is a nonprofit family of leading high-quality providers and other health care organizations working together to make their communities the healthiest in America. Ranked among the nation’s top 100 integrated delivery networks by Modern Health Care in 2010, MaineHealth includes 11 community hospitals, physician practices, long-term care facilities, home care agencies, and support services in Maine’s southern, central, midcoast, and western regions. With a median age of 41.2 years, Maine is the “oldest” state in the nation with almost 58% of Maine’s elders residing in rural areas, more than twice the national average.

In addition, Maine ranks second nationwide for percentage of residents age 65+ living in rural areas; has the fourth highest chronic disease rate in the US; the fourth highest percentage of deaths caused by cardiovascular disease, cancer, chronic lung disease, and diabetes, and 75% of Mainers die from one of these diseases.

The system began addressing issues related to an aging population with a high incidence of chronic illness, including HF, by launching
a variety of programs, many of which were supported by the MaineHealth Clinical Integration Department. These efforts were evidence based, but often locally focused in specific communities or care settings. Many of the resulting HF programs had their own set of clinician education materials and tools, there was no standard approach to care in the inpatient setting, and a lack of consistency on who received home telemonitoring services and for how long. No consistent method was used to identify which patients were engaged in specific interventions, nor was there a process to identify which interventions might be best for an individual patient. Additionally, there was lack of integration across multiple electronic medical record systems used in the inpatient, outpatient, home health, and home telehealth settings, affecting the flow of critical health information across clinicians and care settings. These cultural boundaries and a lack of coordinated communication among care settings, educational initiatives, and coaching models contributed to a fractured, inefficient, and confusing system for HF clinicians and their patients, who were often transitioning to and from multiple care environments.

As health care delivery has moved into an era of heightened accountability, the need for a higher level of integration, coordination, and standardization of quality care has become increasingly apparent. Recognizing that a more comprehensive, system-level view and collaborative environment were needed to address challenges and foster change, MaineHealth moved from working within silos to integrating across care arenas and organizations to facilitate a more efficient, coordinated, and reliable system of care. The Planned Care Model was used as the framework for these efforts.

Although MaineHealth’s conception and implementation of this quality-improvement effort for its HF programs is unique to its health care system, other national and international health systems, hospitals, and programs have used similar processes to bring about improvements in HF care. In 1997, Good Samaritan Community Healthcare in Puyallup, WA formed a Congestive Heart Failure Steering Committee, whose goal was to design, implement, maintain, and monitor a superior communitywide system of care for patients with HF through standardized patient and clinician education, proactive interventions, and medication management. Similar to the MaineHealth Joint Workgroup model, this committee was interdisciplinary, representing clinicians from across settings, including home health, cardiac rehabilitation, inpatient units, outpatient family practice clinicians, and cardiologists. By focusing on standardizing educational systems for clinicians and patients and by working across care settings to facilitate increased communication, Good Samaritan discovered that “An interdisciplinary approach is optimal for heart failure care” and that care improvement “requires a clear vision, collaboration and continuing program development to be successful.”

In exploring the barriers and facilitators to the implementation of a collaborative model, researchers in New South Wales, Australia documented the importance of clinical leadership, champions, communications, and team cohesion in overcoming the latent political, social, and cultural agendas of the different clinicians represented across the HF continuum of care. These identified components are key aspects of the MaineHealth improvement efforts. Likewise, in North Carolina the Onslow County Hospital Authority used HF disease management as the basis for a new approach to performance improvement by creating the opportunity for dialogue among clinical leaders and staff, by developing a shared knowledge base of the population and current practice, by establishing performance measures to assess outcomes, and by seeking participation of stakeholders from across the system of care. Although slightly different from MaineHealth’s framework for HF care improvement, the underlying principles are much the same: integrate and standardize health care services for a patient population across the continuum through collaboration with the entire range of clinicians in the community.

Methods

In 2008, the MaineHealth Clinical Integration HF and associated cardiac programs underwent a change in clinical leadership and program management. In assessing the effectiveness of the systems’ historic outcomes related to HF and the resources used to achieve these outcomes, it became apparent that there was lack of awareness of what others were doing in the system, a lack of coordination of activities, and limited opportunities for collaboration around HF care.

To effectively overcome these barriers, a paradigm shift in how traditional workgroups and programs related to and worked with one another was imperative. MaineHealth needed to develop a comprehensive and collaborative strategy to increase communication across programs and initiatives and to leverage existing resources across
Strategies for Interventions

The first step was to create awareness of the many HF-related initiatives across the system and showcase the lack of communication, coordination, and collaboration among those activities. To improve communication and awareness, relationships were developed between key HF “champions” from diverse care settings and different health care professions. Those champions then assisted MaineHealth in leading an interdisciplinary workgroup, which was instrumental in forming a more comprehensive set of strategies and specific interventions that better linked activities and care settings (Table 1). These included:

• Formal adoption of the Planned Care Model to define strategies and implement interventions in HF care2 (Figure 1).
• Formation of a new Joint Heart Failure Workgroup, comprised of primary care physicians and cardiologists, inpatient nurses, home health staff, cardiac rehabilitation and palliative care specialists, quality managers, transitions coaches and care managers. This group brought together perspectives and initiatives in a new collaborative environment and encouraged behavioral change in collaborating across care settings and professionals to develop a shared vision, goals, and objectives.
• Comprehensive approach to patient and clinician HF education and materials that better linked caregivers across care settings and created a common set of resources; education materials and tools for clinicians and patients; access to resources despite care setting or community; consistent, evidence-based decision support tools; and increased access to services/interventions in more rural communities.
• Better integration vertically (hospital to outpatient setting), horizontally (resources and programs available across all MaineHealth communities), and across professions using common patient and clinician educational materials and tools, clinical pathways, and protocols.
• Implementation of a Home Health Heart Failure Clinical Pathway, adopted by all seven MaineHealth-affiliated home health agencies.
• Establishment of common quality measures for HF care.
• Reorganization of related programs in Clinical Integration under the Transitions of Care Team (palliative care, HF, and readmissions) to enhance coordination and communication.

<table>
<thead>
<tr>
<th>Planned care model pillar</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-management support</td>
<td>• Weigh Every Day Free Scale Program; increased access to standard, patient-centric scales; standards for providing free scales, reduced wastage; and negotiated better contracts with vendors for cost savings.</td>
</tr>
<tr>
<td></td>
<td>• Increased access to standardized, evidence-based patient education materials and classes including a Living Well Heart Failure Program for patients provided live and electronically to increase access in rural communities.</td>
</tr>
<tr>
<td>Delivery system design</td>
<td>• Standardized and innovative care protocols; Home Health Heart Failure Clinical Pathway, Home Lasix Protocol.</td>
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<tr>
<td></td>
<td>• Follow-up phone calls from inpatient clinicians posthospitalization.</td>
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<td></td>
<td>• Transition coaching posthospitalization.</td>
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<td></td>
<td>• Advanced Heart Failure Clinic.</td>
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<td></td>
<td>• Primary care-based chronic care managers.</td>
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<td></td>
<td>• Home telemonitoring for home health patients with HF.</td>
</tr>
<tr>
<td></td>
<td>• Inpatient and outpatient access to palliative care resources.</td>
</tr>
<tr>
<td>Decision support</td>
<td>• Evidence-based, standardized clinician education series; five HF modules for clinicians available electronically.</td>
</tr>
<tr>
<td></td>
<td>• Standardized, evidenced-based HF clinical pathway implemented in all seven home health agencies.</td>
</tr>
<tr>
<td></td>
<td>• Adoption of common performance measures for HF.</td>
</tr>
<tr>
<td>Clinical information systems</td>
<td>• Clinical Improvement Registry Heart Failure Module.</td>
</tr>
<tr>
<td></td>
<td>• Electronic medical records in the home health, inpatient, and outpatient settings.</td>
</tr>
<tr>
<td>Health system</td>
<td>• Adoption of the Planned Care Model as a framework for improvement.</td>
</tr>
<tr>
<td></td>
<td>• Convened system level, multidisciplinary Joint Heart Failure Workgroup.</td>
</tr>
<tr>
<td></td>
<td>• Collaborative strategic planning exercise, development of shared vision, goals, and objectives.</td>
</tr>
<tr>
<td></td>
<td>• Enhanced linkages between diverse programs, care settings, and initiatives through reorganization of Clinical Integration leadership.</td>
</tr>
<tr>
<td>Community</td>
<td>• Relationships with statewide HF initiatives.</td>
</tr>
<tr>
<td></td>
<td>• Provide access to patient and clinician education materials and tools for broader community.</td>
</tr>
<tr>
<td></td>
<td>• Participation in state telehealth collaborative.</td>
</tr>
</tbody>
</table>

HF = heart failure
Results
The impact of collaboration and integration has been substantial, with the end result of better communication, coordination, reliability, and standardization in HF care across our health system. Table 2 describes the findings attributed to our strategic interventions.

In addition to our above-reported outcomes, one of our most valuable results is the creation of a cohesive, committed, diverse team that continues to enhance efficient and standardized HF care in the communities MaineHealth serves. Most recently, the Joint Heart Failure Workgroup developed and is piloting an outpatient lasix protocol for the home health setting. Several other collaborative initiatives are planned (see section: Next Steps) and the group continues to operate with a shared vision, goals, and strategies, which are updated on a routine basis to incorporate new ideas, recent findings, and MaineHealth-related priorities.

Discussion
Within the MaineHealth system, HF care was previously comprised of multiple evidence-based, but disparate efforts and services. Using the multiple aforementioned improvement strategies, MaineHealth has been successful in overcoming many cultural and structural barriers, increased communication and integration across programs and care settings, and leveraged resources to improve outcomes in patients with HF.

Dedicated and innovative leadership has been critical to our success. To facilitate a patient-centered, integrated system of HF care it is essential to work across care arenas, foster collaboration among clinicians, leverage resources in innovative and creative ways, and create comprehensive, evidence-based programs.

To facilitate systems-level change, it is essential to first build strong, trusting relationships among clinical leaders and champions. To foster these types of relationships, MaineHealth invited a senior champion from our home health agency and one from our inpatient clinical community, each representing two groups that had met as separate teams in the past, to meet with MaineHealth staff and discuss how communication between these groups had traditionally functioned. They discussed the many cultural barriers and challenges to open dialogue that existed between the care arenas, but expressed a desire and commitment to lead their colleagues in working together. These leaders then introduced the concept of a joint workgroup to their teams and together created a collaborative and open environment in which participants from different care settings and professions felt valued and willing to work together in new and innovative ways. Clinicians and health care professionals from other backgrounds were invited to participate based on their role in the HF care pathway. They were identified by colleagues already involved with the MaineHealth Heart Failure program and represented multiple disciplines and geographic areas in the system.

Each Joint Heart Failure Workgroup meeting was co-led by our inpatient clinical champion and our home health champion. Meeting agendas were built to allow time for open dialogue, realizing that it is sometimes necessary to move more slowly at the beginning when bringing together representatives from different cultural backgrounds. With assistance from MaineHealth staff and the HF champions, the Joint Heart Failure Workgroup quickly engaged in a strategic planning exercise that included brainstorming as well as developing a shared vision, goals, and strategies under a
common quality and safety agenda. They followed this exercise with a discussion regarding which evidence-based projects, culled from a list created by MaineHealth staff based on research into the latest evidence and innovative systems, would best support their vision and goals. This process allowed MaineHealth staff to focus on a limited number of projects supported by interdisciplinary subcommittees that held working meetings and used finite resources (both financial and time) in creative and efficient ways to improve outcomes for patients with HF in multiple settings. Joint Heart Failure Workgroup participants agreed on where funds and time were spent, so there was no animosity over which group was benefiting most from the system's resources.

After meetings concluded, it became common for representatives from different disciplines to have “off-line” conversations about specific projects that could benefit from collaboration or input from others. MaineHealth staff was informed that these informal interactions were extremely helpful in engendering trust and open communication across care settings, and they even led to changes in workflow processes between groups that otherwise would not have occurred.

At the same time as the formation of the Joint Heart Failure Workgroup, the Clinical Integration Department underwent a reorganization of its own to better integrate the work around HF with other programs focused on transitions of care, palliative care, and prehospital care. By intentionally changing the organizational structure of the Clinical Integration Department and creating an interdisciplinary HF workgroup, MaineHealth fostered increased vertical, horizontal, and

<table>
<thead>
<tr>
<th>Table 2. Results of better integration across the heart failure continuum</th>
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<tr>
<td><strong>Enhanced communication and integration</strong></td>
</tr>
<tr>
<td>• Joint Heart Failure Workgroup meeting regularly</td>
</tr>
<tr>
<td>• Home health, care managers and transition coaches meeting regularly, consistent approach and messages to patients, increased cross referrals and communication</td>
</tr>
<tr>
<td>• Standardized HF education materials for patients deployed for inpatient, outpatient, cardiac rehabilitation, and home health care settings</td>
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<tr>
<td>• Standardized patient HF education classes deployed in four additional community settings</td>
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<tr>
<td>• Standardized clinician education materials and tools developed and implemented</td>
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<tr>
<td>• Increased promotion of cardiac rehabilitation for patients with HF and development of a HF cardiac rehabilitation scholarship program</td>
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<tr>
<td>• Home Health Heart Failure clinical pathway implemented at all member and affiliated home health agencies</td>
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<tr>
<td><strong>Improved outcomes</strong></td>
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<tr>
<td><strong>Home health</strong></td>
</tr>
<tr>
<td>• Telehealth improved readmission rates; 18% vs 23% for general population</td>
</tr>
<tr>
<td>• Increased patients “stable or improved” in oral medications from 82% (2006) to 94% (2009)</td>
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<tr>
<td>• Increased patients “stable or improved” in dyspnea: 79% (2006) to 86% (2009)</td>
</tr>
<tr>
<td>• Reduced readmission rate: 18.5% (2001) to 12.67% (2009)</td>
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<tr>
<td>• Increased completed discharge instructions form: 65% (2004) to 87% (2009)</td>
</tr>
<tr>
<td>• Increased Ace inhibitor prescribed at hospital discharge from 77% (2004) to 96% (2009)</td>
</tr>
<tr>
<td>• Increased smoking cessation counseling from 77% (2004) to 97% (2009)</td>
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<tr>
<td><strong>Center for Medicaid and Medicare Services core measures</strong></td>
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<tr>
<td>• 100% of patients with HF enrolled in care management set self-management goals (2009)</td>
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<tr>
<td>• 99% of patients who received transition coaching (n = 95) had increased confidence in self managing their disease</td>
</tr>
<tr>
<td><strong>Enhanced patient self management</strong></td>
</tr>
<tr>
<td>• Increased use of specific Weigh Everyday Free Scale products for patients in higher risk categories; from 2008-2010, number of digital scales provided increased from 8 to 63, and number of XL talking scales provided increased from 9 to 67</td>
</tr>
<tr>
<td>• Increased access to home telemonitoring for patients with HF; from June 2009 to March 2010, usage of telemonitoring during the first episode of care increased from 28% to 39%, and in March 2011 stands at 35%. Increases in this rate are dependent on home health agencies’ abilities to purchase additional units. Two home health agencies are negotiating contracts to begin using telemonitoring.</td>
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<tr>
<td>• Single, standard set of educational materials and tools for clinicians and patients</td>
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<tr>
<td>• Reduced overall number of Clinical Integration workgroups and meetings</td>
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<tr>
<td>• Reduced duplication of services</td>
</tr>
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</table>

**HF** = Heart failure
Building a System of Care: Integration across the Heart Failure Care Continuum

Next Steps
MaineHealth has learned a great deal about what it takes to move towards a comprehensive, coordinated, and efficient HF care program, but there is still much to do to realize the vision of a fully integrated system for patients, families, and clinicians across the continuum of care. Key to the continued success of this work will be ongoing support for the Joint Heart Failure Workgroup to foster collaboration between clinicians, leverage resources, and create additional innovative, evidence-based programs. Currently, the Joint Heart Failure Workgroup is developing an inpatient risk stratification protocol, piloting a default to the home health care referral program and to the home health medication protocols. In addition, they are collaborating with the health system’s Palliative Care program on palliative care education for HF and other clinicians. All HF programs have been reorganized and now report to a more comprehensive Transitions of Care Program, which focuses on reducing readmissions and preventable hospitalizations, to foster an even higher level of coordination and collaboration within this important area of quality improvement.

Conclusion
Intentionally using a constructive quality improvement framework to integrate programs and services, increasing collaboration and communication across different care settings, and the development of a shared vision, goals, and priorities has resulted in improved outcomes and a more efficient, coordinated, and reliable system of care for patients with HF, families, and clinicians. Health systems must commit to continually working toward the vision of a fully integrated care delivery model if such efforts are to be effective long-term.

Disclosure Statement
The author(s) have no conflicts of interest to disclose.

References

Of the Heart
This moves of itself and does not stop unless forever.
— Leonardo da Vinci, 1452-1519, Italian Renaissance artist, architect, and engineer
Qualitative Assessment of the Impact of Implementing Reiki Training in a Supported Residence for People Older Than 50 Years with HIV/AIDS

Abstract

Introduction: Reiki is a Japanese form of energy healing that has become popular in the US. Reiki training involves three stages—levels I, II, and III—to a master practitioner level and requires both giving and receiving Reiki. We set out to implement a program to train clients of a supported residence in Brooklyn, NY. They were all older than age 50 years and had HIV/AIDS and substance-abuse and/or mental-health disorders.

Methods: A qualitative, narrative-inquiry study was conducted. The Reiki master kept a journal of her 3 years of providing 90 minutes of Reiki treatment and/or training once weekly at the residence. Forty-five of 50 potential participants attended these sessions with various frequencies. Stories were collected from 35 participants regarding their experience of Reiki training. We posited success as continued involvement in the program.

Results: All 35 participants reported receiving benefit from participation in Reiki. Participants first took part in training because of the offered subway tokens; however, 40 continued their involvement despite a lack of compensation. When asked why they continued, participants reported life-changing experiences, including a greater ability to cope with addictions, a greater ability to manage counseling, healing of wounds, improvement of T-cell counts, and improved skills of daily living.

Conclusion: Reiki training can be successfully implemented in a supported housing facility with people with HIV/AIDS and comorbid disorders. Some people in our study population reported areas of improvement and life-changing experiences. Our study did not establish the efficacy of Reiki, but our findings support the effect of the entire gestalt of implementing a program related to spirituality and healing and supports the goal of implementing a larger randomized, controlled trial in this setting to establish the efficacy of Reiki.

Introduction

Reiki

Reiki is a Japanese form of hands-on energy healing in which a certified practitioner places his or her hands on or near the head, throat, chest, abdomen, knees, and feet of an individual to redistribute stagnant energy.1 We see Reiki as a narrative therapy that minimizes verbal dialogue in favor of energetic and/or analog conversation. Stories unfold nonverbally through the interaction of giver and receiver that can be put into words in the post-session discussions that ensue.

Contemplative practices such as Reiki and meditation have been reported to be helpful to decrease burnout and stress-related health problems.2 Self-care practices such as Reiki studied in hospital settings with nurses have been reported to serve as a way for nurses to avoid stress and burnout, cope with increasingly busy and hectic acute-care settings, nurture themselves, and provide a caring, supportive environment for patients.3,4 Brathovde3 studied 10 nurses and nursing students who attended a 1.5-hour educational Reiki session and reported that they felt “more present” with patients and “more connected” with others after learning about Reiki. Cohen-Katz et al4 published similar results with 25 nurses, who reported feeling more present and available to patients.

Reiki has immediate physiologic benefits.5 Thirty
minutes of Reiki produced a statistically significant reduction in anxiety, increase in salivary immunoglobulin A levels, and decrease in systolic blood pressure but did not change salivary cortisol levels. Skin temperature increased and muscle tension, measured by electromyography, decreased while participants received Reiki, but differences before and after the performance of Reiki were not significant.5

Reiki also statistically significantly decreased cancer-related fatigue, pain, and anxiety when compared with rest in a randomized, cross-over trial.7 Another study, however, found no effect of Reiki healing on fibromyalgia pain when 100 study participants were randomized to treatment given by either a Reiki Master or an actor.8 For pain and anxiety, one randomized, controlled trial (RCT) showed intergroup differences compared with a sham control. For stress and hopelessness, another RCT showed beneficial effects of Reiki and distant Reiki compared with a distant sham control.9

A number of qualitative studies have shown some benefit from Reiki. Gallob10 reported benefits in anecdotes, case studies, and exploratory research for Reiki for relaxation, pain relief, physical healing, reducing emotional distress, and deepening participants’ awareness of spiritual connections. Bossi et al11 reported that Reiki helped cancer patients to feel more peaceful and experience less pain. Burden et al12 report stories of Reiki’s benefit in the palliative care setting, including its use for the reduction of anxiety, stress, and pain perception and for its promotion of a sense of well-being, particularly psychospiritual well-being.

In this report, we describe a pilot project of Reiki use in a unique population of clients in whom HIV/AIDS had been diagnosed who lived in a group residence in Brooklyn, NY managed by Housing Works, a New York City not-for-profit agency providing shelter, housing or housing assistance, and medical treatment to impoverished, HIV positive, not otherwise housed and marginalized patients. We wanted to determine whether residents would accept Reiki training and would engage in its practice, and we also wanted to test the feasibility of a larger clinical trial. We report the results of our Reiki master’s (NR) experience (as chronicled in her journal) and the results of qualitative assessment, through narrative inquiry, of the experiences of participants.

**Narrative Inquiry**

Narrative inquiry is an approach to understanding and researching the way people make meaning of their lives as stories.13 Feminist scholars have found narrative analysis useful for data collection of perspectives that have been traditionally marginalized, such as those of the people whom we studied.

Connelly and Clandinin14 defined narrative inquiry as the study of experience of story, first and foremost as a way of thinking about experience. It is based on the idea that people lead storied lives, shaping their daily lives by stories of who they and others are, and how they interpret their past in terms of these stories. Story is a portal through which a person enters the world and by which the person’s experience of the world is interpreted and made personally meaningful. Narrative is the phenomenon studied in inquiry. Connelly and Clandinin identified three commonplaces of narrative inquiry—temporality, sociality, and place, all of which specify the dimensions of an inquiry space or places to direct one’s attention in conducting a narrative inquiry, and all of which must be addressed simultaneously.

Within this model, events and people always have a past, present, and future. It is important to understand people, places, and events as in process, as always in transition. Narrative inquirers are concerned with the feelings, hopes, desires, aesthetic reactions, and moral dispositions of the inquirer and study participants.13 They draw attention to the existential conditions, the environment, surrounding factors and forces—people and other presences—that form each individual’s context. The specificity of location is crucial. Narrative inquirers think through the impact of each place on experience. Narrative beginnings speak to the researcher’s relationship to and interest in the inquiry. In this case, NR felt challenged to do all she could for this population and wondered how best to do that. She believed that Reiki was effective and would help, but she did not know whether people would be attracted to learning how to give it or would accept and incorporate it. The larger social context of this, for her, was the typical limitation of Reiki training to people of higher socioeconomic status who can afford it. NR wondered how a lower socioeconomic group would accept being trained to offer Reiki.

Thus, the study of narrative is the study of the ways humans experience the world. This general concept is refined to the view that research is the construction and reconstruction of personal and social stories.

**Methods**

**Design**

Naturalistic or narrative inquiry methods were used from a standpoint of the methodology of constructivist inquiry15,16 to collect stories from participants about their interaction with Reiki. We wanted to know their...
perceptions of the experience of receiving and sometimes giving Reiki and also their explanations for why they continued to go to treatment for so long (three years), which typically was much longer than the usual duration of treatment attendance.

This type of qualitative research uses participant stories, or testimony, to explore the complexity of responses to a phenomenon such as introducing Reiki into the milieu of a supported-living residence for people older than age 50 years with HIV/AIDS. We wanted to compare the perspectives of receivers, givers, and observing staff. In addition, we wanted to understand what it meant to these different constituencies for a Reiki program to be implemented and how people who participated experienced it, as clients and as practitioners. The collection of story was an interactive, iterative process that took place over weeks and months as the Reiki master and the participants and then the other 2 coauthors spoke together about the stories that had been told, working discursively with the participants and with one another to achieve a consensus about what the Reiki experience meant to the participants.

Participants
Forty participants chose to participate in weekly Reiki sessions; 5 were lost to follow-up monitoring. All participants were older than age 50 years, had HIV/AIDS, needed supportive housing, and almost always had comorbid substance abuse and/or mental health conditions and chemical dependence in addition to histories of homelessness, incarceration, and domestic violence that other organizations deemed “too challenging to serve.” All received supported-living services at Housing Works’ East New York (Brooklyn) facility, offering a program of “health, housing, AIDS prevention, legal, and case management services” to “help our clients empower themselves and actively manage their HIV.” Eighty-five percent were men (Table 1). The Over-Fifty Program continued, the group comprised some 40 people who attended Reiki sessions. Thirty-five continued to attend over the course of 3 years, with as many as 20 people being seen in any given month, of whom 10 were regulars, meaning an average attendance of more than once a month. (Clients were not allowed to attend twice in succession.) Thirty-five people were available in the final quarter of 2009 to tell their stories about participation in the project.

Data Collection
The Reiki master collected stories from participants during and between sessions at the residence. Structured, specific questions were not asked. Rather, the focus was to stimulate a conversation about the participants’ experience of receiving Reiki and learning to give Reiki. Before each session, clients would be asked how they were doing in general, about their ongoing condition; 3) about any other therapies that they believed were helping; 4) about any other life changes; and 5) about their personal practice of Reiki and whether they use it on themselves and/or others. This was done in a conversational manner.

Table 1. Summary of population demographics and results

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value</th>
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<tbody>
<tr>
<td>Number of people eligible to participate</td>
<td>45</td>
</tr>
<tr>
<td>Number who chose to participate</td>
<td>40</td>
</tr>
<tr>
<td>Number lost to follow-up monitoring</td>
<td>5</td>
</tr>
<tr>
<td>Number participating in narrative interviews</td>
<td>45</td>
</tr>
<tr>
<td>Number who were HIV positive</td>
<td>45</td>
</tr>
<tr>
<td>Number with “high stress”</td>
<td>45</td>
</tr>
<tr>
<td>Number with pain-related disorders</td>
<td>23</td>
</tr>
<tr>
<td>Number with HIV complications</td>
<td>45</td>
</tr>
<tr>
<td>Number with drug abuse</td>
<td>39</td>
</tr>
<tr>
<td>Number with a mental-illness diagnosis</td>
<td>43</td>
</tr>
<tr>
<td>Number who reported improvement</td>
<td>35 (100%)</td>
</tr>
<tr>
<td>Number attending once or more per month for three years</td>
<td>10 (25%)</td>
</tr>
<tr>
<td>Number attending at least once every other month for three years</td>
<td>19 (47.5%)</td>
</tr>
<tr>
<td>Number trained to give Reiki</td>
<td>23 (57.5%)</td>
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</table>
sometimes in Spanish. This is consistent with methods of ethnography advocated by others.17,18 Many people spontaneously told stories in a desire to “testify” about the impact of Reiki upon them. The Reiki master recorded stories in her journal. She also kept a journal of her own experiences in the program. As recommended by Mills et al7 to achieve equal sharing of power, interviews were done when the participants found it convenient—before or after their Reiki sessions, as they were waiting for other activities or treatments, at lunchtime, and at other times. Given their sensitivity to hierarchical interviews by people with power over their lives, we felt it important to adopt a more flexible and unstructured approach to questioning, giving participants power over the direction of the conversation and sharing the interviewer’s understanding of the key issues arising. She used an open stance that included sharing of personal details and answering questions.23 Not only was this ethically important to us but it was also the case that some participants would not have spoken had any other stance been taken.

In keeping with our constructivist approach to qualitative methodology, including grounded theory, we did not construct an independent panel of external raters as is often done; instead, we took the stories back to the people who told them for comment, refinement, and evaluation as to the accuracy of our version compared with what they meant. In later work, the originators moved toward acknowledging the coconstruction of meaning between researcher and participant as implicit in the interview process. Constructivists believe that the data that will emerge from the inquiry arises precisely through the interaction of the interviewer and the study participant.24

Results

Stories were collected from clients about their experiences of giving and receiving Reiki. Some of these stories were phenomenal and may represent the role of Reiki in activating what Benson has called the self-healing response.25 As primary data, 12 people’s stories, taken from the journal of the Reiki master (NR), are presented as representative of all 35 participants. The other two authors (BM and LMM) visited with 22 of the participants and confirmed that these stories represented accurate portrayals of their experience. All participants confirmed the accuracy and sometimes added more details. Their names have been changed, of course.

Effects on Individuals

What was intriguing about this population was its consistency in attending Reiki sessions for the 3 years that the Over-Fifty Program lasted, with only 5 people dropping out. We wondered why; we wondered what made the difference for them. All 35 participants told positive stories about their participation in Reiki, with all reporting some level of benefit immediately after the session. All reported consistently experiencing benefit over time. Because these are not people who typically want to please, we wondered what story they would tell about the benefit and why they kept coming. Table 1 summarizes our population and our results.

Nick reported a large open wound on one leg that would not heal for more than 10 years; it was always bandaged and smelled. NR made frequent entries in her journal about Nick telling her that his wound was healing and that he was certain that it was because of Reiki. (He learned Reiki in the first class.) Nick told her that at one point, maggots grew in the wound. In November 2008, he announced that it had healed completely, and he rolled back his pants leg to show NR. Indeed, there was no open sore. He proudly attributed its healing to Reiki, though he was reluctant to believe that his doing Reiki on himself from time to time had helped much. He insisted that the sessions he had received from NR had healed his wound. Descriptions of Nick in the journal showed that in general, he moved from being very pessimistic and angry to being someone who solved his daily-living problems as they came up, felt grateful, and said he wanted to be a “better person.” Nick described what he felt after sessions by saying, “I feel the energy going from various places in his body, down through my legs and out”; “I feel things leaving my body through my feet”; “I feel as if a hand is massaging my muscles deeply.” (He said this often even when not being actually physically touched.) He reported his T-cell count rising from 19 cells/mm³ when he first started the Reiki, to more than 200 cells/mm³ by February 2010. In LMM’s interview with him, he also said that after the Reiki sessions, he was able to think more clearly and he made more progress in his counseling sessions.

After the second class, one of the clients, Batiste, who had received level 2 attunement, came forward to speak. (There are three levels of attunement. Level 1 enables people to work on themselves and on friends and family. Level 2 adds symbols drawn on the palm of the hand so that the person can actively use those symbols when he or she works. The person is given a paper with the three symbols to take home and study.)
Level 2 also adds the capacity to do distance healing. The three symbols connect to the physical level, the mental–emotional level, and the spiritual level. Level 3 is the master level, in which people learn to teach to others.) Batiste spoke emphatically about how much the self-Reiki had helped him, especially emphasizing his being able to do it on himself. He said it had taken away the severe stomach problems he had had. He also said Reiki had taken away his severe depression and that for the first time in a long time, he actually felt hopeful. He added that Reiki had given him a purpose in life. NR learned that he had been a nurse’s aide in his country for 32 years. He asked NR how much money he would have to pull together to learn how to teach Reiki to others, saying that he thought he could get some money from his brother for this, and he offered to pay NR for training at the master level. She said that she would teach him as part of the program. She wanted to start a large program for teaching the poor and homeless; he was very excited and said that he wanted to be part of it. At the same time, he began volunteering at Housing Works, including packaging and distributing condoms at subway stops.

With his level-2 Reiki, he voluntarily began offering Reiki to members of the staff at Housing Works and to clients who were not part of the Over-Fifty Program. He told NR that the lead physician asked him at times to help incoming clients who were having a hard time (with drugs and detoxification), by giving them Reiki sessions. He reported that he did this with “great success.” In a meeting that Batiste set up, the physician said to NR that he knew that the Reiki worked and that he would like NR to offer it at three other sites.

Batiste also got permission to schedule regular Reiki sessions as part of the creative arts program for clients and staff. He began a campaign of voluntary work to help staff file items away and put their offices in order. He cleaned up the Reiki room before sessions and set up the Reiki table for NR. Before he began doing this, NR had had to spend time between sessions looking for the next client on the list, which wasted time.

NR wrote in her journal that she noticed that the energy in the shelter was changing and becoming more relaxed. Batiste proudly told her how he spent time doing Reiki in different rooms every day to change the energy. He was proud that the atmosphere felt different. The Director of Creative Arts confirmed how much the Reiki program helped, carrying over to the general situation: She agreed that the energy of the residence was indeed changing.

Batiste began bringing a CD player and music (Gregorian chants, Beethoven, etc) for the sessions and purchased a lace table mat and incense, which clients loved. Several times, when his name was on the list, he asked NR to give his session to someone else who needed it more than he did. He also brought staff to experience Reiki sessions to understand the benefits, saying that this would help to change the energy of stress in the residence. Some of the staff began to ask him for Reiki sessions.

In her journal, NR noted an increase in interest in Reiki by all her clients after the second round of classes. Tomas, who had received level-2 attunement, and had said from the beginning that Reiki helped him, explicitly said that Reiki made a difference in his life. He did Reiki on himself regularly (sometimes daily), decreasing the arthritis pain in his knees. NR saw that his knees were less bent when he walked. He spent a few days in jail at one point in early 2009, and he told NR that the Reiki helped when he was “sleeping on concrete.” He also said that he had done Reiki on his children, and they were amazed at the heat in his hands.

Helen had a bad leg, which was shorter than the other one, because of a hip lesion, and she walked with a cane. She began attending Reiki sessions in early 2009 and would frequently report the high levels of pain that she felt. She came only to the second part of the class for Reiki 1 in 2009 and therefore had only two of the four level-1 attunements. Nevertheless, she began saying that normally when she got up every morning, there was terrible pain in her leg, but since she had been doing Reiki on it, the pain would go away for the rest of the day. In addition, she had surprised her family by doing some dance steps.

Helen also said she began doing Reiki on her daughter, who had regular asthma attacks and needed to use an inhaler several times a week. At first, her daughter had been skeptical, said Helen, but over the summer her daughter had had to use the inhaler only once.

An older man, Ernesto, came at the beginning of the program. He was confused and told NR that he had Alzheimer disease and terrible arthritis pain throughout his body. After the first Reiki class, he stopped coming to the sessions. Because he seemed so confused, NR did not expect him to keep up the Reiki. When asked why he no longer came for Reiki sessions, he said that he had dropped out of the Over-Fifty Program. In the summer of 2009, NR encountered him on the street. She noticed that he no longer seemed confused. When asked to come to Reiki sessions sometime, he smiled, and, motioning to his
hands, said, “That heat—it really helps the pain.” He
did Reiki on himself at least once a week, whenever
he lay down and “remembered.” “It helps a lot,” he
said. NR noticed that he walked better.

Nick, during the first year and a half of the program,
attended sessions infrequently. When he did come,
he was very angry and agitated, saying that he was
“stressed out.” He would wear earphones and listen
to rap music during the sessions. He said he came be-
cause during the sessions, he went to “bye-bye land,”
and it reduced his stress. During the summer of 2009,
he attended more often because of a bad pain on the
back of his thigh (which he thought was due to past
shingles) and beginning neuropathy in his foot, also
very painful. He soon stopped wearing earphones dur-
ing the Reiki sessions and became visibly more relaxed,
even energetic. At first, the pain in his thigh would
come back, he said, about an hour after each session,
but it gradually took longer to come back, until it was
completely gone. His foot pain was also reduced to
almost nothing most of the time.

Since Donald had undergone surgery for cancer on
his leg, he had felt much pain on walking. Over the
months, the pain was relieved during the sessions, and
it came back less and less until it was nearly gone.
He then walked much better. He did Reiki on himself
regularly (sometimes every day), and even though he
was not a verbal person, he said that it helped him.
Eventually, he no longer mentioned his leg and just
requested an overall body session because his leg
didn’t need treatment.

Bradley went through a period of dealing with
kidney stones and terrible pain. He would come for
Reiki to alleviate the pain, and he continued attending
sessions after he had an operation. He said that he did
Reiki on himself regularly. He never said much, but NR
overheard him explaining to someone what Reiki is,
and he said, “She puts her hands on you, and it takes
the negative energy out.”

Olivia came for Reiki only a few times during the
Over-Fifty Program. She said so little that NR could not
tell what she thought of the Reiki. NR figured that Olivia
was only there for the Metro Cards. At one class, she
received the Reiki level-1 attunements and instruction,
but NR did not expect her to practice. NR was surprised
when, much later, she asked Olivia what she thought
of Reiki. Olivia replied that she did it on herself about
once a week, and it helped.

Ned was blind and attended sessions infrequently.
When he did, he said that Reiki relieved the stress in
his eyes.

George began attending sessions regularly dur-
ing the last year of the program. He was depressed
because he had prostate cancer. He asked for Reiki
to relieve the pain, often in his lower back. Slowly,
NR watched his mood change. Toward the end of
the program, he said that the cancer was contained
and that he really wanted to live, because he was
“beginning to enjoy life again.” He said that he was
doing Reiki on himself regularly, sometimes every
day. He wanted to work on other people more. When
NR had him work on someone one day, she noted
that he was good at giving Reiki.

Most of the remaining stories were about people
feeling that the Reiki was relieving their stress and/
or pain. These people were even less verbal than the
others, though all expressed that their stress and/or
pain was reduced after the sessions. NR reported in
her journal that people left sessions with a different
expression on their faces than they had had when
they arrived.

As recently as March 2010, when NR came to lead
sessions, Oscar said to her, “I want to thank you so
much for the Reiki. I am here today because of the
Reiki.” He explained that he had been having a very
hard time and had decided to just give up. He had got-
ten on the subway with the intention of never going
back to Housing Works, but then he remembered NR
saying to just breathe in the light through his crown
and out through his hands, placing them somewhere
on his body, even if he thought it wasn’t working. He
said that when he tried it, it did indeed work. Soon he
felt okay again, so he turned around and went back
to Housing Works. He insisted that he would not have
returned if not for Reiki.

Oscar then said he wanted to begin filming the ses-
sions, and he brought out his video camera and a TV
set, because his camera’s monitor did not work, so he
attached short wires to the TV monitor to use it. Oscar
recorded the sessions on video, with Batiste and Edu-
ardo performing Reiki on a staff member and another
client and on each other. They looked like professionals
and were extremely happy about it. They all hugged
NR and thanked her.

Effects on the Reiki Master

In the beginning, NR noted in her journal that many
of the clients barely spoke. She described some as being
grouchy or sullen when asked a question. Only one
was initially enthusiastic about Reiki, and only another
two or three were friendly. Slowly, however, her journal
entries showed that the clients began to be open to
Qualitative Assessment of the Impact of Implementing Reiki Training in a Supported Residence for People Older Than 50 Years with HIV/AIDS

participating, saying that they looked forward to the sessions and to learning Reiki. Initially NR believed that the clients were more interested in the Metro Card they received for attending Reiki treatments than in the treatments themselves. NR found it difficult to fill her five sessions in the beginning, but during the first six months, this changed. Participants began regularly asking for Reiki, and they continued to attend sessions after the offer of free Metro Cards was stopped. They gave her testimonials of how Reiki helped them. NR noted in her journal that in the first year of the program, a few clients would occasionally and spontaneously help her set up or put things away after the sessions. This encouraged her.

NR wrote that she had seen a marked difference in the attitudes of her clients since she started working with them. When they first came to sessions, they were mostly all complainers, and she described them as having a “victim attitude.” Within a year, however, she wrote that this attitude was gone. She described them as relating to her like ordinary people who had stopped by for a session. Even though they told her that everything was good, it took several questions to learn that they indeed felt pain somewhere or had something to work on.

After the level-1 class, and especially after the level-2 class, NR noted that the overall mood among her clients was noticeably better, even among those who did not take the class. She wrote that this came from the clients such as Batiste, who said that he was working to bring about changes in “the energy of the place.” He repeatedly stated, “We are changing the energy of this place. There was a lot of negative energy, and we are changing that with the Reiki.” Also, NR described a degree of pride in Batiste that he was doing something important that the staff were not able to do and that he could even offer Reiki to some staff.

As the program progressed, NR reported that even the Housing Works staff became friendlier. The head of the Department of Creative Arts Therapy came to her and said, “What you are doing is really helping these people. This program changed Batiste’s life.” She thanked NR profusely.

Discussion
Most importantly, we demonstrated that a program of Reiki training can be implemented in a supported residential setting for people with HIV/AIDS. This program was implemented by one practitioner who provided weekly 90-minute Reiki treatment and training sessions for 3 years. Funding was available through a New York City program for residents older than age 50 years who had AIDS, so Metro Cards for public transportation were provided to those who came for Reiki for the first 2.5 years of the program. When that program’s funding stopped, Reiki continued and clients continued to participate. It is doubtful that this population would continue something without benefit—in the form of either Metro Cards or symptom relief.

This study was not designed to demonstrate efficacy of Reiki but rather to qualitatively describe the implementation of a Reiki training program. The beneficial changes observed could be because of time and attention, to the spirituality that is intimately related to Reiki, or to other factors beyond our understanding. The synergy of a Reiki program and the residence’s other programming cannot be discounted. We believe that it is feasible to provide Reiki and garner a positive response from Reiki participants. Further studies should explore the efficacy of Reiki itself apart from time and attention.

People living in shelters and supported-living residences have significant stress. It is clearly to their advantage to decrease their stress and improve their ability to solve problems and capacity to focus. The increased self-agency and self-efficacy of people who learned how to offer Reiki sessions to others appeared to generalize to a positive sense of ability to move in the world, leading several of our participants to become employed. The financial investment necessary to offer self-care options such as Reiki at first seem unjustifiable to administrators, given the considerable needs of homeless people. However, the long-term benefit could be large. The savings achieved through shelter residents becoming employable could easily justify paying a Reiki master. Hidden savings to the health care system may result from decreased stress and greater self-agency. Unfortunately, the savings are born by different cost sectors than the shelter or residence itself, which has the same costs whether residents become employed and move out or instead remain in the residence; the residence does not share in the savings in health care costs. Nevertheless, the benefit of the Reiki program in elevating the mood of the residence or shelter and the morale of staff was noticeable and could translate into reduced burnout and reduced staff turnover. Offering Reiki classes may prove to be profitable if these classes affect attendance, increase employment, and promote healthy behaviors or attitudes among those who participate.
Our pilot study supports the feasibility of a rigorous clinical trial in the setting of a supported residential program for people with HIV/AIDS, mental-health problems, and substance-abuse problems for the efficacy and effectiveness of Reiki. Participants accepted the program and kept Reiki session appointments even after their Metro Card incentive ended. Participants provided positive testimonials and spontaneously gave other residents and staff Reiki treatments outside of the sessions supervised by the Reiki master. Participants reported stories that indicated a beneficial effect of Reiki in their recovery, including reduction of substance abuse; increased ability to use other services, especially psychotherapy and group therapy; and decreased medical problems that had previously resisted successful treatment. This pilot study was not designed to define the contribution of attention apart from the contribution of Reiki. The focus was to demonstrate that Reiki (sometimes associated with middle-class or upper-class clients and with New Age or alternative lifestyles) would be acceptable to people who have been homeless, lived on the streets, engaged in drug abuse, been incarcerated, and definitely not among those often associated with using Reiki. This population enthusiastically embraced Reiki and reported benefits, setting the stage for a rigorous RCT that we plan to mount.

**Disclosure Statement**

The author(s) have no conflicts of interest to disclose.

**Acknowledgment**

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**References**


24. O’Connor D. Journeying the quagmire: exploring the discourses that shape the qualitative research process. Affilia 2001 Summer;16(2):138–58.

Hospital Medicine’s Evolution:
Literature Search and Interview Study with Practices

Ruth Greenwald, MA, MS
Marianne Novelli, MD
Tom Lorence, MD

Abstract

Introduction: Hospital medicine is a young specialty that is still evolving. In its early years, research focused on clinical outcomes, efficiency, and cost-effectiveness. As the specialty matures, increasing attention is being given to the patient and hospitalist experience with the hospitalist model of care.

Methods: In 2008, we conducted a literature search to identify patients’ and hospitalists’ satisfaction concerns and potential strategies for their resolution. We used our findings to develop a semistructured interview guide as a basis for a wide-ranging discussion with Kaiser Permanente (KP) hospitalists and physician leaders and KP and non-KP subject-matter experts on their priorities, concerns, and successful practices.

Results: Respondents identified sustainability and communications in coordinating care as their high-priority concerns with sustainability as the top priority. Within these broad concerns, they identified contributing factors and their interrelationships. Factors influencing sustainability of the hospitalist model include hospitalist scheduling, workload, comanagement responsibilities, and recruitment and retention. Regarding communications in coordinating care, respondents viewed themselves as being in the center of a web involving communication with patients, physicians in other services, nurses, and other hospitalists.

Conclusion: Promising approaches have been developed to address sustainability concerns and for communicating with patients, physicians in other services, nurses, and other hospitalists. However, getting reliable feedback on patient satisfaction surveys for individual hospitalists is a continuing challenge. Despite the use of brochures and business cards to introduce themselves to patients and explain their role, there are difficulties in establishing a hospitalist-patient bond.

Introduction

Hospital medicine is the fastest growing specialty in the history of American medicine: There will soon be more hospitalists than cardiologists in the US.1 Until recently, practice-management concerns influencing patient and hospitalist satisfaction were not a central focus. During the specialty’s early years, research focused on clinical outcomes, efficiency, and cost-effectiveness, but there was little focus on the patient’s or hospitalist’s experience with the hospitalist model of care.2 To ensure continued progress for hospital medicine, practice-management concerns of Kaiser Permanente (KP) hospitalists and elsewhere were explored through a literature search and interviews.

KP established the KP Hospitalists’ Forum in December 2009 to develop and share promising practices. Chiefs and hospitalist leaders from most of KP’s eight Regions and Group Health Permanente began to meet regularly by conference call in 2010 to discuss shared concerns. The group also contacted the Society of Hospital Medicine and other integrated health care organizations in the US to develop and to share successful practices.

Methods

Literature Search

In 2008, we conducted a literature search to identify patients’ and hospitalists’ satisfaction concerns and potential strategies for their resolution. Ovid, PubMed, and KP databases were explored, along with the Web site of the Society of Hospital Medicine. Search terms used included hospitalists, hospital medicine, patient satisfaction, care transitions, and coordination of care; with publication dates beginning in 2000.

Interviews

We used our findings from the literature search to develop a semistructured interview guide with 4 pre-
determined questions as a starting point for a wider-ranging discussion. Interviews with 11 KP hospitalists, 2 KP physician leaders, and 10 KP and 1 non-KP subject-matter experts on patient satisfaction and hospitalist career-satisfaction concerns were conducted from August 2008 to May 2009. Respondents reviewed a summary of literature search findings, expressed their perspectives and priorities regarding the hospitalist model, and shared successful practices (Table 1).

Results: Literature Search

Sustainability

Workload: In a 2005–2006 national survey conducted by the Society of Hospital Medicine, hospitalist leaders listed workload and work-life balance among their top concerns. However, the optimal workload and care-delivery model for hospitalists has yet to be determined. There is evidence that some aspects of care deteriorate as patient volume increases. A 2008 time-and-motion study of hospitalists at Northwestern Memorial Hospital in Chicago showed the impact of increasing patient volume on how hospitalists allocate their time to direct patient care, indirect patient care, communication, and electronic medical record use. Except for direct patient care, there were statistically significant decreases in the amount of time spent on the other activities per patient as volume increased. The researchers concluded that as volume increases, hospitalists spent less time communicating with nurses, subspecialists, and primary care physicians (PCP); wrote less-complete notes; delayed completing discharge summaries; and spent more time multitasking.

Data gathered at the KP Sunnyside Medical Center in the Northwest Region showed a strong positive relationship between daily hospital census and average length of hospital stay from January to October 2009. As shown in Figure 1, census increases appeared to adversely affect hospitalists’ ability to proactively coordinate discharges and inhibit throughput.

Comanagement Responsibilities: The hospitalist-orthopedic comanagement model used at Loyola University Medical Center in Maywood, IL was found to improve patient care and satisfaction. The distinguishing feature of this model was the proactive involvement of the hospitalist before admission in a structured preoperative risk assessment and management. During admission, the comanaging hospitalist played an active role in the daily care of the patient such as conducting daily rounds, writing progress notes and orders, assessing and managing acute issues, and facilitating discharge planning and care transitions. Communication with the surgical team was a scheduled daily activity. After surgery, a hospitalist was responsible for the continued management of medical problems for patients transferred to the rehabilitation unit. The observed-to-expected ratio for length of hospital stay was shorter for the patients at high risk and with multiple comorbidities (0.693 days) whose cases were comanaged, compared with 0.862 days for patients in the control group. The severity of illness and mortality-risk scores were higher in the group whose cases were comanaged. Patient satisfaction scores for that group increased by 5% for “communication with doctors” and by 14% for “doctors treated you with respect.”

Table 1. Respondents

<table>
<thead>
<tr>
<th>Title</th>
<th>Region</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formal interviews</td>
<td></td>
</tr>
<tr>
<td>Chief of Hospital Operations and Diagnosticsa</td>
<td>Colorado</td>
</tr>
<tr>
<td>Regional Department Chief, Hospital Medicinea</td>
<td>Colorado</td>
</tr>
<tr>
<td>Chief, Hospital Servicesa</td>
<td>Georgia</td>
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<tr>
<td>Chief of Hospital Medicinea</td>
<td>Ohio</td>
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<tr>
<td>Chief of Hospital Medicinea</td>
<td>Hawaii</td>
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<tr>
<td>HBS Physiciana</td>
<td>Hawaii</td>
</tr>
<tr>
<td>Lead Hospitalist, Sunnyside Medical Centera</td>
<td>Northwest</td>
</tr>
<tr>
<td>Regional Medical Director for Hospital and Continuing Care Operations</td>
<td>Northern California</td>
</tr>
<tr>
<td>Regional Hospitalist Coordinating Chair, SCPMGa</td>
<td>Southern California</td>
</tr>
<tr>
<td>Informal conversations</td>
<td></td>
</tr>
<tr>
<td>Medical Director, Primary Care</td>
<td>Northwest</td>
</tr>
<tr>
<td>Chief of Hospital Medicinea</td>
<td>Northern California</td>
</tr>
<tr>
<td>HBS Nurse</td>
<td>Northern California</td>
</tr>
<tr>
<td>TPMG Service Director</td>
<td>Northern California</td>
</tr>
<tr>
<td>HBS Physiciana</td>
<td>Northern California</td>
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<tr>
<td>HBS Physiciana</td>
<td>Northern California</td>
</tr>
<tr>
<td>Regional Patient Safety Lead</td>
<td>Ohio</td>
</tr>
<tr>
<td>Assistant Medical Director for Critical Care and Hospital Services</td>
<td>Ohio</td>
</tr>
<tr>
<td>Senior Program Consultant</td>
<td>Care Management Institute</td>
</tr>
<tr>
<td>Director, Risk Management and Patient Safety</td>
<td>The Permanente Federation</td>
</tr>
<tr>
<td>Vice President, Safety Management</td>
<td>Program Office</td>
</tr>
<tr>
<td>National Leader, Patient Safety and Risk Management</td>
<td>Program Office</td>
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<tr>
<td>Regional Coordinator, Regional Clinician–Patient Communication Program</td>
<td>Southern California</td>
</tr>
<tr>
<td>HBS Physiciana</td>
<td>Southern California</td>
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<tr>
<td>Administrative Service Line Leader</td>
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<td>Director, Performance Improvement</td>
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<td>Department Administrator</td>
<td>Southern California</td>
</tr>
<tr>
<td>Senior Vice President</td>
<td>Society of Hospital Medicine</td>
</tr>
</tbody>
</table>

aHospitalist

HBS = hospital-based specialist; SCPMG = Southern California Permanente Medical Group; TPMG = The Permanente Medical Group
The time between discharge from the hospital and first visit with the PCP is a “gray zone” where there is no universally accepted standard defining who is responsible for care. One reason is that the hospital system was designed so that responsibility for care ends at discharge. This has become more apparent in the posthospitalist era with the decreasing involvement of PCPs in caring for their hospitalized patients. Some strategies that healthcare organizations have used to cover this gray zone are described in the following sections.

There is evidence that postdischarge phone calls improve patient satisfaction, increase medication adherence, decrease preventable adverse drug events, and decrease the number of subsequent Emergency Department (ED) visits and hospital readmissions. Patients who received a follow-up phone call by a pharmacist within two days of discharge were compared with a group of patients who were not called. During the phone call, pharmacists asked patients if they obtained their medications and understood how to take them. Results from a postdischarge satisfaction survey showed that 81% of the patients in the phone-call group compared with 61% in the no-call group were satisfied with discharge medication instructions. In 19% of the phone calls, pharmacists identified and resolved medication-related problems. Fifteen percent of the patients contacted by telephone reported new medical problems requiring referral to their inpatient team. Ten percent of the patients in the phone-call group returned to the ED within 30 days, compared with 24% in the no-call group.

A hospitalist group in Virginia has home health agencies phone them during the first postdischarge visit in addition to sending their usual report to the PCP. The hospitalists consider themselves still responsible for the patient at the first home health visit. Results from this intervention have not been reported to date. The need for this approach was supported by a study showing that 39% of discharged patients exhibited the first sign of a deteriorating condition at the first home health visit. For 26% of these patients, a physician was not notified the same day that the worsening condition was observed.

Several hospitalist groups scheduled “bridging clinic” sessions in their practices for their patients with complex care needs, such as intravenous catheters or multiple antibiotics in the immediate postdischarge period before hand-off to the PCP.

Recruitment and Retention: The hospitalist workforce is mobile, and demand for hospitalists is increasing, so it is a seller’s market with major challenges in recruitment and retention. Primary reasons for high hospitalist turnover were heavy workloads of 20 or more patients per day, the increasing diversity of clinical and nonclinical duties, and the ability to easily change hospitals because of better offers or job dissatisfaction. Vasilevs et al reported that the average hospitalist group in California had a 33% churn (hires and departures) in 2007. Pham et al observed that Hospital Medicine primarily attracts young physicians. Hospitalist groups reported a mean turnover rate of 13% in 2005 with 25% of departing hospitalists entering specialty fellowships or other training programs. Because of these factors, the researchers concluded that outside of well-established hospitalist programs, it is difficult to recruit and retain seasoned hospitalists.

Emphasis on Communications

A 2006 time-and-motion study conducted at Northwestern Memorial Hospital in Chicago showed that hospitalists spent a large proportion of their time communicating compared with nonhospitalists. A 2008 study at the same hospital showed that hospitalists spent 25.6% of their time on communications. Hospitalists spent the most time communicating with other physicians (44.5%) and nurses (18.1%). The emphasis on communication appears to be justified. Although most PCPs are satisfied with the care delivered by hospitalists, they are less satisfied by hospitalist communications. Nurses and physicians discussed patients’ plans of care 50% of the time and agreed on the priorities of care in 17% of cases. Relatively little research has been done on improving hospitalist communication in coordinating care.

Hospitalist–Hospitalist Communications: Much attention has been focused on communications about transitions between care settings, but little attention has been paid to communications during shift changes despite their daily occurrence. Communications failures...
at shift change are characterized by omissions of content or by failure-prone communications processes. This often leads to uncertainty in patient care decisions, resulting in unnecessary or repeat work. Reasons for poor information transmittal include the chaotic physical environment, the hierarchic nature of medicine (which can discourage open communication between health professionals), language barriers among physicians, lack of face-to-face communications, and time pressure. An effective hand-off includes the transfer of critical patient information needed to continue patient care and the acceptance of responsibility for caring for that patient. The situational briefing model, or SBAR (situation, background, assessment, and recommendation) is a technique developed by the US Navy for communicating critical information and has been used by hospitals, including many in KP. In addition to a structured approach, formal training in hand-offs is needed because it is not included in most internal medicine residency programs. A 2004 survey of internal medicine internship clerkship directors at 125 US medical schools showed that only 8% of such programs teach how to hand off patients in a formal didactic session.

A 2006 survey conducted by the Victorian Quality Council of Public Health Services in the Australian state of Victoria on the types of clinical hand-offs identified the shift-to-shift hand-off as being most problematic. As a follow-up to the survey, they developed a hand-over improvement toolkit. They recommended that hand-offs should be face-to-face in a dedicated location that comfortably holds all participants and with minimal interruptions. Shifts should overlap to allow enough time for departing and arriving physicians to make the hand-off, with the duration varying between 30 and 60 minutes, depending on patient load. A study showed that the amount of time used to prepare and execute the hand-off also varied by the type of service being covered (general medicine ward vs intensive care unit) and that the average time was 18.7 minutes.

Hospitalist–Patient Communications: A survey reported in 2009 showed that hospital patients are rarely able to identify their physicians by name or describe their roles in the patients’ care. Of the patients participating, 75% were unable to name a physician assigned to their care. Of the 25% who responded with a physician’s name, only 40% were correct. Patients who claimed to understand the roles of their physicians were more likely to correctly identify at least one of their physicians. Patients able to name one of their physicians also were more likely to be dissatisfied with their care. One small study showed that giving patients business cards with photos improved patients’ ability to identify their hospitalists. Patients may not be able to distinguish their hospitalist from other physicians involved in their care. The ability to do so is important because, according to findings from the Society of Hospital Medicine, half of the hospitalist programs in the US have some of their compensation tied to quality metrics. The percentage is expected to increase and include some satisfaction scores for patients.

Effective hospitalist–patient communications are necessary to prepare patients for a smooth transition from hospital to home or other care setting. Project BOOST (Better Outcomes for Older Adults through Safer Transitions in Care) is a mentoring program sponsored by the Society of Hospital Medicine and the John A. Hartford Foundation to improve patient care during the transition from hospital to home. It proposed a number of promising interventions and approaches that were tested and refined at 24 pilot sites in 2009. These interventions are described in the Project BOOST Toolkit on the society’s Web site.

Communication with Physicians in Other Services: The scope of hospital medicine has grown and is still evolving. Comanagement of cases involving surgical patients is increasingly common; in California, 61% of hospitalist groups provide surgical comanagement. Surgical comanagement will probably become more common, particularly for cases involving older surgical patients with chronic diseases. The widening scope of practice has led to increased demand for hospitalists. A leader at the University of California San Francisco Medical Center reported that the number of hospitalists in his program grew from 15 in 2004 to 38 in 2007, largely because of the development of nonteaching, hospitalist-based services in general internal medicine, oncology, cardiology, and neurosurgery. The expansion of the hospitalist role requires the development of service agreements between specialty services and hospitalists to ensure that tasks and clinical responsibilities are coordinated effectively. Three key areas that service agreements should cover are admitting procedures, clinical responsibilities, and physician communications. Service agreements should be developed early and revised often. Although teamwork and collaboration have been extensively studied in operating rooms and intensive care units, little research exists for the general medical inpatient setting. There is a need to better characterize communication patterns and define barriers to communication between hospitalists and other inpatient health care team members.

A study of communications between Emergency...
Physicians (EMs) and hospitalists found that they had different expectations about hand-offs and that these expectations influenced their interactions in ways that could result in communication breakdowns. EM–hospitalist communications are especially important because the hospitalist service is a common recipient of ED patient admissions and ED-initiated hand-offs. Two barriers in hand-off communication are poor communication practices, including insufficient, incomplete, and omitted information, and conflicting information expectations stemming from EMs' and hospitalists' differing approaches to patient care. The study showed that EMs wanted information that helped them treat patients' immediate needs but that hospitalists wanted information that helped them make admitting diagnoses and plan inpatient treatment. Conflicting expectations for information influenced physicians' hand-off behaviors, and those communication practices affected interservice relationships. Hospitalists believed that they were being “dumped on” with admissions that were difficult to justify, whereas EMs believed that their professional opinions were being questioned.

**Results: Interviews**

We gave the KP hospitalists, KP hospital leaders, and KP and non-KP subject-matter experts a list of concerns derived from the literature search. They could comment on the concerns, define them more broadly or narrowly, draw connections between them, and name their top-priority concerns. They were also asked to identify promising practices within KP that address these concerns. Respondents felt most strongly about sustainability and communications in coordinating care; they assigned top priority to sustainability.

**Sustainability**

Respondents identified four major factors that influence sustainability of the hospitalist model. These factors and their interrelationships are depicted in Figure 2. Issues raised by interview participants regarding sustainability are shown in more detail in Table 2.

**Practices to Enhance Sustainability**

Approaches have been developed in various KP Regions and Medical Centers that have enhanced sustainability. These approaches are not end-state but are evolving as the hospitalist model grows and matures.

**Scheduling.** The traditional “7 days on, 7 days off” schedule is being phased out. In Colorado, hospitalists have adopted a five-day, 10-hour on-call schedule that includes a day and a night shift. This approach helps ensure patient safety by providing patient care 24 hours a day, 7 days a week. In addition, shorter call schedules reduce turnover and increase job satisfaction.

**Comanagement.** Hospitalists work closely with primary care physicians to manage patients' care. This approach helps ensure that patients receive the best possible care and that the hospitalist model remains sustainable. The relationship between hospitalists and primary care physicians is critical to the success of the hospitalist model.

**Recruitment.** Hospitalists are encouraged to participate in recruitment efforts to attract new physicians to the hospitalist model. This approach helps ensure that the hospitalist model remains sustainable by attracting new physicians to the organization.

**Retention.** Hospitalists are encouraged to participate in retention efforts to retain existing physicians in the hospitalist model. This approach helps ensure that the hospitalist model remains sustainable by retaining existing physicians in the organization.

**Table 2. Issues of sustainability posed as questions**

<table>
<thead>
<tr>
<th>Scheduling</th>
<th>Workload</th>
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<tbody>
<tr>
<td>What is the rotation that optimally balances the number of patient hand-offs between hospitalists with job sustainability?</td>
<td>How can schedules be designed to minimize off-hours shifts, and should there be differential pay for these shifts?</td>
</tr>
<tr>
<td>What is the appropriate “panel size” for hospitalists?</td>
<td>How can relative value unit (RVU) measurement be modified to better capture hospitalist activities, and what alternatives are there to RVUs? “We do a lot of things that we can’t assign an RVU to.”</td>
</tr>
<tr>
<td>What is the optimal balance between cost-efficient care and service? “There is pressure on hospitalists to do things as efficiently as possible, but this might conflict with service, like discharging patients too soon.”</td>
<td>What should the relationship be between hospitalists and subspecialists in caring for orthopedic, oncology, neurosurgery, and other patients requiring expertise beyond their scope?</td>
</tr>
</tbody>
</table>

**Comanagement responsibilities***

| Should there be limits on the types of medical and surgical cases hospitalists are expected to handle as the primary physician? “We get involved in consultations that cross over into other areas. There is some pushback from hospitalists about admitting surgical patients, but the trend across the US is to cover more.” |

**Recruitment and Retention**

| How can our organization successfully compete with others to staff hospitalist positions? “The salary structure for new hires hasn’t kept up with the community. The tradeoff is that we don’t work nights and have lower workloads, but new doctors are carrying a lot of debt and want to pay off their loans quickly.” |

| What strategies are effective in reducing hospitalist turnover? |

*Interview participants expressed their concerns but also asked questions that they hoped would be answered. Although some of these questions are currently unanswered, we have included some representative quotes from interviewees that might suggest answers or avenues of inquiry.

PCP = primary care provider
and professionally dissatisfying. Through consensus, they arrived at a schedule of 6 consecutive 8-hour days of rounding, with 1 triage physician handling most daytime admissions and off-hours calls.24 There is always a triage hospitalist during the day who admits patients in addition to the rounding physicians. There are at least 2 hospitalists on-site 24 hours a day, 7 days a week, and they admit and cross-cover after 7 pm. There are few moonlighters.

Workload: Sustainable Workload, Retention, and Best-Practice Development: Colorado hospitalist leaders attribute their ability to retain hospitalists to a sustainable schedule and workload. Hospitalists round for 6 days per week. The Chief of Hospital Medicine and Diagnostics stated that this “is optimal for reducing the number of hand-offs and length of stay. The ideal workload is 10 to 12 patients in an 8-hour day. If the census is over 11, length of stay increases.” She believes that career sustainability is a factor in best practice development. “The average age of hospitalists in Colorado is 40. Many groups have young physicians who prefer a 7-day-on, 7-day-off schedule, but we don’t believe that it is sustainable for the long-term career hospitalist. Some hospitalists who were in our group when it began in 1995 are still here. That longevity and experience has contributed to many best practices within the group.”

Comanagement Responsibilities: Hospitalists’ Clinics: At Group Health Permanente, the Hospitalist Department staffs Hospitalists’ Clinics on weekdays at 6 sites. Of Hospitalist Department physicians at these sites, 66% divide their time between the clinic and hospital. Patients are referred by PCPs, specialty physicians, Urgent Care Departments, or hospitalists. Sicker patients who are heavy users of the hospital or ED are comanaged with their PCPs through visits to Hospitalists’ Clinics. Preoperative evaluations for patients at high risk are also conducted. By providing another treatment venue, Hospitalists’ Clinics prevent unnecessary hospitalization and ED visits for patients with chronic conditions who are decompensating. This approach may increase career sustainability. The Hospitalist Chief observed that hospitalists with clinic and hospital duties have less risk of burnout than those with only hospital duties.

Comanagement Responsibilities: Postdischarge Calls to Manage Transitions: Inpatient-care coordinators in Ohio schedule a phone appointment with the patient’s PCP within 72 hours of hospital discharge. Physicians ask a standardized SmartSet of questions during the phone conversation, including questions on medication reconciliation.

Colorado hospitalists complete summaries at discharge that are sent electronically in real time to patients’ home clinics. Patients receive a follow-up call from care coordinators within 48 hours of discharge and are seen in their home clinic within 1 week of discharge. This has decreased the readmission rate and improved patient satisfaction.

In San Rafael, CA, a registered nurse (RN) and medical assistant (MA) in the Hospitalist Department phone patients within 24 to 48 hours of discharge. The phone calls are “a safety net between the hospital and the PCP.” They ask how the patient is feeling, review medications, and make sure there is a follow-up appointment with the PCP. On the basis of what they discover during the phone conversation, the RN and MA communicate with the appropriate medical staff to address the patient’s postdischarge concerns. Patients can also phone the RN and MA directly. Before discharge, the RN and MA visit patients to introduce themselves and to tell them to expect a postdischarge phone call. They believe “it is good to put a face to a name” for both patient relations and medical reasons. Meeting patients during the hospitalization makes the RN and MA aware of their medical condition and functional level so that they can recognize postdischarge deterioration and alert appropriate medical staff.

Comanagement Responsibilities: Improving Transitions in Care: KP is using several approaches to improve transitions in care. The Care Management Institute (CMI) is doing ongoing work on developing a patient-centered transition model to improve care during the transition from hospital to home. The goal is for all patients going from hospital to home to understand how to take care of themselves, the follow-up plan, medication instructions, whom to call with questions, what to expect at home, and warning signs. There is wide regional participation in the development, testing, and refinement of patient-centered transitions design. A pilot at Southern California’s South Bay Medical Center that focused on improved medication reconciliation for patients with heart failure resulted in a decrease in the 30-day rehospitalization rate from 13.7% to 9.0% for an 8-month period ending April 2009. Another pilot is the KP Northwest Comprehensive Transitions Project, started in March 2009, that focuses on successful transitions for patients at high risk. A transition bundle to address patients’ needs was created and implemented. Hospitalists play a key role by preparing standardized same-day discharge summaries, handling medication reconciliation, and being accountable for care in the 48 hours after discharge.
As a pilot site for Project BOOST, West Los Angeles Medical Center built on its transition work with the CMI and the KP Innovation Consultancy. A 26-person multidisciplinary team with internal and external participants convened in mid-May 2009. The team includes the Chief of Internal Medicine, an inpatient pharmacist, the Director of Nursing Education, experts in hospital informatics, a caregiver (a friend or relative of a patient), and other stakeholders. The team’s focus is on improving patient education, medication reconciliation, and discharge.

Recruitment and Retention: Involvement in Hospital Management: There is low hospital turnover at the KP San Francisco Medical Center. Since 1997, only 5 of 21 hospitalists have left. Reasons for leaving have included retirement, transfer to another KP hospital, an out-of-state move, and career changes. The former Hospitalist Department Chief attributed this success to hospitalist involvement in hospital management and operations and to giving hospitalists the opportunity during three lunch meetings per month and at other times to provide input on scheduling and policy matters. “Almost everyone has an administrative role or is a champion of a health initiative.” Because of staff longevity, there is also good mentoring for new hires.

Recruitment and Retention: Part-time Scheduling Option and Selectivity in Hiring: Of 20 hospitalists in Georgia, 6 have tenure of more than 10 years. The Hospitalist Department Chief attributed this success to limiting the number of patients whom a hospitalist sees to no more than 12 in a 10-hour day and also to permitting hospitalists to work part time. “People don’t get overburdened. They stay fresh and are enthusiastic about their work.” Another factor that may contribute to the low turnover is that they are very selective about new hires. Everyone on the team has an opportunity to interview a candidate, and “if there is a strong objection, we pass.”

Communications in Coordinating Care
The other top-priority concern that KP hospitalists, KP hospital leaders, and KP and non-KP subject-matter experts identified was communications in coordinating care. Respondents viewed themselves as being in the center of a web involving communication with patients, physicians in other services, nurses, and other hospitalists. Effective communication with all of these stakeholders is vital to ensure that patients receive coordinated care while in the hospital and have a smooth transition from hospital to clinic or other care setting. One of the hospitalists interviewed said that communication “is an issue for all physicians, not just hospitalists. There is not enough communication in general.” Issues raised by interview participants are shown in more detail in Table 3.

Table 3. Issues of communications in coordinating care posed as questionsa

<table>
<thead>
<tr>
<th>Hospitalist–hospitalist communications</th>
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<tr>
<td>How can end of shift hand-offs be improved? “ Hospitals should get communications sorted out among themselves first.”</td>
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<td>How can end of rotation hand-offs be improved?</td>
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<tr>
<th>Hospitalist–patient communications</th>
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<tr>
<td>What is the most effective way for hospitalists to introduce themselves to patients and explain their role?</td>
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<tr>
<td>How can hospitalists become more “memorable” to patients so that patients can offer meaningful feedback on patient satisfaction surveys?</td>
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<tr>
<td>“Patients don’t remember who their hospitalists are.”</td>
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<tr>
<td>How can patient-satisfaction survey results be linked to a specific hospitalist? “ We have never been able to develop a survey tool that is specific to a particular doctor. The survey is taken as a team rather than as individuals.”</td>
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<tr>
<td>What can be done to better prepare hospitalized patients for discharge?</td>
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<tr>
<td>How can discharge phone calls with patients be used for effectively managing care?</td>
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<td>Should discharge phone calls be strictly clinical or include questions on the patient’s care experience?</td>
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<th>Hospitalist–nurse communications</th>
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<tr>
<td>How can the expectations that physicians and nurses have of each other be clarified?</td>
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Communications with physicians in other services
Should there be service agreements between specialists, ED physicians, intensivists, and hospitalists to define their roles in patient care?
“Subspecialists view us not as partners but as residents, pairs of hands to do what needs to be done rather than partners in the care of the patient.”
How can physicians caring for the same patient achieve consistency in communications with the patient?
What information and in how much detail should hospitalists provide PCPs? (What is the optimal balance between supporting PCPs and performing other inpatient care duties?)

a Interview participants expressed their concerns but also asked questions that they hoped would be answered. Although some of these questions are currently unanswered, we have included some representative quotes from interviewees that might suggest answers or avenues of inquiry. ED = Emergency Department; PCP = primary care provider.
hospitalists the opportunity to give input on scheduling and policy matters. The low turnover is attributed to hospitalist involvement in hospital management and operations and to giving hospitalists the opportunity to provide input on scheduling and policy matters.

Hospitalist–Patient Communication: Brochures and Business Cards with Photos: In some Regions and facilities, hospitalists have brochures (Northwest, Northern California’s San Rafael and Richmond Medical Centers) and business cards with photos (Northern California’s Santa Clara Medical Center) to give to hospitalized patients. The purpose of the brochure is to explain hospitalists’ role and their interface with PCPs and other physicians and to provide contact information for patients and family members.

Hospitalist–Nurse Communications: Joint Nurse–Hospitalist Rounds: There are joint nurse–hospitalist rounds at West Los Angeles Medical Center. Morning rounds start by confirming the diagnosis and reviewing and completing Project BOOST’s risk-assessment tool. The nurse gives an update on the patient’s progress and overnight events. The hospitalist and nurse then evaluate the patient in the room together using teach-back to review the diagnosis and plan of care with the patient. The hospitalist and nurse reconvene at the nurse’s station to discuss the care plan for the day and for the remainder of the hospitalization, to clarify patient-education topics, and to review the discharge checklist.

Hospitalist Communications with Physicians in Other Services: Improving Communications Between Hospitalists and Emergency Department Physicians Through SBAR: ED physicians and hospitalists in Ohio had differing information needs in providing patient care. The two groups of physicians met to discuss their work and the information they needed from each other. They used the SBAR format to learn to communicate in the same way. The SBAR format helped them create a clear description of
what needed to happen and when for a smooth hand-off between the two services. As reported in 2006, the next step was to create a template of important criteria to enhance the basic SBAR tool and then to post this enhanced version of SBAR by each ED physician’s phone for easy use when patients must be transferred.

Currently, SBAR’s use has expanded beyond ED physician–hospitalist communication to other physician–physician conversations. In Ohio, hospitalists use SBAR for patient hand-offs at the end of rotations. The Hospitalist Chief finds SBAR useful when communicating with consultants, especially during the initial telephone conversation when it is important for hospitalists to clearly state information needs. Hospitalists communicate primarily with ED physicians, and “communications with KP ED physicians is superb; we get a complete diagnosis.”

Hospitalist Communications with Physicians in Other Services: Service Agreements: KP Northwest has developed service agreements with 30 departments. Agreements include algorithms to determine in advance which patients are admitted to each service, the roles and responsibilities of each service in providing patient care, and timelines for consults and documentation. In addition to department-specific service agreements, there are higher-level service agreements that apply to all departments and focus on specialist communications with hospitalists. The Hospitalist Chief believes that the benefits resulting from these agreements have far outweighed the time invested in developing them.

Conclusion
Hospital medicine is mature in some aspects and still developing in others. The issues of sustainability and communications in coordinating care mentioned in the literature and by interview respondents are areas that are still under development.

Sustainability was interview respondents’ top concern. As the specialty matures and the practitioners mature as well, they are seeking scheduling and workload strategies that will allow them to pursue hospital medicine as a career. Respondents indicated that their groups are moving to an 8- or 10-hour day with ideally a 12- to 15-patient panel. A more sustainable schedule and workload benefits patients, hospitals, and hospitalist groups. The deterioration of some aspects of care mentioned in the literature may be avoided or minimized by a sustainable workload, recruitment and retention will be less challenging, and there will be a larger cohort of hospitalists with the experience to develop best practices that contribute to their group’s success. Regarding comanagement and scope-of-practice issues, hospitalists have accepted responsibility for patient care during the time between discharge and first visit to the PCP and devised strategies to successfully manage transitions.

Communications in coordinating care was a concern with a slightly lower priority than sustainability for interview respondents. This is not surprising, because the literature shows that hospitalists spend a large proportion of their time communicating compared with nonhospitalists. Promising approaches have been developed for communicating with other hospitalists, patients, nurses, and physicians in other services. These include leveraging the electronic medical record to improve hand-offs; innovative rounding strategies to improve hospitalist–hospitalist, hospitalist–patient, and hospitalist–nurse communications; and using SBAR and service agreements to improve communications with physicians in other services. However, getting reliable feedback on patient-satisfaction surveys for individual hospitalists is a continuing challenge. Despite hospitalists’ use of brochures and business cards to introduce themselves to patients and explain their role, there are difficulties in establishing a hospitalist–patient bond.

At KP and in the larger hospitalist community, greater attention is being focused on practice-management concerns affecting patient and hospitalist satisfaction that were not a central focus in the specialty’s early years. KP hospitalists hope to accelerate the pace of innovation in these areas through interregional discussions at the Hospitalists’ Forum. The Society of Hospital Medicine has established mentorship programs on transitions and comanagement to address some of these concerns. We are optimistic that hospital medicine will meet these challenges as it evolves.

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References


A Strange Principle

It may seem a strange principle to enunciate as the very first requirement in a hospital that it should do the sick no harm.

— Notes on Hospitals, Preface, Florence Nightingale, 1820-1910, celebrated English nurse, writer, and statistician
The Role of Minimally Invasive Surgery and Outcomes in Colorectal Cancer

**Abstract**

For some time now, there has been significant interest in understanding and defining the role of minimally invasive surgery in colorectal cancer. Laparoscopic surgery has been shown to have similar or better outcomes compared with open surgery. Recently, prospective randomized trials have demonstrated oncologic outcomes of laparoscopic colon surgery equivalent to those for open surgery. However, the technical challenges of performing laparoscopic resection of rectal cancers and the uncertainty of the oncologic quality of the surgical resection have hindered the growth of minimally invasive rectal surgery. Robotic rectal surgery has recently emerged as an attractive alternative to laparoscopic surgery because it allows for superior visualization within a narrow pelvic field and more precise dissection. Studies of robotic rectal resection have suggested similar or potentially improved short-term oncologic outcomes when compared with laparoscopic rectal resection. Ongoing randomized studies will provide additional insight into the role of laparoscopic and minimally invasive robotic surgery for rectal cancer.

**History of Robotic Surgery**

Since the introduction of robotic surgery in 1985 when a robotic flexible arm (PUMA 560) was used to orient a needle for a brain biopsy, there has been extensive research on and growth in the use of robot-assisted surgery. One of the many reasons for the growing interest in robotic surgery stems from the shortcomings of laparoscopic minimally invasive surgery (MIS), including suboptimal optics, loss of dexterity, need for experienced assistants, and inability to provide fixed retraction. A number of robotic systems were first introduced in the 1990s, all touting several advantages over conventional laparoscopic surgery, including enhanced dexterity, three-dimensional field of vision, and more intuitive instrument manipulation, reducing the difficulty associated with complex laparoscopic procedures, particularly for nonlaparoscopic surgeons.

In 2000, the US Food and Drug Administration approved the first commercial robotic device for general laparoscopic surgery, and soon thereafter, many reports surfaced, suggesting that cases once considered technically too difficult or previously unfeasible to treat by laparoscopy could now be performed with the assistance of a robot.

Early proponents of robotic surgery highlighted shorter learning curves for performing MIS, better depth perception from three-dimensional stereoscopic vision, increased freedom of instrument movements (degrees of freedom), and tremor filtration from the console to the patient.

When robotic surgery was in its infancy and general surgeons were struggling to define the utility of robotic MIS in complex abdominal surgery, urologists quickly embraced commercially available robotic surgical systems. With the exception of high-volume centers, few centers were performing laparoscopic radical prostatectomy (LRP), because the procedure was known to be very challenging, with the greatest difficulty being in performing urethrovessical anastomosis. The technical limitations of a confined and narrow pelvis hindered optimal visualization and prevented maneuverability of laparoscopic instruments. The technical difficulty of LRP combined with uncertainty regarding the oncologic adequacy of the procedure prevented its rapid adoption. However, the improved dexterity of the robotic interface overcame many of the technical limitations.

Initial reports on robot-assisted prostatectomy highlighted the fact that many of the aforementioned disadvantages associated with LRP—namely, the inability to perform precise movements within the
tight confines of the male pelvis—could be overcome with the robot. The first large case series highlighting the effective and efficient use of robot-assisted surgery was reported by Menon,6 revolutionizing the role of robot-assisted surgery in urology. Soon thereafter, many centers began to perform and document the feasibility of robot-assisted surgery in a variety of surgical subspecialties. General surgeons in particular began examining the utility of robotic surgery, and many case series documented its feasibility for cholecystectomies and even complex pelvic surgery.7–11 However, it was never clear where robotic surgery fit into general surgery. Opponents of robotic surgery argued that surgeons alone can perform many laparoscopic procedures more efficiently than with a robot. In addition, the increased costs, loss of haptic feedback, and inability to perform multiquadrant surgery were prohibitive to the rapid adoption of robotic surgery. Proponents of robotic surgery argued that the superior three-dimensional visualization and the ability to perform articulated and precise movements in tight confines such as the pelvis were better than conventional laparoscopic surgery. One arena of gastrointestinal surgery where robotic assistance for MIS has gained considerable favor has been in colorectal surgery. More recently, surgeons have also looked to the robot to facilitate performance of more complex operations.

**Minimally Invasive Surgery and Oncologic Outcomes**

There were initial reservations regarding the oncologic safety and adequacy of MIS for colon cancer; however, several prospective randomized trials have demonstrated that the oncologic outcomes of laparoscopic colon surgery are equivalent to open surgery.14–16 These results led the American Society of Colon and Rectal Surgeons and the Society of American Gastrointestinal and Endoscopic Surgeons to support laparoscopic resections for curable colon cancer by suitably experienced surgeons in selected patients.17 However, the technical challenges of laparoscopic rectal resection, along with the potential for functional and oncologic hazard, have limited the expansion of MIS for rectal cancer. Studies are under way to evaluate the role of laparoscopic resection for locally advanced rectal cancer.18 Although the feasibility of laparoscopic pelvic surgery has been demonstrated, there are little data regarding oncologic outcome. However, some lessons can be learned from the experience with minimally invasive prostatectomy. A study of 4702 patients who underwent laparoscopic prostatectomy performed by 29 experienced surgeons at 7 high-volume centers demonstrated a steep learning curve for the procedure, based on 5-year risk for recurrence after resection as determined by serum level of prostate-specific antigen.19 The risk was elevated until a surgeon had performed ≥250 laparoscopic prostatectomies. Another meta-analysis, reported in 2009, compared published results of 1067 LRPs with results for 973 open radical retropubic prostatectomies (RRPs) and 1034 robot-assisted laparoscopic radical prostatectomies (RALPs) regarding perioperative, functional, and oncologic outcomes.20 Although the analysis observed no statistically significant difference in stage-stratified rates of positive surgical margins in those patients undergoing open RRP or LRP (relative risk, 1.02; 95% CI, 0.83–1.26; p = 0.85), there was a significant difference in rates of positive surgical margins favoring RALP (relative risk, 2.23; 95% confidence interval [CI], 1.36–3.67; p = 0.002) over open RRP. These data are in keeping with the technical challenges of LRP and the potential advantages afforded by the robotic interface.

One of the factors hindering the growth of minimally invasive rectal cancer surgery has been the lack of adequately powered randomized studies of oncologic and functional outcomes. The uncertainty of the oncologic quality of the surgical resection, including factors such as mesorectal dissection and circumferential resection margin, combined with the technical difficulty of the procedure, have made it difficult for surgeons to readily adopt this technique. Although observational studies have suggested that MIS for rectal surgery may be similar to open rectal resection regarding oncologic outcomes,21–24 there are little data from prospective randomized trials comparing outcomes. Analysis of the rectal cancer subgroup of the Conventional versus Laparoscopic-Assisted Surgery in Colorectal Cancer (CLASICC) randomized, controlled trial raised concern about a potentially higher risk for positive circumferential resection margin and impaired sexual function in men associated with the laparoscopic
approach without differences in three-year rates of local failure or overall survival. However, that study was not specifically designed to address oncologic endpoints of MIS for patients with rectal cancer. The COREAN (Comparison of Open versus laparoscopic surgery for mid and low REctal cancer After Neoadjuvant chemoradiotherapy) trial randomized patients to laparoscopic or open proctectomy for mid to low rectal cancer. It observed no difference between circumferential resection margin, macroscopic quality of the total mesorectal excision, number of harvested lymph nodes, or perioperative morbidity between the two groups. However, no long-term data are yet available, and the study was not sufficiently powered to address survival outcomes. Currently, there are two ongoing prospective, randomized trials examining the outcomes of MIS for rectal cancer: The COLOR (COlon cancer Laparoscopic or Open Resection) II and ACOSOG (American College of Surgeons Oncology Group) Z6051 trials are randomized, international, multicenter studies that will compare the outcomes of laparoscopic (including robotic in ACOSOG Z6051) and conventional resection of rectal carcinoma with curative intent. These studies will test the efficacy of laparoscopic and open surgery with respect to short- and long-term oncologic outcomes, including quality of the mesorectal dissection, risk for local recurrence, and disease-free survival. Other endpoints will include quality of life, sexual function, and costs.

Some of the risk for oncologic efficacy of laparoscopic rectal surgery may come from the technical challenges of performing laparoscopic resection of rectal cancers particularly in patients with bulky tumors or in those who are obese. In an effort to overcome some of these limitations, considerable interest has emerged on robot-assisted colorectal surgery. A number of case series and nonrandomized comparative studies from early experiences with robotic colorectal surgery have been reported that demonstrate the feasibility of the robotic approach. Robotic approaches to the rectum are attractive for some of the same reasons that robotic surgery for prostatectomy has been so readily accepted: superior visualization for mesorectal dissection within a narrow pelvic field and improved precision for radical mesenteric vascular dissection for lymphadenectomy.

Most reports of robot-assisted rectal resection, however, have been based on limited numbers of patients. A small prospective, comparative trial performed in Korean patients compared laparoscopic to robotic-assisted low anterior resection. Although initially designed as a randomized study, the study had difficulty recruiting patients to accept randomization. However, the patients were similar with respect to demographics and tumor factors. The authors observed that robotic low anterior resection (LAR) of the rectum had superior outcomes versus laparoscopic LAR for the integrity of the mesorectal dissection specimen (p = 0.033). Other short-term outcomes were similar, although the robotic surgery group experienced a lower conversion rate (0% robotic vs 10.5% laparoscopic) and a shorter length of hospital stay (4.7 days for robotic vs 5.5 days for laparoscopic).

Short-term outcomes for robotic versus laparoscopic total mesorectal excision for rectal cancer in 50 Italian patients were reported in 2010, and no differences in tumor characteristics, duration of surgery, or morbidity were observed between the groups. In addition, the median number of lymph nodes examined did not differ between the groups. Also in 2010, a larger Korean study reported short-term outcomes of robotic-assisted laparoscopic surgery for low rectal cancer in 115 patients assigned to either laparoscopic or robotic rectal resection. Both groups had similar tumor characteristics, and there were no observed differences in early short-term morbidity, return of bowel function, or length of hospital stay. Again, there was a lower rate of conversion to open surgery in the robotic-surgery group (0%) than the laparoscopic-surgery group (10%). Mean distal and circumferential resection margins were the same in both groups. There was a trend toward an increased number of harvested lymph nodes in the robotic-surgery group (17.3 ± 7.7 vs 14.2 ± 8.9; p = 0.06).

One of the only reports of survival outcomes includes 64 patients after robotic total mesorectal excision. All findings for circumferential and distal resection margins were negative, the median number of lymph nodes harvested was 14.5, 32 of 38 mesorectal specimens were deemed complete, whereas 6 of 38 were deemed nearly complete. After a mean follow-up of 20.2 months, there was local recurrence in 3.1% (2 of 64) of patients and distant-only metastases in 6.3% (4 of 64). The mean time to local recurrence was 23 months. The conversion to open surgery in this early experience was 9.4% (6 of 64), which is in line with or better than previously reported conversion rates for laparoscopic rectal surgery.

**Surgical Approach to Robot-Assisted Rectal Surgery**

As more data emerge documenting the feasibility and safety of robot-
assisted rectal surgery, it is becoming increasingly clear that there are several shortcomings of the robot, including limited working volume and the need for fixed docking. Performing both splenic flexure mobilization and rectal dissection is a challenge for the robotic system. The currently available da Vinci (Intuitive Surgical, Inc, Sunnyvale, CA) robotic system cannot accommodate the large working volume needed to work in multiple abdominal quadrants without repeat docking. Because of this limitation, various techniques for robotic rectal surgery have emerged.

The traditional “hybrid” approach to robot-assisted rectal surgery involves laparoscopic colon mobilization, followed by robotic pelvic dissection. Laparoscopy is first used to isolate and ligate the inferior mesenteric artery and then to mobilize the splenic flexure. Thereafter, the robot is used for the pelvic dissection. Two shortcomings of this hybrid approach are that it may require additional port placement and that the benefits of the robotic interface are not realized during the lymphovascular dissection. Furthermore, because only the rectal dissection is performed robotically, it is still a prerequisite that the surgeon and assistant have expertise in laparoscopic surgery during the vascular dissection and colonic mobilization.

These shortcomings led to the evolution of “totally robot rectal surgery” either with the robotic surgical cart, surgical table, and patient’s position maintained throughout the operation or with two or more separate dockings. In one of the largest series reported to date, this technique has been described as a six-port system, where five robotic ports and a camera port are used to perform complete rectal surgery from the splenic flexure to the pelvic floor. The surgical procedure consists of two phases. The first phase, the lateral phase, consists of medial-to-lateral dissection from the sacral promontory to the splenic flexure, dissection of lymph nodes around the interior mesenteric artery, ligation of the artery, and splenic flexure mobilization if needed. Thereafter, two of the robot arms are detached and redocked to different ports. The second phase, the pelvic phase, involves dissection of the mesorectum while preserving the pelvic autonomic nerve plexus, division of the mesorectum if needed, and division of the rectum with an end linear staple when possible. The anastomosis is performed either laparoscopically or under direct open visualization. Another approach has used an over-the-hip single docking to perform these steps without redocking of the robot. Although the entire procedure is performed using the robot, the series reported to date have only rarely performed complete splenic flexure mobilization, perhaps the most difficult aspect of a robot-assisted approach, particularly with a single docking because of external collisions between the robotic arms. Even the authors who first reported over-the-hip docking have acknowledged the limitations of this approach to flexure mobilization. Furthermore, in this configuration, the system is limited in its ability to reach the distal rectum. In the US splenic flexure mobilization is generally a requisite step during rectal resection and reconstruction because of the characteristic poor quality of the sigmoid colon as a rectal replacement, and therefore the single-docking technique may often not be applicable.

At the University of Texas MD Anderson Cancer Center, motivated in part by the more distal nature of our rectal cancer practice in a more obese and taller US population, we have developed a “reverse hybrid” approach to robotic rectal resection (Figure 1). It entails performing robotic lymphovascular dissection and pelvic dissection first, and then laparoscopic splenic flexure mobilization (Park I, You Y, Schlette E, et al, unpublished data, 2011). One of the advantages of the reverse hybrid approach is that it requires a single docking of the robotic cart and that the docking is between the patient’s legs to allow the robotic system to have maximized instrument range while minimizing the risk for external collisions. After the pelvic dissection is completed, the robot is completely removed from the operating field, and the laparoscopic approach to the splenic flexure is initiated. Thus the robotic phase includes all of the steps for rectal resection with the exception of splenic flexure mobilization, similar to the
“totally robotic” approach. Laparoscopic splenic flexure mobilization overcomes the limitations of working volume and fixed docking and permits the optimal use of patient position and gravity to assist with retraction and colonic mobilization. After the splenic flexure is mobilized, the specimen is delivered either transanally or through a small Pfannenstiel incision and the anastomosis is constructed in a standard fashion.

Conclusions
The role of robotic surgery in rectal disease continues to evolve. MIS for colon cancer has been shown to have improved short-term results compared with open surgery.12,13,45 However, there are still technical challenges that must be overcome, and oncologic efficacy must be established before more MIS for rectal surgery is readily accepted. Ongoing randomized trials should provide additional data regarding the appropriateness of MIS, and the evolution and advancement of technology and techniques of robotic surgery may further enhance the therapeutic applicability of MIS for rectal cancer.

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References


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**The Slightest Attack**

Allow patients to escape with the slightest attack of surgery your skill can supply.

— Robert Tuttle Morris, 1857-1945, American surgeon and author
This photograph was taken with a Canon 1Ds-Mrk II camera in Namibia at the Sossusvlei Dunes. Namibia is clearly a land of contrasts. For example, there are the red desert dunes of Sossusvlei, a long, rugged coast, and then a more typical Africa-like area with wildlife in Etosha. Namibia is also the home of the Himba, a semi-nomadic herding people.

Dr Hahn retired from The Permanente Medical Group in 2010. He previously was the Clinical Director at the Sacramento Regional Appointment and Advice Call Center. He has been seriously exploring photography since 2000 and has an interest in both wildlife and landscape photography.
Improving Diagnostic Reasoning to Improve Patient Safety

Alvin Rajkomar, MD
Gurpreet Dhaliwal, MD

Abstract
Both clinicians and patients rely on an accurate diagnostic process to identify the correct illness and craft a treatment plan. Achieving improved diagnostic accuracy also fulfills organizational fiscal, safety, and legal objectives. It is frequently assumed that clinical experience and knowledge are sufficient to improve a clinician’s diagnostic ability, but studies from fields where decision making and judgment are optimized suggest that additional effort beyond daily work is required for excellence. This article reviews the cognitive psychology of diagnostic reasoning and proposes steps that clinicians and health care systems can take to improve diagnostic accuracy.

Introduction
The ability to transform medical data into an actionable diagnosis is paramount to the functioning and identity of every physician. This first fundamental step in patient care is complex and prone to errors yet is infrequently considered to be a focus of potential improvement. Given the costs and dangers of an incorrect diagnosis, improving diagnostic accuracy has been called the next frontier for patient safety. An incorrect working diagnosis can lead to treatment of a nonexistent condition as well as a delay in appropriate therapy for an existing condition. Shojania et al found that 5% of autopsies demonstrate diagnostic errors leading to lethal complications that would have been averted by treatment if the correct disease had been diagnosed. Malpractice lawsuits about diagnostic errors are more common than lawsuits about medication errors and result in larger payouts.

Knowledge and experience are the cornerstones of strong diagnostic skills, but the ongoing improvement of a clinician’s diagnostic skills requires a basic understanding of the cognitive process that underlies diagnosis and a commitment to lifelong learning and expertise principles. Decades of study on physicians’ judgment and reasoning have yielded practical insights into how to optimize the diagnostic thought process.

In the first part of this article, we present a summary of the cognitive psychology of diagnostic reasoning. In the second part, we suggest changes that both individual clinicians and health care systems can adopt to improve diagnostic accuracy and improve patient care and safety.

The Science of Diagnostic Reasoning
Many clinical encounters require a modest number of data points for diagnosis. For example, a brief medical history from a healthy woman, age 30 years, with dysuria is largely sufficient to diagnose a urinary tract infection. Extensive listing of other diagnostic possibilities is impractical and frequently superfluous. This type of reasoning employs the intuitive system in our brain, which conducts a rapid mental comparison of the current case with an abstract prototypical picture (“illness script”) of common causes of dysuria such as a urinary tract infection. The brain performs this comparison on the basis of past experience and knowledge through a process that is largely inaccessible to conscious control or manipulation. This seemingly instantaneous process was celebrated by Malcolm Gladwell for its utility and efficacy in his best seller Blink: The Power of Thinking Without Thinking.

Common, straightforward cases dominate daily practice, but clinicians are also faced with patient encounters that do not fit previously recognized patterns. Take, for example, the case of a man, age 42 years, with back pain, a serum calcium level of 6.9 mg/dL, and a hemoglobin level of 6.3 g/dL. To make sense of such a scenario, a clinician employs the more deliberate and time-consuming method of analytic reasoning. The physician must comb through memory and knowledge stores and frequently use external information sources to derive a clinical solution. The aforementioned case does not immediately trigger a unifying diagnosis and explanation, but with extended thinking, consideration of pathophysiology, consultation with colleagues, and...
use of online resources, the physician might deduce that this patient’s anemia is due to malabsorption leading to vitamin D deficiency, with the ensuing osteomalacia causing bone pain. Further analysis may allow her to arrive at the underlying diagnosis of celiac disease.

Studies using functional magnetic resonance imaging suggest that intuitive and analytic reasoning correspond to the activation of separate brain structures—the ventral medial prefrontal cortex and right inferior prefrontal cortex, respectively. However, in human reasoning and decision making, the two systems are not used in isolation. Rather, they exist on a cognitive continuum: Ideas generated by intuition are subject to analytic scrutiny, and conclusions that are reached through formal analysis may be overridden by intuition (eg, “I will admit this patient with chest pain for exclusion of MI [myocardial infarction] despite the low TIMI [Thrombolysis in Myocardial Ischemia] risk score”).

**Hypothetico-Deductive Model**

Although little is known about the inner workings of intuition, analytic reasoning has been characterized by multiple models. The longest-standing conceptualization of analytic reasoning is the hypothetico-deductive method, in which diagnostic hypotheses are proposed, tested, and either verified or rejected.

Within seconds of a patient encounter, the physician starts developing a short list of possible diagnoses (typically two to five), either as specific entities such as influenza or malaria or as broad categories such as “an infectious disease.” These hypotheses transform the cognitive task of the patient encounter from deciding “What is this patient’s illness?” to deciding “Is this fever due to vitamin D deficiency, with the ensuing osteomalacia causing bone pain?” These specific questions then direct further inquiry and data gathering from the history, physical examination, laboratory tests, and imaging studies. During this process, some initial hypotheses are rejected, new ones are generated, and broad categories are refined into specific disease states.

When the number of hypotheses is narrowed to one or two, they are subjected to a process of verification. The final working diagnosis must be adequate and coherent—that is, it must explain most normal and abnormal findings and conform to the patient's demographics, presentation, and clinical course. Stated otherwise, there must be a reasonable (but as clinicians know, rarely perfect) match between the clinical features of the patient in front of them and the illness script (ie, template of the disease) in their mind. Physicians generally seek assurance that the worst-case scenarios have been excluded, such as an ectopic pregnancy in a young woman with abdominal pain. Moreover, a single unifying diagnosis in the spirit of Occam’s razor is preferred although not always feasible in complex illnesses. Usually the verified diagnosis must meet a high-enough likelihood to merit treatment (ie, meet the treatment threshold), which often varies with the risks of the associated therapy.

**Cognitive Heuristics and Biases**

For many routine patient encounters, physicians can use mental shortcuts and rules of thumb to arrive at the correct diagnosis. These shortcuts, or heuristics, are very efficient and allow clinicians to complete high levels of work, but they are also prone to producing predictable mistakes in the course of reasoning. Despite their shortcomings, these double-edged swords are used constantly in practice and everyday life because they usually yield correct decisions. The following five heuristics are commonly employed in clinical practice and can lead to diagnostic errors:

- The **representative heuristic** leads clinicians to judge the probability of a disease by how closely a patient presentation matches a prototypical case without considering the prevalence of a disease. For example, a clinician may strongly suspect that a patient with hypertension, headache, diaphoresis, and palpitations has a pheochromocytoma, given the match with the textbook description. However, each individual symptom is very commonly encountered in clinical practice, and the true likelihood of the unifying diagnosis of pheochromocytoma is vanishingly low.

- The **availability heuristic** leads the clinician to judge the probability of a disease on the basis of how easily that disease is recalled, which is often skewed by recent and memorable cases. For example, a physician who arrives at an accurate diagnosis of constrictive pericarditis after examining a patient with edema may overestimate the likelihood of that diagnosis for other patients who present with lower-extremity edema. This effect sometimes colors judgment for weeks to months, but frequently it modifies clinicians’ judgment for their entire career (eg, “One time in fellowship I saw X, so I always do Y”).

- The **anchoring heuristic** leads clinicians to cling to their initial diagnostic hypotheses even as contradictory evidence accumulates. For example, a patient with stage 5 chronic kidney disease was admitted with altered mental status and myoclonus of the left arm attributed to uremia (the anchor). However, as the patient’s condition failed to improve with dialysis...
(contradictory evidence), the clinicians had a difficult time revising the formulation to the eventual diagnosis of status epilepticus.

- **Premature closure** describes settling on a diagnosis without sufficient evidence or without seeking or carefully considering contradictory information. For example, a patient with rheumatoid arthritis who was taking immunosuppressive medication presented with shortness of breath and was found to have a small distal pulmonary embolus. A consulting physician was not satisfied with this explanation in light of the diffuse fine infiltrates on the chest radiograph and requested bronchoscopy, which revealed *Pneumocystis jiroveci* pneumonia.

- A related problem, **confirmation bias**, is the tendency to look for evidence to support a working hypothesis, ignore contradictory evidence, and misinterpret ambiguous evidence. For example, for a patient with symptomatic anemia with a nearly absent reticulocyte count, there was an incidental finding of potentially full mediastinum on a screening chest radiograph. The reticulocyte count was considered to support the diagnosis of iron-deficiency anemia and the radiograph finding was discounted, although the patient was later found to have aplastic anemia from a thymoma.

### Intuitive or Analytic Reasoning?

Intuitive reasoning can quickly sort through large volumes of data (which characterize many complex medical encounters) through an unknown algorithm with a reasonably high success rate. We rely on this balance of efficiency and accuracy to make it through the busy clinical day. The algorithm, however, relies heavily on cognitive shortcuts that use recollection of cases that are disproportionately memorable (availability bias) or rare (representativeness, or the closely related concept of base-rate neglect), and it may abort a search once a diagnosis conforms to currently available data (confirmation bias, premature closure, search satisfaction—stopping the diagnostic search when a single abnormality is detected).

The majority of educational and psychological writings have advanced analytic reasoning as the more accurate and reliable method of problem solving. This matches the common perception that a decision arrived at by detailed analysis is more valuable and accurate than one reached through intuition. However, abundant research suggests that both the intuitive and the analytic systems are critical, are interwoven, and have strengths and weaknesses.12,13

A modern characterization of expert clinical judgment is the adroit recognition of the limits of intuition and acknowledging when analytic reasoning is required (ie, “knowing when to slow down”).14 Diagnostic experts develop a base of experience and knowledge that increasingly employs intuitive reasoning to accurately diagnose the cases they confront, but they also develop an accurate sense of when analytic reasoning is merited. Just as pilots know when to turn off or to turn on autopilot, physicians too can develop a sense of when to use intuitive versus analytic reasoning.

### Improving Diagnostic Reasoning

Measures that may improve diagnostic accuracy can be broadly grouped into two categories: improving individual clinicians’ diagnostic reasoning skills and improving health care systems to support clinicians through the diagnostic process.

#### Individual Continuous Improvement

The individual clinician can pursue at least three different measures to improve diagnostic performance: feedback, deliberate practice, and metacognition. These methods are derived from the literature on expertise, lifelong learning, and professional development.

- **Feedback**
  
  The only way decision makers can improve their judgment is through feedback. When diagnostic decisions are correct, reinforcement occurs. When diagnostic decisions are incorrect, recalibration occurs. Too often in medicine, however, there is no feedback on decision-making episodes. Schiff outlined the barriers to feedback in medicine, which include fragmentation of care, a culture of not providing clinician-to-clinician feedback (especially when clinicians are wrong), and lengthy delays between diagnosis and test results.15 The natural tendency of the human mind is to equate the absence of feedback with positive feedback, and that leads to miscalibration and overconfidence.16

  Actively seeking feedback on diagnostic decisions not only refines the clinician’s judgment but also serves as an important patient-safety mission. Reliance on patients to return for follow-up care if there is no improvement without scheduled surveillance invites an open loop in the decision-making process, whereby the patient is both physically and cognitively discharged from the physician, and forfeits the potential for detection of early adverse clinical events.17

  In high-stakes fields where decision-making optimization is continually sought (eg, military), feedback on judgments is not optional; rather, the feedback is systematic and comprehensive. All physicians get
low-frequency, random feedback on their decisions, but individual clinicians can consider how they (or the system) can increase the rate and scope of feedback through scheduled follow-up visits, phone or electronic communications, or triggered alerts on subsequent diagnostic tests or consultations.

**Deliberate Practice**

It is tempting to assume that daily practice for many years is sufficient to develop superb diagnostic skills (an expert), but research in other professional fields shows that simply attending to the day’s work without additional reflection and training creates an experienced nonexpert.19 In every profession where top performance has been studied,19 it has been demonstrated that additional training and effort—termed deliberate practice20—is required to achieve an individual’s maximal potential.

Whether the goal is excellence in playing an instrument, leading a military battalion, or honing diagnostic skills, there is no substitute for practice. In each profession where excellence is sought, performers seek additional opportunities to refine their judgments and actions. In other fields, these efforts go by the names of rehearsal, scrimmage, simulation training, and practice. The question for physicians is: What does deliberate practice look like for us?

Generally, most busy clinicians are not seeking additional patient encounters in order to augment their skills, but they can amplify their clinical experience and practice clinical reasoning by actively reading about clinical cases, whether on paper or online. Although reading or clicking through a case will never reproduce the full cognitive challenges or rewards of interacting with a patient, an active reading approach that focuses on solving the case can yield some of the same intellectual benefits.

The general theme of this reading approach is to maximize the challenge of solving the case by continuously making decisions along the way rather than perusing the case while waiting for the answer to be revealed. Action steps to recreate this challenge include concealing the title or other early artificially placed diagnostic clues (eg, imaging or pathology results), interrupting reading at regular junctures to make decisions and assessments and then comparing judgments with the author’s judgments, and pursuing learning (can be done quickly) that is based on knowledge gaps that become apparent. This active approach mentally weaves the simulated case into the memory of related clinical experiences, so that the thought process of working through a case becomes an episodic memory in the way that a true patient encounter does. Studies are needed to examine whether this method translates to improved diagnostic performance.

**Metacognition**

Since the 1970s, there has been an increasing awareness of the complexity of the diagnostic process and an appreciation of its pitfalls, including cognitive errors. As the popularity of Jerome Groopman’s *How Doctors Think*21 can attest, this is a subject of great public interest as well. Some authors have championed metacognition—thinking about thinking—as a way to minimize physician cognitive errors. The proposition is that physicians who have a heightened awareness of their thought processes are best positioned to recognize and counteract incipient errors.

Croskerry suggested that physicians develop an awareness of cognitive errors in order to develop cognitive forcing strategies that subvert errors in real time.22 For instance, the physician who understands the ever-present risk of premature closure may habitually force herself to always ask, “What else could this be?” before discharging a patient from the Emergency Department, just as the diagnostic radiologist who recognizes the pitfall of search satisfaction may adhere to a thorough checklist for chest radiographs despite the detection of a clearly defined infiltrate.

Physicians who strive to improve their diagnostic process must be aware of it, and there are many reasons to expect that an awareness of cognitive errors and a general commitment to reflection and learning from one’s practice and decisions will improve clinical knowledge and judgment. However, it remains to be seen whether routine reflection in action—essentially a habitual override of intuition or rapid decision making—will lead to improved patient outcomes.12

**Improving Health Care Systems to Improve Diagnosis**

Currently, the refinement of diagnostic skill is an individual pursuit, powered by a clinician’s own drive for excellence. However, as institutions recognize the financial, quality, safety, and legal ramifications of diagnostic errors, they will become increasingly motivated to help clinicians improve their diagnostic accuracy through technology, through processes based on information systems, and through cultural approaches.

**Decision-Support Systems**

Since the 1980s, numerous versions of computer-based decision-support systems—DXplain (http://lcs.mgh.harvard.edu/projects/dxplain.html), PKC (www.pkc.com), and most recently, Isabel (www.isabelhealthcare.com)—have been developed to help the clinician...
by suggesting diagnostic possibilities in real time after clinical data are entered. The premise of providing an aid or check on physician reasoning is logical and attractive. Although such systems have demonstrated modest usefulness and satisfaction, to date the results, in terms of physician adoption and effect on patient outcomes have been disappointing.

Barriers to the success of decision-support systems have included physicians’ perceived lack of need for such assistance, the time-consuming entry of patient data, the need to look through lengthy differential diagnoses, and potential increased time and financial costs associated with exploring those options. Essentially, physicians have found it unrealistic to integrate these systems into their everyday workflow.

Although much work remains to be done, there is reason to believe that a well-designed system can be created that uses data from electronic medical records without requiring additional data entry, provides a more filtered output, and links directly to condensed knowledge sources or the next steps in the diagnostic algorithm. Even as computer intelligence grows in leaps and bounds (witness the supercomputer Watson on the television show Jeopardy!), the proposition remains that decision-support systems will exist to supplement but not replace the clinician’s reasoning. To be adopted, they must prove to be safe, effective, cost-effective, and convenient in everyday practice.

Diagnostic Checklists

It can be argued that if there is a checklist for placing central venous catheters, there should be a checklist for our most critical procedure: diagnosis. In 2011, Ely et al proposed such a diagnostic checklist. The checklist starts with the rudiments of patient assessment—obtaining a medical history, performing a physical examination, and forming a differential diagnosis—but then distinguishes itself from routine practice by inserting two final steps in every encounter: taking a “diagnostic time-out” and embarking on a follow-up plan. The time-out explicitly confronts any shortcomings of a diagnostic encounter by asking a series of reflective questions:

- “Was I comprehensive?”
- “Did I consider the inherent flaws of heuristic thinking?”
- “Was my judgment affected by any other bias?”
- “Do I need to make the diagnosis now, or can I wait?”
- “What is the worst-case scenario?”

This checklist encompasses the key elements of metacognition introduced in an earlier section and concludes with a follow-up plan that captures the safety and learning benefits of feedback already discussed. The general checklist is supplemented with a syndrome-specific checklist, which is a much simpler form of decision support that requires the input of only one data point: the chief complaint. The lead author has compiled checklists for 46 common but diagnostically challenging presentations (eg, tachycardia, ankle pain) and suggests in an accompanying online video that the list could be used in real time with the patient to ensure that common and “do not miss” diagnoses are considered (www.youtube.com/watch?v=ui1p1ieyPiw0). The authors conclude with a very forthright and thorough discussion of the limitations of their proposal, including the need for evidence to promote the adoption of checklists in clinical settings.

Shifting from Continuing Medical Education to a Learning Community

Increasingly, health care systems are making investments to improve the quality of health care delivery, but within that larger goal, relatively little investment is made in the continuous quality improvement of the diagnostic skills of their practitioners. The traditional reliance on continuing medical education requirements and the passage of time on the job are both inadequate. Institutional support for time, workforce, and information technology resources should be devoted to transforming the workplace from a production facility to a learning community that produces. Examples include groups that do practice-based inquiry, electronic medical record systems that automatically close feedback loops (eg, the clinician who suspects that a murmur is aortic stenosis can receive an e-alert of echocardiographic results when they are available), and allocation of time to use a diagnostic checklist.

Conclusion

Diagnosis is the clinician’s most critical procedure but has eluded the same degree of scrutiny and innovations in improvement achieved for central venous catheters or medication administration. We have every reason—including our professional identity, patient safety, and risk mitigation—to face that challenge. A comprehensive review of diagnostic errors is provided in a supplement to the May 2008 issue of the American Journal of Medicine (see www.elsevier.com/wps/find/authored_newsitem.cws_home/compaynews05_00919), and the Diagnostic Errors in Medicine conference (www.smdm.org/diagnostic_errors.shtml), now in its fourth year, continues to convene to address the study and remediation of this important problem. We fully support the call for more research on clinician-level and systems-level interventions to increase diagnostic accuracy.
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References

Find the Cause
Diagnosis means finding the cause of a disorder, not just giving it a name.
— Sydney Walker, III, MD, neuropsychiatrist and author
Retinal Drawing: A Lost Art of Medicine

LuAnn Dvorak, PhD, LPN
Stephen R Russell, MD

For the retina specialist half of our team (Stephen Russell), finding the “lost” retinal drawings at the University of Iowa was personal. I (SR) was one of the last retina fellows in a line of Iowa-trained ophthalmologists who had, from 1958 to 1988, created formal retinal (ocular fundus) drawings, a form of preoperative documentation. For those 30 years, drawings that took from 30 minutes to 3 hours each were routinely created both to map retinal tears, detachments, and landmarks prior to surgical retinal detachment repair and to rigorously educate the examiners in ocular anatomy and the use of the binocular indirect ophthalmoscope, which Belgian-born Charles Schepens had developed in the 1940s and 1950s.1,2

With lenses in hand, examiners could visualize the peripheral retina, a surgically important region that remains difficult to view and document. Achieving visualization of its pathology through both indirect ophthalmoscope, and the discipline required to record its findings, allowed that previously elusive area to be documented in the clinic and operating room far better than during the era of the direct ophthalmoscope, the tool often used by nonophthalmologists who do not routinely receive specialized training with the indirect ophthalmoscope.3 Edward Ferguson and Robert Watzke, who had learned Schepens’ methods in Boston, brought with them to Iowa the “new” viewing technology and expertise in surgical methods, specifically scleral buckling, that allowed indirect ophthalmoscopy to be fully exploited.4 The drawings immediately became a significant part of the culture in the retina clinic and obtaining them a legendary challenge for “artists” in training.

When I (SR) left my position as the head retina-vitreous surgeon at Saint Louis University and joined the University of Iowa faculty in 1997, I set out to find the roughly 12,000 retinal drawings from files then stored at an off-site facility. Inspired by the artwork and accompanying essays in the Journal of the American Medical Association, and by the spectacular iris and iridocorneal angle drawings done by prior Iowa faculty Lee Allen (in W Lee Alward’s Color Atlas of Gonioscopy),5 I sought to somehow commemorate this lost art; however, I soon learned the art was lost, literally lost.

The drawings had been removed from the ophthalmology clinic years before when the practice of formal retinal drawing ended—due, in part, to Medicare’s restrictions on lengths of stay and reimbursement, to advancements in technology, including the increasing use of electronic and digital diagnostic tools, and to changes in retinal detachment management. Nine years and a great deal of detective work later, I (SR) had 19 large boxes of drawings and a plan for the images that were most interesting or most varied in artistic style and historical merit.

We are currently developing a collection: The Lost Art of Retinal Drawing (in progress), which will feature over 120 drawings and a history of the practice and process. Chapters will highlight differences among various artists’ representations of similar diagnoses, and how drawing style and technique evolved over time, how shading—sometimes basic; sometimes sophisticated—was used, and how transparencies and opacities were represented. Although the volume will include drawings and remembrances of artists at only one institution, fundus drawing in its entirety, as an art and a practice, is being celebrated since the technique has become a lost art of medicine. Unlike at the University of Iowa, drawings at other institutions remain embedded within individual medical records or charts, making access to them difficult, which renders the replication of the Iowa collection unlikely.

Just as artifacts from past cultures and faraway lands find their way into museums and galleries around the world, these colored-pencil (and watercolor) drawings emerge as art.

References
NARRATIVE MEDICINE

Retinal Drawing: A Lost Art of Medicine

Patrick J Caskey, MD — 2/11/87
Tractional retinal detachment of left eye, with possible rhegmatogenous component.
s/p panretinal photocoagulation for proliferative diabetic retinopathy.
Surgery: Retinal reattachment with vitrectomy, membranectomy, and scleral buckling.

C Neal Jepson, MD — 9/5/63
Recurrent retinal detachment after silicone injection, right eye. Blind left eye from recurrent retinal detachment despite open surgeries.
Surgery: Replacement of vitreous by silicone injection, right eye.

Steven J Vermillion, MD — 1/5/80 (apparently Dr V wrote the previous year’s date, as people often do in January).
Retinal detachment of right eye, macula off.
s/p cataract extraction 1968.
Surgery: Scleral buckling, right eye.

Stanley G Shortt, MD — 4/7/82
Extrusion of implant.
s/p scleral buckling of right eye with polyethylene implant, 1957, and bilateral cataract extraction, 1974.
Surgery: none.
CASE STUDY

The Treatment of Black Widow Spider Envenomation with Antivenin _Latrodectus Mactans_: A Case Series

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Abstract

Black widow spiders (_Latrodectus mactans_) are found throughout the US. Though bites are relatively uncommon, they pose a significant health problem with over 2500 reported to American poison control centers annually. Black widow spider bites cause a characteristic envenomation syndrome consisting of severe pain, muscle cramping, abdominal pain, and back pain. The significant pain associated with envenomation is often refractory to traditional analgesics. Antivenom (Antivenin _Latrodectus mactans_) is available and effective, but is often withheld because of a fear of acute hypersensitivity reactions. We report four cases of symptomatic black widow spider envenomation. One of the reported cases was managed without antivenom, and, in contrast, three were treated successfully with Antivenin _Latrodectus mactans_. We believe that these cases demonstrate safe and effective use of black widow antivenom. This article presents the rationale for use of antivenom in these cases, and a nonsystematic review of the pertinent literature.

Background

_Latrodectus_ species are found throughout the world. Five species of widow spiders occur in the US: the southern black widow (_L mactans_), the northern black widow (_L variolus_), the Western black widow (_L hesperus_), the brown widow (_L geometricus_), and the red widow (_L bishopi_). In North America, the most widely distributed native spider is _L mactans_, known as the black widow spider.1,2 Although most spiders produce venom, the vast majority lack mouthpieces (chelicerae) capable of delivering their venom through human skin.3,4 Black widow spiders are one of only a few spiders with the ability to cause a poisonous bite to humans.3,4 Only female widow spiders are dangerous. They can be identified by the hourglass pattern (red or orange in color) on the ventral aspect of their shiny, black abdomen (Figure 1). Male widow spiders are much smaller and lighter in color, and they lack the ability to deliver venom. Black widow spiders are commonly found in garages, trash heaps, and outbuildings but are uncommon in occupied dwellings. Bites are usually defensive, occurring when the spider is accidentally disturbed.4

Black widow spider envenomation remains a significant health problem in the US, being reported over 2500 times annually to US poison-control centers.1,2 The actual number of envenomations is probably much higher, because poison-center estimates tend to underreport exposures.6 Black widow spider envenomation frequently results in severe pain, muscle cramps, abdominal pain, back pain, and hypertension. These symptoms may be refractory to traditional therapies. However, envenomation is associated with low mortality.6,7 Only three cases of deaths associated with widow spiders have been reported in the world medical literature. Two were patients from Madagascar bitten by _L geometricus_ species, and the third was a young Greek woman who...
The Envenomation Spider of with Mactans: Black Case Series

Treatment morbidity and lorazepam in the complained of severe pain. He cried constantly and abdominal examinations were clear, and findings on his cardiac rate, 103 beats/min; temperature, 98.4°F; pulse oxygen saturation, 99% on room air. He appeared uncomfortable and was treated with intravenous diazepam and ketorolac, which did not provide relief. During his ED stay, his pain became more severe, requiring multiple doses of hydromorphone for control. The patient stood bent over the gurney and appearing very uncomfortable. His lungs were clear, and findings on his cardiac and abdominal examinations were normal. His left middle toe showed no discernible bite marks, swelling, or erythema.

Because of the patient’s severe pain, the medical toxicologist thought that Latrodectus antivenom would be appropriate for treatment. The benefits and risks of treatment were discussed, and then the patient stated, “I would rather die taking the medicine than feel the pain the way I do.” One vial of Antivenin Latrodectus mactans (2.5 mL) was infused intravenously during a 30-minute period. Within 15 minutes of infusion completion, he began experiencing relief. No further hydromorphone was required. He was observed in the ED for 2 hours and then discharged to his home. A follow-up appointment was scheduled for 48 hours later, but he did not keep it. A review of the medical records showed no return visits to the ED and no further clinic visits by the patient. He was not available for long-term follow-up assessment.

Case 3

A woman, age 24 years, arrived in the ED and said that she had sustained a black widow spider bite on her right shoulder. The spider was on a shirt that she put on. The patient had mild erythema without swelling at the bite site. She complained of severe pain and muscle cramps in the shoulder, neck, and back. Her vital signs died of myocardiitis after being bitten by an L. tredecimguttatus spider.8,9 There are no known cases of death resulting from envenomation by the widow species found in the US.

Antivenin Latrodectus mactans (Merck & Co, Inc, Whitehouse Station, NJ) is the only antivenom currently available in the US for treatment of black widow spider envenomation.8,9 Despite the significant symptoms that may develop after envenomation, the use of antivenom is a subject of debate within the toxicology community. This controversy stems primarily from a single reported case of fatal hypersensitivity related to spider antivenom administration. We describe here one case in which envenomation was treated without antivenom and three cases in which Antivenin Latrodectus mactans was used safely and effectively.

Case Presentations

Case 1

A previously healthy boy, age 3 years, arrived in the Emergency Department (ED) 1.5 hours after suffering a black widow spider bite to the top of his right foot while putting on his boots. The parents brought the spider to the ED, where it was identified as a female black widow. There was a 2-by-2-cm area of mild erythema to the top of the boy’s foot. Over the next hour, the boy developed severe foot, leg, groin, and abdominal pain. His vital signs were as follows: blood pressure, 111/68 mmHg; respiratory rate, 20 to 30 breaths/min; heart rate, 103 beats/min; temperature, 98.4°F; pulse oxygen saturation, 99% on room air. His lungs were clear, and findings on his cardiac and abdominal examinations were normal. He cried constantly and complained of severe pain.

The patient was treated with morphine and lorazepam in the ED, which did not provide relief. Because of concern about a hypersensitivity reaction, he was not given Antivenin Latrodectus mactans. He was eventually admitted to the pediatric ward for further pain control. In the hospital, he received ketorolac every 6 hours and hydromorphone every 4 hours for 2 days. A consultation with the Medical Toxicology Service was not obtained. On the third hospital day, the boy began to feel better and was discharged to his home that afternoon. After discharge, his symptoms resolved completely, and he had experienced no further sequelae when evaluated 6 months later.

Case 2

A previously healthy man, age 35 years, arrived in the ED approximately 1 hour after sustaining a bite to his left middle toe from what he described as a “black spider.” He was doing yard work, wearing boots that were “open at the top,” when he felt a sudden pain in his toe. When he removed the boot to investigate, a black spider ran out. Within 5 minutes of the incident, he began feeling severe pain, cramping, and paresthesias in his left leg. The pain progressed to include his abdomen, low back, and chest. In the ED, the patient complained that the pain was so severe that it was difficult to sit or lie down. Because the patient’s description of the spider that bit him and the classic clinical syndrome, his symptoms were believed to be caused by Latrodectus envenomation.

His vital signs were as follows: blood pressure, 146/72 mmHg; respiratory rate, 18 breaths/min; heart rate, 71 beats/min; temperature, 97.8°F; pulse oxygen saturation, 99% on room air. He appeared uncomfortable and was treated with intravenous diazepam and ketorolac, which did not provide relief. During his ED stay, his pain became more severe, requiring multiple doses of hydromorphone for control. The patient stood bent over the gurney and appearing very uncomfortable. His lungs were clear, and findings on his cardiac and abdominal examinations were normal. His left middle toe showed no discernible bite marks, swelling, or erythema.

Because of the patient’s severe pain, the medical toxicologist thought that Latrodectus antivenom would be appropriate for treatment. The benefits and risks of treatment were discussed, and then the patient stated, “I would rather die taking the medicine than feel the pain the way I do.” One vial of Antivenin Latrodectus mactans (2.5 mL) was infused intravenously during a 30-minute period. Within 15 minutes of infusion completion, he began experiencing relief. No further hydromorphone was required. He was observed in the ED for 2 hours and then discharged to his home. A follow-up appointment was scheduled for 48 hours later, but he did not keep it. A review of the medical records showed no return visits to the ED and no further clinic visits by the patient. He was not available for long-term follow-up assessment.

Case 3

A woman, age 24 years, arrived in the ED and said that she had sustained a black widow spider bite on her right shoulder. The spider was on a shirt that she put on. The patient had mild erythema without swelling at the bite site. She complained of severe pain and muscle cramps in the shoulder, neck, and back. Her vital signs
were as follows: blood pressure, 143/94 mmHg; respiratory rate, 18 breaths/min; heart rate, 101 beats/min; temperature, 97.8°F; pulse oxygen saturation, 99% on room air. She appeared extremely uncomfortable. Her lungs were clear, and findings on her cardiac and abdominal examinations were normal. She was treated with hydromorphone, ketorolac, metoclopramide, and lorazepam, which provided minimal relief.

*Latrodectus* antivenom therapy was recommended by the medical toxicologist because of her severe pain. After intravenous infusion of a single vial (2.5 mL) of Antivenin *Latrodectus mactans*, the patient experienced significant relief and required no further pain medication. She was discharged to her home after 2.5 hours of observation. She did not return to the ED or to her primary physician for further treatment. At a follow-up evaluation more than 1 year after the incident, she reported having no further sequelae after leaving the ED and no symptoms of serum sickness.

**Case 4**

A boy, age 8 years, was brought to the ED by his mother approximately 3 hours after sustaining a black widow spider bite to his right second toe. The spider was in a shoe that the boy put on. The mother had brought the spider to the ED, and it was clearly identifiable as a female black widow. The patient complained of severe pain that began in his foot and then progressed to his leg, low back, abdomen, and chest.

At presentation, his vital signs were as follows: blood pressure, 134/92 mmHg; respiratory rate, 26 breaths/min; heart rate, 96 beats/min; temperature, 97.8°F; pulse oxygen saturation, 96% on room air. He appeared to be in distress. He was diaphoretic. His abdomen was tight, and he exhibited diffuse guarding. His lungs were clear, and findings on his cardiac examination were normal. There was mild erythema of his right second toe, but there were no identifiable puncture marks. While in the ED, the patient began to complain of difficulty breathing. He was treated with morphine and diazepam, which did not provide relief.

*Latrodectus* antivenom was recommended by the on-call toxicologist for treatment of his severe pain. A single vial (2.5 mL) of Antivenin *Latrodectus mactans* was infused intravenously during a 20-minute period. During infusion, he began experiencing relief of his symptoms. Within 20 minutes, he was feeling better and described his pain as being at a level of 1 on a scale of 1 to 10. After 1.5 hours of observation in the ED, he was released to his home. He was seen for a follow-up evaluation 2 days later and reported no further pain and had required no oral pain medication. At a follow-up evaluation more than 1 year later, he reported no further sequelae and no symptoms of serum sickness.

**Discussion**

Of the four cases discussed here, three involved bites to the feet and one to the right shoulder. One patient was treated without antivenom, and the other three patients were successfully and safely treated with Antivenin *Latrodectus mactans*. We believe that the rapid symptomatic improvement and favorable outcomes we observed in these cases were directly attributable to the use of spider antivenom. Antivenom provides rapid pain relief and may help to avoid hospital admissions and/or repeat ED visits.

*Latrodectus* venom is one of the most potent poisons by volume, containing at least five insecticidal toxins, a vertebrate-specific neurotoxin (α-latrotoxin), and one toxin affecting crustaceans. The primary toxin responsible for the envenomation syndrome in humans is α-latrotoxin. The neurotoxin binds to specific presynaptic receptors (neurexin 1a and CIRL) that precipitate neurotransmitter release, particularly norepinephrine and acetylcholine.

Release of these neurotransmitters is responsible for the classic envenomation syndrome seen with these bites.

Black widow spider bites occur most commonly to the lower extremities, followed by the upper extremities and then the trunk. Interestingly, reports of early series noted higher numbers of bites to the trunk (ie, the buttocks and genitalia) related to outhouse exposures. No association between bite location and envenomation severity has been found. Local bite site findings are variable, including tiny puncture marks, mild erythema, and an erythematous target-like lesion (Figure 2). Symptoms of envenomation include diaphoresis, hypertension, muscle cramping, weakness, and pain either near or distant from the site of envenomation. The most common presenting symptoms are...
The Envenomation Spider Latrodectus Case Black with Treatment success at best. In addition, laxants. Past trials involving these opioid analgesics and muscle re-

Table 1. Signs and symptoms of black widow spider envenomation

| Local pain at envenomation site |
| Local diaphoresis of envenomation site and/or extremity |
| Muscle pain in envenomated extremity |
| Generalized muscle pains in back, abdomen, and/or chest (may mimic “acute abdomen”—severe abdominal pain of acute onset and of unknown cause) |
| Diaphoresis remote from envenomation site |
| Facies latrodectismica (painful grimace, flushing, diaphoresis, tachycardia, and/or hypertension) |
| Abnormal vital signs (tachypnea, tachycardia, and/or hypertension) |
| Shortness of breath |
| Nausea and vomiting |
| Headache |
| Priapism (rare) |
| Myocarditis (rare) |

abdominal and/or back pain that may be very severe and difficult to treat (Table 1). Severe abdominal pain mimicking “acute abdomen” has even been reported.15 Although these symptoms can be extremely uncomfortable, permanent disability and death are rare.1,7 Treatment of black widow spider envenomation can be challenging, often necessitating large doses of pain medication and/or hospital admission. In one study, 52% (39 of 76) of patients with black widow bites who did not receive antivenom required hospital admission for further treatment.3 The traditional therapies for black widow spider envenomation are aimed at providing symptomatic relief while venom effects resolve. These include primarily opioid analgesics and muscle relaxants. Past trials involving these therapies have shown partial success at best.3,6,16 In addition, calcium therapy was once considered to be an antidote for black widow envenomation.17 Calcium was thought to stabilize nerve membrane permeability, resulting in decreased neurotransmitter release.16,17 Although this effect was demonstrated in vitro and reported in some early clinical series, subsequent experience has not shown effectiveness. Therefore, calcium therapy has lost favor in the medical toxicology community.3-6 The only therapies with proven effectiveness are opioid analgesics and black widow spider antivenom. Antivenin Latrodectus mactans is an equine-derived antivenom based on immunoglobulin G.4,10,19,20 The proposed pharmacologic mechanism is binding of venom toxic constituents by the antivenom antibodies. A single vial (2.5 mL) generally provides adequate relief in human (adult or pediatric) poisoning cases.3,5,14,19,21 The Kaiser Permanente (KP) acquisition cost for one vial of Antivenin Latrodectus mactans was $27.71 in 2011. In the largest series reported to date of moderate to severe black widow spider envenomation (n = 163), patients treated with antivenom experienced a much shorter duration of symptoms and were less likely to be admitted to the hospital than those who did not receive antivenom.5 Relief of symptoms occurred within an average of 31 minutes of antivenom infusion.5 Administration of antivenom even late in the course of envenomation has been reported to be effective.21,22 In one reported case, antivenom was used effectively for the treatment of symptoms 90 hours after a black widow spider bite.22

Acute hypersensitivity reactions are the most feared complication associated with Antivenin Latrodectus mactans administration. Although these reactions do occur, relatively few minor reactions have been reported.3,6,14 and only one report of a severe reaction can be found in the medical literature.3 Unfortunately, that one case is frequently cited as the reason to avoid administering antivenom to symptomatic patients.3,6 Critics believe that because black widow spider envenomation is generally a nonfatal condition, it is too risky to administer such treatment with even a single reported fatality reported in the medical literature. The case at the heart of controversy, however, involved a young woman with history of asthma and multiple medication allergies who received a rapid, undiluted bolus of antivenom. She had a severe hypersensitivity reaction. Unfortunately, her resuscitation was complicated by a pneumothorax and a protracted hospital stay, and she eventually died.5,6 Although that case was tragic, we do not believe that it represents sufficient evidence for abandoning antivenom use on the grounds that it is unsafe. The current package insert for Antivenin Latrodectus mactans calls for infusion of diluted antivenom during a period of 15 to 30 minutes.30 At these slower infusion rates, immediate hypersensitivity appears to be extremely rare.6 We believe that antivenom, when given correctly, is safe and should be considered in cases of envenomation with systemic symptoms or severe local symptoms. Though it is not mentioned on the package insert for Antivenin Latrodectus mactans, patients may be pretreated with diphenhydramine and/or steroids in an attempt to blunt a hypersensitivity response.5,6 Multiple
allergies, asthma, or past reactions to equine-based products should be considered contraindications.\textsuperscript{10}

Black widow spider envenomation in pregnancy has been recommended as an indication for antivenom because of the risk of venom-induced abortion or other possible harm to the fetus\textsuperscript{1-3}; however, the actual risk is not known. In one report of a poison-center study of 97 black widow spider bites in pregnant females, there were no miscarriages.\textsuperscript{24} Although Antivenin \textit{Latrodectus mactans} is a category C drug, it has been given in pregnancy without consequence.\textsuperscript{5,26} Even though absolute safety is impossible to prove, there is nothing currently to suggest that spider antivenom is unsafe in pregnancy. Antivenin \textit{Latrodectus mactans} does contain the preservative thimerosal, but the amount of mercury associated with an antivenom dose would not be expected to cause fetal harm.\textsuperscript{24}

The package insert for Antivenin \textit{Latrodectus mactans} does warn of the potential for (delayed) serum sickness after antivenom administration. In contrast to equine-based snake antivenom (Antivenin \textit{Crotalidae} Polyvalent [Wyeth-Ayerst, West Greenwich, RI]), which required much larger doses and was associated with serum sickness in the majority of patients, \textit{Latrodectus} antivenom usually requires only a single vial, and there are few reports of serum sickness from it.\textsuperscript{10,14} Although the exact rate of serum sickness after black widow spider antivenom is unknown, our review of the literature leads us to believe that it is low. In one study of Australian red-back spider antivenom (a similar antivenom product, Antivenin \textit{Latrodectus basi/li} [CSL Limited, Parkville, Victoria, Australia]), the incidence of serum sickness was 1.7%.\textsuperscript{11}

Antivenin \textit{Latrodectus mactans} has been used for more than 70 years. A new Fab antibody-based antivenom is currently in development and in phase 3 trials. The hope is that this product will be equally effective but carry a lower risk of hypersensitivity reactions.

KP Northern California has a regional on-call Medical Toxicology consultation service offering assistance in treating poisoned patients.

**Conclusion**

In three of four cases of symptomatic black widow spider envenomation, we administered Antivenin \textit{Latrodectus mactans} and observed rapid and complete resolution of symptoms. These cases demonstrate the safe and effective use of spider antivenon. Our review of the literature suggests that the witnessed effects of antivenom are usual, which leads us to believe that Antivenin \textit{Latrodectus mactans} is safe when given correctly.

**Disclosure Statement**

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**Acknowledgment**

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**References**

15. Bush SP. Black widow spider enven-
The Treatment of Black Widow Spider Envenomation with Antivenin Latrodectus Mactans: A Case Series

A Timid Little Beastie

Consider the black widow spider. It’s a timid little beastie, useful and, for my taste, the prettiest of the arachnids, with its shiny, patent-leather finish and its red hourglass trademark. But the poor thing has the fatal misfortune of possessing enormously too much power for its size. So everybody kills it on sight.

— Stranger in a Strange Land. Robert A Heinlein, 1907-1988, American science fiction author
CASE STUDY

Acute Myocardial Infarction due to Coronary Artery Embolism in a Patient with a Tissue Aortic Valve Replacement

Joel T Levis, MD, PhD, FACEP, FAAEM
Geoffrey Schultz, MD
Philip C Lee, MD, FACC

Abstract

Acute occlusive embolism to the coronary arteries resulting in acute myocardial infarction (AMI) is an uncommon occurrence. Although cases of patients with mechanical prosthetic heart valves resulting in this phenomenon have been reported in the setting of inadequate anticoagulation, reported cases resulting years after tissue aortic valve replacement (AVR) are rare. We report the case of a 50-year-old man who underwent a tissue AVR four years earlier and presented to the Emergency Department (ED) with an ST-segment elevation myocardial infarction. ED door-to-balloon time was delayed (at 115 minutes) because of pre-existing left bundle branch block on electrocardiogram. Emergent coronary angiography demonstrated complete occlusion of the left anterior descending coronary artery by a coronary embolus. The patient was successfully treated with percutaneous transluminal coronary angioplasty and aspiration thrombectomy, and subsequently underwent a transesophageal echocardiogram demonstrating thrombus on the tissue aortic valve prosthesis. This case demonstrates that coronary embolism resulting in AMI, while rare, can occur in patients years after tissue AVR surgery.

Case Report

A 50-year-old man who underwent a tissue aortic valve replacement (AVR) (23 mm Magna pericardial tissue heart valve) four years earlier for bicuspid aortic valve and aortic stenosis, presented to the Emergency Department (ED) complaining of sudden onset chest discomfort with radiation to his left arm. The discomfort began 20 minutes before arrival in the ED while he was lifting heavy weights. Medical history was notable for a coronary angiogram immediately prior to his AVR without significant coronary artery disease,

Figure 1. 12-lead electrocardiogram (ECG) from a 50-year-old man presenting to the Emergency Department with chest discomfort (panel A), compared with a previous ECG obtained from the same patient four years earlier (panel B).

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CASE STUDY

Acute Myocardial Infarction due to Coronary Artery Embolism in a Patient with a Tissue Aortic Valve Replacement

The patient was a well-developed, middle-aged man who appeared to be in no acute distress. Vital signs demonstrated an oral temperature of 98.6°F (37°C), pulse 60 beats/minute, blood pressure 115/72 mm Hg, respirations 20 breaths/minute, with an oxygen saturation of 100% on room air. Physical examination, including the heart and lungs, was entirely normal. A 12-lead electrocardiogram (ECG) was obtained in the ED (Figure 1, panel A), which demonstrated a normal sinus rhythm, left bundle branch block (LBBB) (present on previous ECG, figure 1, panel B) with new ST-segment concordance with the QRS waves and slightly more prominent ST-segment elevations in leads aVL and V5. The patient was initially felt not to meet criteria for an ST-segment elevation myocardial infarction (STEMI). Laboratory tests were significant for a troponin I of 0.45 ng/mL (normal range 0.00-0.09 ng/mL). Treatment for presumed acute coronary syndrome was initiated with oral aspirin, clopidogrel, and sublingual nitroglycerin. The patient was given intravenous amiodarone 150 mg over 10 minutes, and was rushed to the cardiac catheterization laboratory (pulse 56 beats/minute, blood pressure 106/54 mm Hg at time of transfer). Angiography demonstrated a complete occlusion of the proximal left anterior descending artery, with angiographic features strongly suggestive of an embolic event (Figure 2, panel A), and akinesis of the mid to distal anterior wall and apex of the left ventricle. Successful percutaneous transluminal coronary angioplasty with balloon angioplasty and aspiration thrombectomy (6 French Export AP Catheter; Medtronic, Inc; Minneapolis, MN, USA) was undertaken with successful recanalization of the left anterior descending artery (Figure 2, panel B). Gross and microscopic pathological examination of the aspirated material by the pathologist confirmed the presence of thrombus. The patient was continued on unfractionated heparin, and warfarin therapy was initiated. A transesophageal echocardiogram (TEE) performed on hospital day #2 demonstrated 0.5 x 0.5 cm echodensities associated with the leaflets (but not the struts) of the tissue aortic valve prosthesis, consistent with thrombi (Figure 3, panel A, arrows). These thrombi were adjacent to the left main ostium; notably, no thrombi were seen in the left atrium. The patient was discharged neurologically intact on hospital day #5 with instructions to continue warfarin, enoxaparin (until warfarin therapeutic), aspirin, losartan and simvastatin as an outpatient.

Discussion

In patients with significant aortic valve disease, replacement with prosthetic mechanical valves or with tissue valves (porcine or pericardial xenograft) remains the current standard treatment.1 In clinical practice, valve selection is based on several factors, including patient age, valve position (aortic vs mitral), patient comorbidities, the risks and benefits of anticoagulation, and

Figure 2. Coronary angiogram from a 50-year-old man demonstrating acute occlusion of the proximal left anterior descending artery by the coronary thrombus (panel A, arrow), and following successful percutaneous transluminal coronary angioplasty, suction thrombectomy and recanalization of the left anterior descending coronary artery (panel B, arrow).
CASE STUDY

Acute Myocardial Infarction due to Coronary Artery Embolism in a Patient with a Tissue Aortic Valve Replacement

In patients with a presumed embolic coronary event, TEE has been recommended to identify any potential endocardial source of emboli.23

In one study, 55 out of 419 patients (13%) with autopsy-studied infarcts showed evidence of coronary artery embolism.28 It has been observed that most emboli involve the left coronary system, which could be because of the preferential flow into the artery related to coronary flow volume characteristics and aortic valve morphology.22 In patients with a presumed embolic coronary event, TEE has been recommended to identify any potential endocardial source of emboli.23 Percutaneous transluminal coronary angioplasty and stenting have been successfully used to treat patients with AMI resulting from coronary artery embolism.24 Conversely, catheter aspiration embolectomy (as used in this case), has been successfully employed by several authors to aspirate thrombus from a native coronary artery.8,25-28 In our case, following successful aspiration thrombectomy of the clot, the patient was continued on unfractionated heparin (as a bridge to anticoagulation) and started on warfarin to decrease the risk of further thromboembolic events.

Our patient presented with STEMI in the setting of a known LBBB. The presence of a preexisting LBBB on the ECG may conceal the changes of AMI, and delay both its recognition and treatment.29 The Sgarbossa criteria are the most validated ECG criteria for diagnosing STEMI in the presence of LBBB.29,30 These ECG criteria include:

1) ST-segment elevation >1 mm concordant with QRS complexes;
2) ST-segment depression >1 mm in lead V1, V2; and
3) ST-segment elevation >5 mm discordant with QRS complex. The application of the Sgarbossa criteria has resulted in low sensitivities and high specificities for identifying patients with known LBBB and STEMI.29-31 The
low sensitivity limits their utility in clinical practice, as diagnostic tests for AMI need to be highly sensitive to detect most cases.29

Our patient was not taking aspirin or any antiplatelet agent at the time of his STEMI. The 2006 American Heart Association/American College of Cardiology Guidelines for Management of Patients with Valvular Heart Disease recommend long-term aspirin for all recipients of bioprosthetic heart valves (Class I, level of evidence C).32 The fact that our patient was not using an antiplatelet agent may have played a role in development of the AVR thrombus and subsequent coronary artery embolism.

We report the case of a man presenting with a STEMI resulting from acute coronary embolism in the setting of a tissue AVR performed four years earlier. The thrombus was successfully aspirated during coronary angiography, with the source of the coronary thrombus arising from the tissue AVR leaflets, as visualized by TEE. Following warfarin anticoagulation for six weeks, repeat TEE demonstrated near resolution of the AVR thrombi. Our case demonstrates that although rare, embolism from tissue prosthesis valves to the coronary artery can occur, resulting in life-threatening AMI. In such cases, emergent coronary angiography (with aspiration thrombectomy, percutaneous transluminal coronary angioplasty, and/or coronary artery stenting), TEE, and treatment with anticoagulation therapy are effective management strategies.

Disclosure Statement

The author(s) have no conflicts of interest to disclose.

References

CASE STUDY

Acute Myocardial Infarction due to Coronary Artery Embolism in a Patient with a Tissue Aortic Valve Replacement


The Hot Organ

In the midst of [the lungs] is seated a hot organ, the heart, which is the origin of life and respiration.

It imparts to the lungs the desire of drawing in cold air, for it raises a heat in them; but it is the heart which attracts.

If, therefore, the heart suffer primarily, death is not far off.

— On Pneumonia, Aretaeus, the Cappadocian, 2nd Century AD Greek physician
Image Diagnosis: Pneumomediastinum

Figure 1. Anterior-posterior chest radiograph
An adolescent girl, age 14 years, presents to the Emergency Department after one week of cough with chest pain, neck pain, and shortness of breath.

Chest radiograph shows pneumomediastinum. Air is seen outlining the mediastinal structures and the pericardium. Pneumomediastinum can occur because of the increased pressures seen with sneezing, coughing, vomiting, and the Valsalva maneuver.

Figure 2. Anterior-posterior neck radiograph
Anterior-posterior view of the neck in the same patient shows significant subcutaneous emphysema throughout the neck soft tissues extending into the upper chest.
Climate Change: It’s Not About the Weather—Continuing Medical Education and Maintenance of Certification and Licensure

Carol Havens, MD
Jeffrey Mallin, MD

State of Health Care in the US

Many feel that the impending acceleration of global warming is the greatest threat that our species has ever faced. Less arguable but already having an impact is a drastic climate change in health care. Not only is it shaking up health care delivery and insurance, but its effects are visible on the education, training, certification, and accreditation systems of physicians and other health care professionals and organizations throughout the US.

The US public is increasingly questioning medical care. Well-publicized cases of poor quality of care, wide variations in practice, embarrassing failures to achieve good patient outcomes (such as routine preventive care, hypertension control, management of chronic disease, and prevention of postsurgical infections), escalating health care costs, and interactions between physicians and commercial entities have led to increasing public outcry and legislative scrutiny.

It seems as if Mother Nature’s vengeance is palpable already.

In 2001, the Institute of Medicine described US health care in crisis, with 30-40% of patients not getting evidence-based care and with 25% of the care delivered not needed or actually harmful to patients. Evidence demonstrates overuse, underuse, and misuse, even in situations with appropriate access to care.

A whole alphabet soup of health care-related organizations and groups has been trying to develop better methods of oversight in their areas of control.

Fortunately, all those groups are also now aligning around the common goal of improving patient care and protecting the public through a focus on performance assessment and improvement. They are creating systems that actually support each other rather than generate differing and sometimes bewildering requirements.

Realistically, physicians are only one part of the problem, and that means that we’re only one part of the solution. The systems and environments in which we practice, access to care, other health care professionals, and patients themselves play significant roles, too. But the challenge for us as physicians is to see how our role is changing and how the “be all and end all” is “Quality” of care (with a capital Q).

There are many factors driving up the Quality of care, and these include respected quality constructs (such as, Plan-Do-Study-Act and Six Sigma), electronic health records (such as, Kaiser Permanente HealthConnect), clinical decision support systems, public reporting, and pay for performance. There is also a relatively new construct called Continuous Professional Development. Think of it as Continuing Medical Education (CME) Version 2.0.

New Face of Continuing Medical Education

Similar to how The Joint Commission sets hospital standards for accreditation, requirements in the US regarding CME are directed by the Accreditation Council for Continuing Medical Education (ACCME). The ACCME is a national organization formed through and accountable to the joint membership of seven other key national organizations (Table 1). Directly or

<table>
<thead>
<tr>
<th>Table 1. ACCME member organizations</th>
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<tr>
<td>American Board of Medical Specialties (ABMS)</td>
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<tr>
<td>Federation of State Medical Boards (FSMB)</td>
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<td>American Medical Association (AMA)</td>
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<td>American Hospital Association (AHA)</td>
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<td>Association for Hospital Medical Education (AHME)</td>
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<td>Association of American Medical Colleges (AAMC)</td>
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<td>Council of Medical Specialty Societies (CMSS)</td>
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ACCME = Accreditation Council for Continuing Medical Education
indirectly, the ACCME accredits organizations that offer CME activities for AMA PRA Category 1 Credit. Whereas the credit system was developed and is maintained by the American Medical Association (AMA),10 the ACCME identifies, develops, and promotes standards for accredited CME providers nationwide who in turn offer CME activities to physicians.11 Just as medicine evolves over time, so have these standards.

The most recent CME standards, released in September 2006, explicitly require that CME activities support improvements in the Quality of care. Key components of the 2006 Accreditation Criteria require that CME activities relate to the actual scope of practice of physicians, narrow the differences between current practice and best practice, use formats that will meet the desired results, use evidence-based content, and are independent from commercial influence.12 Acceptable outcome measurements for CME activities focus on changes in physicians’ skills or abilities, actual performance on the job, or patient outcomes (Table 2).

The necessary skill set of physicians includes more than just clinical knowledge. Therefore, the content of CME must also address more than merely knowledge and include communication, working in teams and systems, use of information technology, patient-centered care, professionalism, commitment to lifelong learning and quality improvement, among other key attributes identified from health care organizations and professional societies. These competencies largely derive from those defined by the Institute of Medicine, the Accreditation Council for Graduate Medical Education, and the American Board of Medical Specialties.13 Essentially all these organizations are coming to closer agreement on what defines a quality and qualified practicing physician (Table 3).

Conventional CME has often been stand-alone lectures to large, diverse audiences featuring experts of national reputation flown in from far away delivering essentially canned presentations. New and improved models of CME are emerging to meet the different needs and learning styles of today’s physicians and health care system. CME is increasingly taking on new forms. Some examples of this include “just-in-time learning” in the work setting or online (eg, Internet Point of Care CME activities, Committee Learning CME Activities); problem-based, team and systems learning and change (eg, Performance Improvement CME Activities); and multi-interventional, experiential, and/or self-assessed curricula around particularly complex areas of practice.

How effective CME is at improving patient care is a longstanding question that still cannot be accurately answered. The limited evidence to date (almost exclusively based on conventional lecture formats) does show that CME can be effective in changing physician knowledge and performance.14,15 But not all CME is created equal.

Compared to older standards, the 2006 CME criteria help ensure that CME activities are not only more effective, but also more strategically important to physicians, health-related organizations and the public (ie, our patients).16 CME is no longer only about “getting credit.” Today’s CME is a means to an end—not the end in itself.

At its best, CME is a change agent. And a powerful one at that—partly because its credits are still of value to physicians and other health care professionals.

You’re probably now wondering what happened to the idea that CME is something that I need to do to maintain my medical license and prepare for my Board recertification. Why is CME so “difficult” now when that’s really all I want from it?

### Table 2. ACCME accreditation criteria for Continuing Medical Education activities (partial list)

| Educational needs on the basis of physician learners’ own professional practice gaps |
| Designed to change physicians’ abilities or skills, performance, or patient outcomes |
| Content matches scope of practice |
| Format appropriate to the desired results |
| Supporting general physician competencies or attributes |
| Independent of commercial interests |
| Free of commercial bias and promotion |
| Valid content |

ACCME = Accreditation Council for Continuing Medical Education

### Table 3. American Board of Medical Specialties core physician competencies (attributes)

| Patient care |
| Medical knowledge |
| Interpersonal and communication skills |
| Professionalism |
| Systems-based practice |
| Practice-based learning and improvement |

New Face of Board Recertification and License Renewal

The answer lies in the fact that maintaining Board certification and a medical license is no longer an episodic event every so many years. Like CME, the American Board of Medical Specialties (ABMS) and the Federation of State Medical Boards (FSMB) (who set the
... practicing physicians will need to participate in an ongoing process of continuous professional development and assessment ...

direction for Board certification and medical licensure, respectively) are putting a new face on these processes, and in doing so they are taking a different view of CME and CME credits. They aren’t far along in making the changes, but the winds have definitely shifted.

Maintenance of Certification (MOC) is a relatively new approach to Board certification. The ABMS, which is the umbrella organization governing all 24 recognized specialty boards, has implemented a universal policy of time-limited certificates (no more lifetime certification!) and a process for maintenance of certification (ie, continuous process), rather than recertification (ie, one-time process). The biggest change is that instead of just having to get a certain number of CME credits and pass a test every 7-10 years, now there are additional requirements.

The ABMS and all their member boards have agreed to an expanded 4-part MOC process (Table 4).

Yes, there is still an exam to take and CME activities to do, but there is more. Each of these four components is required for all boards, even those each board gets to set its own process for how MOC will be implemented, and some are further along in this process than others. ABMS and the individual boards might be prescriptive in terms of which CME activities will count, requiring that they be relevant to your specialty and perhaps even considering the role of commercial support and the relationships that the individuals involved have with commercial interests.

The Permanente Federation and the various Permanente Medical Groups are working together and with the ABMS and its member boards to support Permanente physicians in this process. Most notably, the National (Permanente Federation) and Regional CME offices are in various stages of gaining approval for physicians to use organizational quality-improvement projects in which they are already participating as their Part IV MOC. Board-approved Part II MOC activities are also being developed and offered within the organization. These efforts should drastically reduce the cost, time, and hassle otherwise typically encountered by individual physicians and outside practices struggling to meet MOC.

Maintenance of Licensure (MOL) is governed by the FSMB. The goal is to protect the public by licensing physicians who can demonstrate that they provide good care. Unfortunately, this has been difficult to assess in the absence of litigation or criminal proceedings. CME has been used as a “surrogate” marker for “competence” by many states that require it for licensure. However, as long ago as 2002, the FSMB realized that CME credit alone may be unrelated to a physicians’ competence or actual practice. Even so, they have struggled to find other ways to assess physicians.

In late 2010, the FSMB released a recommendation for all state licensing boards to adopt requirements similar to those required for MOC, including participating in CME, a proctored exam, and performance improvement (Table 5). They also recommended that this be a 5-year cycle, and that all 70 state licensing medical and osteopathic boards adopt this within 10 years. Although this is voluntary, some states have already started implementing the requirements, and as more states adopt this policy, it will create momentum for all states to adopt. The California Board of Osteopathic Medicine already implemented these requirements; however, the Medical Board of California has not. Presumably, if your state has adopted these standards, they have or will notify you, but you can also check with them directly as this is a moving target.

Table 4. Maintenance of Certification

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<th>Part</th>
<th>Description</th>
<th>Requirement</th>
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<td>I</td>
<td>Licensure and professional standing</td>
<td>Having a valid, unrestricted medical license</td>
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<tr>
<td>II</td>
<td>Lifelong learning and self-assessment</td>
<td>Doing self-assessment by participating in regular required activities and participating in CME</td>
</tr>
<tr>
<td>III</td>
<td>Cognitive expertise</td>
<td>Taking a secure exam on specialty specific knowledge and skills</td>
</tr>
<tr>
<td>IV</td>
<td>Practice performance assessment</td>
<td>Demonstrating practice assessment and improvement</td>
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CME = Continuing Medical Education

Table 5. Maintenance of Licensure

<table>
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<th>Component</th>
<th>Requirement</th>
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<tbody>
<tr>
<td>Reflective self assessment</td>
<td>Doing self-assessment and practice assessment and participating in CME</td>
</tr>
<tr>
<td>Assessment of knowledge and skills</td>
<td>Taking a secure exam within the framework of ABMS attributes and as applied to own practice</td>
</tr>
<tr>
<td>Performance in practice</td>
<td>Using data to assess practice performance and improvement</td>
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ABMS = American Board of Medical Specialties; CME = Continuing Medical Education

For those physicians who are already “grandfathered in” to specialty Board certification or do not wish or need to maintain their Board certification, the MOL requirements will likely catch up with them because they still need to maintain their medical license. So either way you cut it, practicing physicians will need to participate in an ongoing process of continuous professional development and assessment, exemplified by
MOC and/or MOL. And—if all goes according to plan—the similarities between the two systems are going to be many, and the role of CME is going to be critical.

**Alignment between Continuing Medical Education, Maintenance of Certification, and Maintenance of Licensure**

Recognizing that CME activities that are unrelated to a physician’s actual practice does not support the vision for MOC, the ABMS has implemented a policy that only CME related to the physician’s own practice can be used to meet the CME requirements for MOC. The FSMB has endorsed a similar principle for MOL. Luckily, because CME standards now require that activities be directed at the actual or desired scope of practice, it is much easier to demonstrate this if CME activities are chosen deliberately.

It is a fundamental truth that all physicians strive to provide great care.

A goal to be mediocre does not lead to success in medical school or residency. CME is changing to provide information and tools to help physicians provide that great care. With medical information changing so rapidly and the delivery of care changing (use of technology, informatics, team based care, etc), it is difficult for physicians to keep up with advances in their own fields.

Learning about other specialties might support a more “well-rounded” physician and be of interest to some physicians; however, given the limitation of time and monetary resources for CME, the questions are: Is it better spent on topics that are of interest but limited practical use, or instead spent on CME that will help support that great care we all want to provide? If Board certification denotes competence in that specialty and medical licensure denotes being a qualified physician, then shouldn’t CME that is used to support certification and licensure be related to what we actually do within the specific scope of our practice or job?

As primary care physicians, for example, the authors may be interested in the technique of hip replacement surgery, but for our practice—and our patients—what we really need to know is how to evaluate hip pain, how to manage it and prevent it getting worse, and how to know when to refer to an orthopedist about potential replacement or other interventions. Even physicians eventually become patients. So, as patients, if we ever end up on an operating table for that hip replacement (and we hope we don’t!), we would want our surgeons to use their CME resources to learn about how to improve surgical and postsurgical outcomes, rather than about the latest controversy on breast cancer screening or the history of medicine in the 20th century.

**Continuous Professional Development**

Continuous Professional Development is the latest buzz. As we mentioned, some say it is CME Version 2.0 (Table 6). Whether or not you subscribe to that, continuous professional development and assessment are the basis of new faces of CME, MOC, and MOL.

In today’s world and going forward, physicians have more and more choices for CME opportunities, and accredited organizations that provide CME are responsible, under current CME standards, for creating activities that actually make a difference in practice.

When physicians expect and select CME activities to specifically help their practices (with content related to scope of practice, addressing actual care gaps, with tools and strategies to be able to apply the information based on the best and unbiased evidence), the entire health care system in the US will reap the benefits. Physicians will be poised for success in MOC and MOL, and patients will experience improved Quality of care (remember, with a capital “Q”).

We should demand nothing less!

And who knows? We might just come out of this climate change and realize that we have actually supported our fundamental desire as physicians to provide great care.

**References**


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**Table 6. Comparison of attributes of Continuing Medical Education and Continuous Professional Development**

<table>
<thead>
<tr>
<th>Continuous Medical Education</th>
<th>Continuous Professional Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Episodic</td>
<td>Lifelong</td>
</tr>
<tr>
<td>Time specific</td>
<td>Continuous</td>
</tr>
<tr>
<td>Group learning</td>
<td>Individualized learning</td>
</tr>
<tr>
<td>Teacher driven</td>
<td>Learner driven</td>
</tr>
<tr>
<td>Covers clinical domains only</td>
<td>Covers full spectrum of profession</td>
</tr>
<tr>
<td>Physician as practitioner</td>
<td>Physician as health care team member</td>
</tr>
<tr>
<td>Lecture based</td>
<td>Varied formats and media</td>
</tr>
<tr>
<td>Formal settings</td>
<td>Varied venues including on the job</td>
</tr>
</tbody>
</table>


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**Education**

The education of the doctor which goes on after he has his degree is, after all, the most important part of his education.

— John Shaw Billings, 1838-1913, American librarian and surgeon
As a practicing physician for the past 35 years, I am constantly looking for new tools to incorporate into my doctor’s toolkit. Brian Alman, PhD, has indeed come up with a simple, straightforward method that can help people find their “inner voice” to meet their personal challenges and reach life’s goals. Amidst an abundance of self-help books on the market, this book gets the technique across in a style that the reader can rapidly remember to use over and over again. There are multiple scenarios recounted throughout the pages that will be familiar to any clinician, or for any human being who reads and soaks up the wisdom contained therein.

These are simple, quick, and effective skills that any patient can develop and improve with practice. The individual must learn three easy steps to tap into the caring voice of one’s inner wisdom. In this way, s/he can successfully deal with any physical or emotional challenges from the past, the present, or the future. Through this “find-your-voice process,” readers begin the process of working with themselves, instead of against themselves. These teachings are based on Dr Alman’s own personal experiences that he learned dealing with his own personal health, and on the education he received from his beloved teacher, Milton Erickson, MD.

The three steps to true success are referred to repeatedly in the book and are outlined as follows: 1) Experience Your Challenge, 2) Judge Your Challenge, and 3) Resolve Your Challenge. These steps will enable readers to tap into their inner voice of wisdom and to learn to interact with the inner critic or judge who is responsible for the negative self-talk that we all encounter every day of our lives. Now readers will finally be able to deal with adverse childhood experiences of the past, issues in the present, and the concerns of the future with a new sense of confidence. In short, the readers will finally become the person they are meant to be.

This book provides great healing power, and what safer and more effective treatment can one have for mind-body healing? This wisdom can be taught by a physician to the patient in only a few minutes via the numerous down-to-earth examples that are provided in the book, or can be learned by the patients themselves since they are so clearly outlined. One will literally be using all of one’s senses by following the different scenarios that are presented. What better teacher is there than learning the proper methods to listen to one’s inner voice or TruSage as Dr Alman describes?

The usefulness of this book is that it will empower those who read it with practical tools they can count on to treat such quality-of-life issues as weight loss, pain control, relief from addictions, stress reduction, problem solving, and chronic disease management. In this way, each person has a chance to achieve an extraordinary change by learning how to experience, judge, and resolve the past, present, and future challenges we all face.

Those who read the book will gain a new understanding of the gift of their own intuition and true authentic self. Readers will focus on breathing, take notes, and draw with their nondominant hand, and practice the imagery of sitting in a movie theater and watching themselves onscreen, receiving judgment from the inner critic sitting in the 50th row and then achieving resolution of conflict by tuning in to the TruSage sitting in the back row. Once readers learn to hear the sound of their inner voices to help overcome their negative self talk, they will discover their inner wisdom as a partner forever.
BOOK REVIEW

**Connected for Health: Using Electronic Health Records to Transform Care Delivery**
by Louise L Liang, Editor

Review by Robert W Hogan, MD

**Connected for Health** is a 12-chapter, multiauthor book that chronicles the development of Kaiser Permanente’s (KP’s) HealthConnect electronic health record, the largest civilian electronic medical information project in the US. The book is edited by Louise L Liang, MD, recently retired KP Senior Vice President for Quality and Clinical Systems Support, with a Foreword by Donald Berwick, MD, well-known former President and Chief Executive Officer of the Institute for Healthcare Improvement.

Studying this book, the reader will have peered at a gargantuan creation through the eyes of multiple observers. Therein rests one of the strengths of the book: it is an insider’s account. I suggest beginning with the final chapter, Kaiser Foundation Health Plan’s CEO George Halvorson’s visionary statement. Here the reader gains a sense of the powerful vision deeply imbedded in the development of this system. Other chapters help us understand why KP undertook the rapid implementation of an enterprise-wide electronic record system: How did it carry out the task? What has it produced? What are the strengths of the system and what are its weaknesses?

A clue to the intentions behind the HealthConnect development and implementation lies in the subtitle of the book: *Using Electronic Health Records to Transform Care Delivery*, which suggests the intention to accomplish nothing less than the transformation of health care from a cumbersome paper-based record system with sluggish information movement among all involved in the enterprise (patients, staff, managers, and professionals) to an electronic-record-based system with a new set of social expectations and norms for fast-paced electronic encounters supported by convenient computerized organization and flow of information.

So, how well does this book tell the story of the conceptualization, execution, and effect of a huge and massively expensive project? The people of KP, the administrative staff, managers, employees, nurses, and physicians, will find much that rings true in the book: concepts, language, and description of process all will be familiar. Chapter authors are clearly all very familiar with the unique culture of KP, and how that culture drove the profound changes that are involved in the HealthConnect project. But the book suffers a common flaw of multiauthor books: multiple writing styles. A successful book addressing a huge health information technology project should be authoritative, clear, and comprehensive. Some sections are clear and well written, others less so. Although chapter contributors include notables from multiple segments of KP, I found it odd that so little of the book originates from Southern California, a large Region of the program. Most notably lacking in this book is any systematic attempt to assess the response of the clinicians of KP, to the implementation of HealthConnect. By these measures *Connected for Health* has limited itself to a partial success even though the thematic material is of profound importance to us.

Reading this slim volume reminded me of the parable of the blind men describing an elephant, with their distinctive and different descriptions of the creature. As a full-time clinician trained to use HealthConnect, I imagine myself to be one of the blind who has been struggling to fully comprehend the behemoth since its implementation in Southern California. As a former software developer and critic, I use HealthConnect daily and I have witnessed firsthand its impact on the lives of every KP professional around me. Reviewing a book about the development of a system as huge as HealthConnect is no minor responsibility. Using it every day, I find I have a love-hate relationship with HealthConnect. I love it when it works well for locating vital facts quickly, and I hate it when the screen design allows it to be crowded with junk, or when five steps are needed to complete a task that should take one. Years after startup, HealthConnect is still a work in progress, and as impatient as I was to have an electronic record before implementation, I am still impatient to have one that is easy to work with.

There is an apocryphal story of an interview granted by Mao Tse-Tung in which a western journalist asked the Leader of Billions his opinion about the impact of the French Revolution upon the course of Western Civilization. Mao is said to have remarked simply “It is too soon to tell.” So too with respect to HealthConnect; we will have to wait quite a while before anyone can attempt a comprehensive analysis of its impact on KP as an institution, on the health of its millions of members, or a dispassionate comparison with other very large electronic medical record systems. The metrics by which to carry out such a comparison have yet to be imagined.
Kaiser Permanente physicians (NUID required) may earn up to 4 AMA PRA Category 1 credits for reading and analyzing the four designated CME articles, by selecting the most appropriate answer to the questions below, and by successfully completing the evaluation form. Other clinicians for whom CME is acceptable in meeting educational requirements may report up to four hours of attendance. Please return (fax or mail to the address listed on the back of this form) to The Permanente Journal by November 30, 2011. Forms may also be completed and submitted online at: www.thepermanentejournal.org. You must complete all sections to receive credit. (Completed forms will be accepted until November 2012. Acknowledgment will be mailed within two months after receipt of form.)

### Section A.

<table>
<thead>
<tr>
<th>Article 1. (page 4)</th>
<th>Article 2. (page 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Black Men Have Lower Rates Than White Men of Biochemical Failure with Primary Androgen-Deprivation Therapy</strong></td>
<td><strong>Building Teams in Primary Care: What Do Nonlicensed Allied Health Workers Want?</strong></td>
</tr>
<tr>
<td>In patients with prostate cancer undergoing androgen deprivation therapy, black men had:</td>
<td>What factor influenced nonlicensed allied health workers' experience as health coaches with the Teamlet Model of care?</td>
</tr>
<tr>
<td>a. no difference in treatment failure</td>
<td>a. decreased relationships with patients</td>
</tr>
<tr>
<td>b. higher risk of treatment failure by 66%</td>
<td>b. increased salary for their new roles</td>
</tr>
<tr>
<td>c. lower risk of treatment failure by 34%</td>
<td>c. ability to make independent clinical decisions</td>
</tr>
<tr>
<td>d. higher treatment failure only compared with white men</td>
<td>d. having inadequate time and space to carry out activities</td>
</tr>
</tbody>
</table>

This article states that the advantage of using a managed care population in studying ethnic differences in prostate cancer is that:

a. equal health care among the ethnic groups allows for a more accurate assessment of the true biologic disease
b. socioeconomic differences are more pronounced and can explain the differences in results
c. the managed care population is not different from other populations
d. equal health care among ethnic groups allows better assessment of their socioeconomic differences

In recruiting and selecting nonlicensed allied health workers as health coaches, an important factor to consider is:

a. clinicians' willingness to work in a team-based care model
b. desire and motivation of the health worker to assume new role
c. preferentially using existing staff who are already familiar with the clinical practice setting
d. exclusively consider medical assistants for the role of health coach

The Kaiser Permanente National Continuing Medical Education Program (KPNCMEP) is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians. The KPNCMEP designates this educational activity for 4 AMA PRA Category 1 credits. Each physician should claim only those hours of credit that s/he actually spent in the educational activity. All editors, reviewers, and authors have no conflicts of interest to disclose; where any possible conflict is indicated, it has been reviewed and found not to have any impact on the article content.
CME Evaluation Program

Article 3. (page 19)
Coffee, Caffeine, and Risk of Hospitalization for Arrhythmias

Which of the following properties of coffee might be related to cardiovascular effects?
- a. sympathomimetic actions via catechol release
- b. effects on low-density-lipoprotein (LDL) cholesterol
- c. antioxidant effects
- d. adenosine antagonism
- e. all of the above

What do the authors of this report conclude about relations of coffee and caffeine to risk of hospitalization for arrhythmias?
- a. there is convincing evidence that moderate intake of coffee causes arrhythmias
- b. it is unlikely that moderate intake of coffee causes arrhythmias
- c. there is convincing evidence that moderate intake of coffee protects against arrhythmias
- d. it is likely that moderate intake of coffee is unrelated to risk of arrhythmias

Objectives
1. To inculcate the use of evidence-based medicine as part of the science of medicine
2. To stress the art of medicine via enhanced patient-physician communication, improved care experience for patients, and more satisfying caregiving experience for physicians and staff through better teamwork
3. To review appropriate updates on the diagnosis and treatment of clinical conditions
4. To describe infrastructure and systems improvements that lead to improvements in outcomes and patient care experiences

Section B. Referring to the CME articles and the stated objectives, please choose your level of agreement next to each statement as appropriate.

<table>
<thead>
<tr>
<th>Article 1</th>
<th>Article 2</th>
<th>Article 3</th>
<th>Article 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>The article covered the stated objectives.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I learned something new that was important.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I plan to use this information as appropriate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I plan to seek more information on this topic.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I understood what the author was trying to say.</td>
<td></td>
<td></td>
<td></td>
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</table>

Section C. What change(s) (if any) do you plan to make in your practice as a result of reading these articles?

Section D. (Please print)

Name __________________________
Title __________________________
NUID # __________________________
E-mail __________________________
Address __________________________
Signature __________________________
Date __________________________

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