Original Research & Contributions

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Mr. Larsen is a Clinical Microbiologist in the Bacteriology Department of the Northern California Regional Laboratory in Berkeley, CA. He uses photography as a refreshing excuse to get away from the busy laboratory to peaceful locations and to indulge in his re-energizing hobby.

In a retrospective cohort study (1998-2007), we studied 1047 men (older than 35 years) within a large integrated health care system, 572,356 (28%) had prostate-specific antigen (PSA) screening. Patterns of screenings varied markedly by age, race, and physician. The best frequency were in men younger than 45 years (19%), and older than 85 years (15%). PSA screening was most common in white men (33.5%) and in men seen by physicians of the same race/ethnicity (32%), compared with men with physicians of disparate racial/ethnicity (26%, p < 0.001).

In a retrospective analysis of infection rates at Kaiser Sunnyside Medical Center, from the National Quality Improvement Program (NQIP) database, the authors reviewed overall, superficial, deep, and organ-space surgical site infections (SSIs). As a baseline, there were 460 colorectal cases from January 2006 to December 2009. After a colorectal case bundle of interventions was implemented January 2010 through June 2011, there were 13 infections in 96 cases, a 4.67% rate. The overall decrease of 14.49% from baseline, and the decrease of superficial SSIs from 15.12% to 3.59% were both significant (p < 0.001). The rate for deep and organ-space SSIs showed a nonsignificant decrease. The NQIP observed a targeted goal for colorectal SSIs decreased from a range of 1.27 to 1.83 to 0.54 post implementation.

In the article reports an observational analysis of the average pain outcomes and medication use reported at every TCM visit. Among the nausea and vomiting predominant symptom, users were asked if they would recommend an NDAO use—only 24% said yes. This is a trend that continued over the month. There were no indications that pain reduction during TCM treat- ment was influenced by drug use.

In ultrasound Measurements in Hypertrophic Pyloric Stenosis Don’t Let the Numbers Fool You, Moreno Said, MD, Donald Booth, MD, Michelle Fujimoto, MD, Gary Rainbow, MD, Romain M Sydorak, MD, Harry Applebaum, MD. In a retrospective analysis of 189 patients with hypertrophic pyloric stenosis (means of 4.5 weeks, 3.9 g, 0.42 cm muscle thickness, and 1.1 cm muscle length that were treated at a single institution over a 5-year period (2005-2010), analysis showed a significant relationship between body age and weight and the muscle thickness. No significant relationship existed between pyloric length and age or weight.

In a longitudinal study of patient, family, and caregiver needs, Karen Tallman, PhD, Ruth Greenwald, MD, MM, Alice Bolln- mimer, MM, Laurel Pentek! little is known about how the needs of patients with advanced illness and their families and caregivers evolve, or how effectively these needs are addressed. A video-ethnographic approach was conducted to observe and interview 12 patients and their families before, during, and after an important palliative care consult at 3 urban Medi- cal Centers. This longitudinal approach highlighted areas for improvement, which include clear, integrated communications in the hospital and con- ducive, comprehensive care support for patients not under hospice care and for their families and caregivers.

In a study of demographic characteristics of a population of a large, integrated health care system, compared with US Census Bureau Data, Cornelia Kromholz, PhD, MD, AnnMarie McCormick, PhD, MD, Dr. Michael K Greenfield, MD, Ms. Chuan K Chua, PhD, Ms. Ryan J Yen, MPH, Ning Smith, PhD, Wansu Chen, MD, Steven Jacobsen, MD, PhD, on review of demographic characteristics of Kaiser Permanente Southern California (KPSC) in 2000 and 3,957,559 members in 2010, compared with those of the underlying population in the coverage area based on US Census Bureau Data. Similarities included neighborhood edu- cational levels, household income, race, sex, and the proportion of Hispanic/Latino. However, KPSC members included more African-Americans. These findings suggest that setting may provide skill differences for clinical, epidemiologic, and health services research.
**CASE STUDIES**

### 60 Lymphoepithelial Carcinoma: A Case of a Rare Parotid Gland Tumor

Christopher G Tang, MD; Thomas M Schmidt-Knecht, MD; Grace Y Tang; Luke J Schloegl, MD; Barry Ragon, MD

A 29-year-old woman presented with a 10-month history of an enlarging left-sided facial mass. The patient received a total left parotidectomy and a selective neck dissection. A lymphoepithelial carcinoma of the parotid is a rare salivary gland tumor accounting for less than 1% of all salivary gland tumors. Complete resection of this poorly differentiated carcinoma followed by postoperative radiation is essential for local control.

### 63 Neurothekeoma in the Posterior Fossa: Case Report and Literature Review

Daniela Alexandru, MD; Radha Satyaved, MD; William So, MD

Neurothekeoma is a benign nerve sheath tumor (myxoma), though intracranial neurothekeoma is an extremely rare entity (only 3 cases reported in the literature): A case is presented of a 40-year-old man with a very large neurothekeoma present in the posterior fossa who had no neurologic deficit on presentation.

### CLINICAL MEDICINE

### 65 Nailing the Diagnosis: Koilonychia

Vivek Kumar, MD; Sourabh Aggarwal, MD; Alka Sharma, MD; Vishal Sharma, MD

Koilonychia is an abnormality of the nails that is also called spoon-shaped (concave) nails. It is primarily recognized as a manifestation of chronic iron deficiency, resulting from malnutrition, gastrointestinal blood loss, worms, gastrointestinal malignancy, and celiac disease. Other causes of koilonychia are high altitude, trauma, exposure to petroleum products, and heredity.

### 66 Image Diagnosis: Foot Pain and Fever

William C Krauss, MD, FACEP

Necrotizing fasciitis is characterized by widespread necrosis of the subcutaneous tissue and fascia (as evidenced by air on this patient’s plain films). Typical sites for this infection are the lower extremities, abdomen and perineum. The incidence of such infections, in the US, is estimated at 500 to 1500 cases per year, with a case-fatality rate of 24% and is more commonly associated with injection drug use, diabetes mellitus, immunosuppression, and obesity.

### 67 Development of a Computerized Intravenous Insulin Application (AutoCal) at Kaiser Permanente Northwest, Integrated into Kaiser Permanente HealthConnect: Impact on Safety and Nursing Workload

Christine Olinghouse, MPH/MSN, FNP-BC, BC-ADM, CDE

A review of 35 patient charts using a computerized insulin infusion tool indicated 100% accuracy in computations with a reduction of nursing workload from 2 minutes to 30 seconds per calculation. Development and operationalization of an integrated intravenous insulin calculator into HealthConnect was successfully completed at the Kaiser Sunnyside Medical Center, with 97% nursing satisfaction scores, and a promise to generate data on intravenous insulin therapy to refine the protocol.

### COMMENTARY

### 71 Solving the Emergency Care Crisis in America: The Power of the Law and Storytelling

John Maa, MD

An Emergency Department visit that ended tragically prompted a yearlong journey to Washington, DC, to explore the current crisis in emergency room care. A three-part solution includes 1) nationally standardizing and coordinating care, 2) prioritizing resources and incentives in the delivery of emergency care, and 3) inspiring young clinicians to careers in emergency care. Physicians across America should now harness the power of storytelling to strengthen both the delivery of patient care and health care reform efforts on Capitol Hill.

### NARRATIVE MEDICINE

### 75 Trifecta: Running on Hope

Carol Redding, MA

With excerpts from physicians’ notes, a patient-author recounts the physical and emotional history of personal illness that began in 1983.
ORIGINAL RESEARCH & CONTRIBUTIONS

Prostate Cancer Screening Trends in a Large, Integrated Health Care System

Lauren Wallner, PhD, MPH; Stanley Frencher, MD; Jin-Wen Hsu, PhD; Ronald Loo, MD; Joice Huang, PharmD, MBA; Michael Nichol, PhD; Steven Jacobsen, MD, PhD

Abstract

Background: As the debate over the effectiveness of prostate-specific antigen (PSA) screening for prostate cancer continues, it is increasingly important to understand how PSA screening occurs in general-practice settings.

Methods: We conducted a retrospective cohort study within Kaiser Permanente Southern California, a large integrated health care system. Men aged 35 years and older at baseline, in 1998, were eligible. The proportion of men who underwent PSA screening was estimated and compared across groups defined by patient and physician characteristics. We also evaluated trends in screening across time and serum PSA levels for all subgroups.

Results: Of 2,061,047 men, 572,306 (28%) underwent PSA screening from 1998 through 2007. Patterns of PSA screening varied modestly by age, race, and physician. The lowest frequencies of screening occurred among men younger than age 45 years (19%) and men ages 85 years and older (13%). PSA screening was most common among white men (33.5%) and in men seen by physicians of the same race/ethnicity (32%), compared with men with physicians of disparate race/ethnicity (26%, p < 0.001). PSA screening increased over time for all racial/ethnic groups and among men age 75 years and older but decreased over time for men younger than age 75 years old.

Conclusions: Nearly 1 in 4 eligible men underwent PSA screening from 1998 through 2007, and screening varied only modestly by patient and physician characteristics. Estimates of the frequency of PSA screening in general-practice settings can inform the debate and provide useful insight as to how changes in cancer screening guidelines would alter practice patterns in an increasingly integrated health care environment.

Introduction

Despite its importance as the most commonly diagnosed noncutaneous cancer and the second leading cause of cancer death among men in the US, no definitive screening tool for prostate cancer exists. Digital rectal examination (DRE) and measurement of serum prostate-specific antigen (PSA) levels are imperfect but widely used methods of early detection. Given the questionable benefit of PSA screening regarding prostate cancer mortality and the discussion surrounding the guidelines that inform its use, understanding the utilization of this test is imperative.

Central to the discussion regarding early detection of prostate cancer is the inability to distinguish between indolent prostate cancer that does not require treatment and aggressive prostate cancer that does require definitive treatment. The issues of overdetection and overtreatment of early stage prostate cancer are further compounded by the questionable accuracy of serum PSA measurements. Current estimates of the sensitivity and specificity of serum PSA testing for prostate cancer screening, based on the Prostate Cancer Prevention Trial, are 21% and 88.6%, respectively. As a result, some men with false-positive results undergo invasive and unnecessary work-ups (eg, prostatic ultrasound-guided biopsy). Furthermore, many men with indolent prostate cancer receive invasive therapies that often result in treatment-related complications such as erectile dysfunction and incontinence.

Despite the potential limitations of PSA testing, prostate cancer mortality has decreased by 4% annually since its introduction. Controversy persists nonetheless, because the influence of PSA testing on prostate cancer mortality is questionable. Two recently published randomized clinical trials, the Prostate, Lung, Colon, and Ovarian Screening Trial and the European Randomized Study for Screening Prostate Cancer suggest that PSA testing does not decrease prostate cancer mortality. In light of these findings, the American Urological Association and the American Cancer Society have updated their prostate cancer screening guidelines. The American Urological Association recommends PSA and DRE screening begin at age 40 years, given a life expectancy of at least another 10 years, and at a younger age for men with certain risk factors (eg, African-American men or men with a family history of prostate cancer). The American Cancer Society takes a more conservative stance, recommending that men with low risk begin discussing the pros and cons of screening with their physician at age 50 years. Taking this conservative stance further, the US Preventive Services Task Force recently concluded that there is insufficient evidence to recommend screening. Further complicating the issue, payers and governmental agencies have attempted to intervene either...
through reimbursement policy or by requiring insurers to provide coverage for PSA testing.\textsuperscript{24-26} This ambiguity has made it difficult for health care systems and physicians both in the US and in Europe to develop consistent and appropriate approaches to prostate cancer screening.

Despite the discussion surrounding the use of PSA to screen for prostate cancer, estimates of PSA screening rates in the US are generally limited to surveys or institutional studies.\textsuperscript{17,24,25} Furthermore, these estimates are based on samples that are small and that often lack diversity, limiting their generalizability. National guidelines can have the greatest effect in large general practices, but the implementation of PSA testing in this setting remains poorly characterized.\textsuperscript{26-29} Therefore, the goal of this study was to characterize prostate cancer screening practices in a large managed health care system that promulgates and enforces practice guidelines across an integrated care network. This study was approved by the Kaiser Permanente Southern California (KPSC) institutional review board.

**Methods**

**Setting and Study Population**

KPSC is a large managed care organization that spans from Bakersfield, in the southern San Joaquin Valley, to San Diego, at the Mexican border. KPSC currently serves more than 3.4 million members with a racial and ethnic composition similar to that of Southern California. Health care is mostly delivered in 1 of 14

<table>
<thead>
<tr>
<th>Table 1. Characteristics of 2,061,047 men enrolled in KPSC 1998–2007, by PSA screening status</th>
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$^a$χ$^2$ test of general association.

$^b$Baseline is when the study started, in 1998.

KPSC = Kaiser Permanente Southern California; PSA = prostate-specific antigen.
Medical Centers or affiliated outpatient facilities. A small fraction of emergent and specialty care is received from contracted physicians or through reimbursement claims. Regardless of the setting, detailed information on all diagnoses, procedures, test and biopsy results, pathology reports, treatments, and outcomes is tracked in electronic data systems.

Men who were 1) active KPSC members for at least 1 day during the period 1998 to 2007; 2) at least age 35 years on January 1, 1998; 3) at least age 45 years upon termination of membership or at the conclusion of the study period; and 4) without a prostate cancer diagnosis before baseline (ICD-9 code 185) were eligible for inclusion (N = 2,061,047). PSA data were captured from electronic medical records, including tests performed from the date of first eligibility (based on age and membership) until termination of membership or prostate cancer diagnosis (censoring).

Measurements
Demographic information was obtained from electronic medical records. Physician race/ethnicity (white, black, Asian, Hispanic, and other) and medical specialty, categorized as family medicine, internal medicine, or other, were ascertained from electronic provider files. During the study period, serum PSA levels were measured in ng/mL, using three immunocassays: AxSYM (Abbott Laboratories; Abbott Park, IL; 1998–2003), Immulite (Siemens Medical Solutions; Malverny, PA; 2003–5), and Elecsys (Roche Diagnostics; Indianapolis, IN; 2005–7). All serum PSA measurements from tests that were performed from the beginning of study eligibility through the end of follow-up (or censoring) were extracted from electronic health plan files. To confirm the consistency of the test results, we randomly selected a 100-patient sample from tested men for chart abstraction. In addition, we abstracted DRE results, physician interpretations, and indications for testing.

Statistical Analysis
Demographic characteristics of men who had PSA tests during the study period were compared with those of men who did not, using the $\chi^2$ test and two-sided t test where appropriate. The proportion of men who had a PSA test was then calculated as the number of men with at least one PSA test divided by the total number of men eligible for PSA screening (as defined by the age and membership inclusion criteria) during the study period. The proportion of men screened was then calculated by demographic and physician characteristics. The proportions were similarly estimated over specific time periods (1998–2000, 2001–2003, and 2004–2007), with each proportion based on the first serum PSA measurement within the time period. The distributions of men with serum PSA values above the corresponding age-specific reference ranges (ASRRs) or greater than or equal to 4 ng/mL were also determined. All analyses were performed using SAS version 9.1 (SAS Institute, Cary, NC), with an alpha-level of 0.05.

Results
In this cohort of men eligible for prostate cancer screening, the duration of enrollment in the Health Plan from 1998 through 2007 was 6.46 years. Approximately 27% of men had at least one PSA test during the study period. Patterns of PSA testing differed significantly by age (Table 1), with lower proportions observed in the oldest and youngest groups ($p < 0.001$). Men aged 45–74 years, constituting the majority of men screened, had similar testing proportions, approximately 36%, when age groups were divided by deciles. Only 19% of men younger than age 45 years underwent PSA tests, while 28% of men aged 75–84 years were tested. The oldest subgroup, men age 85 years and older, had the lowest proportion of PSA testing: 13%. In addition, the overall proportion of PSA testing varied slightly across racial groups, with white men (33.5%) having the highest proportion of PSA screening, followed by black men (30.4%), Asian men (30.0%), and Hispanic men (28.5%, $p < 0.001$, Table 1).

The percentage of men who had a PSA test differed minimally across physician specialty and race/ethnicity. PSA testing was more common in men receiving care from family physicians than in patients cared for by internal medicine physicians (45.0% vs 36.1%, $p < 0.001$). Although patients seen by black and Hispanic physicians had a screening rate of 28% (28.56% and 28.06%), those treated by white and Asian physicians were screened at a slightly higher rate (30.5% and 30.3%, respectively). Patients with physicians who shared the same race/ethnicity were more likely to be screened (32.4%) than patients with physicians of a different race (26.4%, $p < 0.001$, Table 1).

Table 2 presents rates of PSA screening during 3 progressive time periods beginning in 1998 and ending in 2007. During the study period, PSA testing rose from 16.4% to 26.0%, Screening rates increased over time for black men (19.5%, 21.9%, and 26.3%), white men (21.1%, 24.5%, and 29.7%), Hispanic men (14.1%, 18.4%, and 25.6%), and Asian men (17.4%, 22.0%, and 27.3%). PSA testing among the youngest men (<45 years) rose from 2.1% to 18.3% during the study period. Concurrently, screening for men older than age 55 years consistently decreased. Most Medical Centers had initial testing rates in the range of 13.7% through 20.8% and rates ranging from 22.7% through 30.2% in the most recent period (data not shown).

The distribution of PSA levels over the entire study period is presented in Table 3. The median overall serum PSA level was 1.01 ng/mL during the study period. The proportions of initial serum PSA levels greater than 4.0 ng/mL or exceeding the ASRR were 9.7% and 8.5%, respectively. Elevated serum PSA levels (>4 ng/mL or >ASRR) were more frequent among black men (13.7% and 12.8%) than white men (12.6% and 10.0%), Asians (9.8% and 8.6%), and Hispanics (8.9% and 8.4%). Older men had substantially higher proportions of elevated PSA levels than younger men ($p < 0.001$). We compared men younger than age 45 years to older subgroups defined by 10-year intervals extending to age 85 years. The proportion of PSA results above the ASRR increased considerably with age (range, 3.9%–30.9%). The proportion of men with results exceeding 4 ng/mL diminished from 16.1% in 1998 to 5.0% in 2007. Comparably, 12.7% and 5.5% of screened men had results exceeding the ASRR in 1998 and 2007, respectively (Table 3).

We performed validation studies of the electronic medical records via chart abstracting for a sample of 100 patients who had a PSA test ordered and completed. Of the 46 patients who underwent a DRE, 3 (6.5%) had abnormal findings.
Table 2. Proportions of men who participated in PSA testing, among those who were eligible, over time by age and race

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<td>%</td>
<td>n</td>
<td>%</td>
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<td>24,569</td>
<td>19.51</td>
<td>26,687</td>
<td>21.86</td>
<td>30,914</td>
<td>26.3</td>
</tr>
<tr>
<td>Asian</td>
<td>12,940</td>
<td>17.40</td>
<td>63,039</td>
<td>21.97</td>
<td>23,641</td>
<td>27.25</td>
</tr>
<tr>
<td>Hispanic</td>
<td>34,967</td>
<td>14.07</td>
<td>51,910</td>
<td>18.35</td>
<td>81,549</td>
<td>25.59</td>
</tr>
<tr>
<td>Other</td>
<td>846</td>
<td>17.5</td>
<td>1062</td>
<td>16.33</td>
<td>1321</td>
<td>28.29</td>
</tr>
</tbody>
</table>

a Tests for trend across time for age and race all yielded p values <0.001.
b Numbers for race/ethnicity do not add up to total because of missing values.

PSA = prostate-specific antigen.

Table 3. Distribution of initial PSA levels and PSA levels exceeding the ASRR or greater than 4.0 ng/mL, among men with a history of PSA testing in KPSC, 1998–2007

<table>
<thead>
<tr>
<th></th>
<th>PSA</th>
<th>&gt;ASRR</th>
<th>≥4.0 ng/mL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Median</td>
<td>Interquartile range</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>561,194</td>
<td>1.01</td>
<td>0.60–1.94</td>
</tr>
<tr>
<td><strong>Age at baseline</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;45</td>
<td>130,450</td>
<td>0.75</td>
<td>0.49–1.15</td>
</tr>
<tr>
<td>45–54</td>
<td>201,063</td>
<td>0.9</td>
<td>0.56–1.53</td>
</tr>
<tr>
<td>55–64</td>
<td>133,606</td>
<td>1.28</td>
<td>1.28–2.46</td>
</tr>
<tr>
<td>65–74</td>
<td>70,438</td>
<td>1.89</td>
<td>0.94–3.82</td>
</tr>
<tr>
<td>75–84</td>
<td>23,406</td>
<td>2.53</td>
<td>1.11–5.55</td>
</tr>
<tr>
<td>≥85</td>
<td>2231</td>
<td>3.21</td>
<td>1.26–8.25</td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>200,595</td>
<td>1.11</td>
<td>0.62–2.28</td>
</tr>
<tr>
<td>Black</td>
<td>41,263</td>
<td>1.09</td>
<td>0.61–2.30</td>
</tr>
<tr>
<td>Asian</td>
<td>29,117</td>
<td>1.06</td>
<td>0.64–1.98</td>
</tr>
<tr>
<td>Hispanic</td>
<td>101,517</td>
<td>0.96</td>
<td>0.57–1.83</td>
</tr>
<tr>
<td>Other</td>
<td>1780</td>
<td>0.98</td>
<td>0.59–1.89</td>
</tr>
</tbody>
</table>

Calendar year

|                | n         | Median     | Interquartile range | n | %   | n | % |
|----------------|-----------|------------|                    |   |     |   |    |
| 1998           | 107,585   | 1.32       | 0.73–2.74           | 13,689 | 12.72 | 17,293 | 16.07 |
| 1999           | 74,207    | 1.16       | 0.67–2.24           | 7114  | 9.59  | 8619  | 11.61 |
| 2000           | 59,299    | 1.08       | 1.08–2.04           | 5100  | 8.6   | 5885  | 9.92  |
| 2001           | 52,747    | 1.05       | 1.05–1.95           | 4458  | 8.45  | 4985  | 9.45  |
| 2002           | 49,955    | 0.98       | 0.98–1.81           | 3935  | 7.88  | 4195  | 8.4   |
| 2003           | 44,729    | 0.85       | 0.85–1.60           | 3066  | 6.85  | 3193  | 7.14  |
| 2004           | 42,650    | 0.8        | 0.80–1.58           | 2983  | 6.99  | 2991  | 7.01  |
| 2005           | 41,935    | 0.84       | 0.84–1.54           | 2629  | 6.27  | 2560  | 6.1   |
| 2006           | 43,202    | 0.89       | 0.89–1.52           | 2472  | 5.72  | 2394  | 5.54  |
| 2007           | 44,885    | 0.88       | 0.88–1.46           | 2456  | 5.47  | 2260  | 5.04  |

a Numbers for race/ethnicity do not add up to total because of missing values.
ASRR = age-specific reference ranges; KPSC = Kaiser Permanente Southern California; PSA = prostate-specific antigen.
Discussion

In this descriptive analysis of prostate cancer screening practices in a large managed care organization with a predilection for protocol and guideline-driven clinical practice, we found that nearly one in four eligible KPSC members underwent PSA testing from 1998 through 2007. PSA screening increased considerably over time and varied modestly across certain populations. This analysis of real-world practice could prove particularly useful in assessing the cost-effectiveness of prostate cancer screening as it is currently applied and the impact of emerging advances in cancer detection, and in anticipating how changes in screening guidelines will alter practice patterns in an increasingly coordinated health care environment.

Few population-based studies have assessed how screening is implemented in general-practice settings.\textsuperscript{15,30,31} Without direct observational data on screening patterns, researchers typically rely on billing and survey data or focus on physician or patient attitudes toward screening.\textsuperscript{24,26,28,32-34} Estimates using Medicare data put rates of PSA testing at 34% and 25% for white and black men over age 65 years, respectively.\textsuperscript{35} The Behavioral Risk Factor Surveillance Survey, a comprehensive national assessment of cancer screening, found that 49.3% of men underwent PSA testing within the previous 2 years of being questioned, in 2004.\textsuperscript{36} Despite its methodologic rigor, the Behavioral Risk Factor Surveillance Survey was limited by its self-report design and was subject to participation bias.

Interestingly, differences in rates of PSA testing between blacks and whites, which have been consistently reported in other studies, were not apparent in our study.\textsuperscript{37} Race was a very minor factor: the proportion of whites who were screened was 10% greater relative to blacks, Hispanics, and Asians, all of whom had similar rates of testing. This study does, however, highlight the need to better understand patterns of testing among minority racial/ethnic groups. Furthermore, some may argue that the greater risk of prostate cancer among black men should lead to higher rather than similar rates of testing relative to other racial groups. However, this variability could reflect appropriate differences in screening practices that are based on our understanding of prostate cancer risk factors and competing recommendations.

Age was a significant factor in this analysis, with the youngest and oldest men less likely to undergo PSA testing. In a study of self-reported data from the National Health Interview Survey, Ross et al showed that the rate of PSA testing for men aged 40 to 49 years was 16%, whereas men aged 50 to 69 years had a rate of 49%.\textsuperscript{37} Variability in rates of PSA testing by age may have the most potential for interventions aimed at standardizing prostate cancer screening practices. Surprisingly, the rate of PSA testing for older men (≥85 years) was 13% and increased over the most recent study period, representing an opportunity for patient and physician education based on the multiple guidelines that argue against screening in this age group.

Reasons for the variability in PSA testing rates among the various subpopulations in the present study are not immediately evident. However, earlier literature suggests that educational attainment, marital status, poverty, usual source of medical care, family history of prostate cancer, and comorbidities may all play a role.\textsuperscript{38-41} Clinical uncertainty, conflicting guidelines, physician beliefs, and patient preferences are also proffered.\textsuperscript{42,43} Insurance status and having a personal physician have been found to be associated with the likelihood of PSA testing.\textsuperscript{44} Patient-physician concordance has been suggested to increase PSA testing rates.\textsuperscript{55} These factors taken together suggest a disadvantage of certain populations (eg, those of low socioeconomic status and racial and ethnic minorities) in accessing or negotiating available services for prostate cancer detection.

Looking to modifiable factors, patient and physician perceptions of the efficacy of PSA testing may affect physician screening practices and adherence to guidelines.\textsuperscript{46,47} Certainly, differences in screening practices can result from variability in patient demographics and risk factors, however individual and organizational knowledge and preferences must also be considered. In fact, in our small validation sample of men who had undergone PSA testing, only 46% also had a concomitant DRE, raising the question of patient preferences and physician perceptions regarding the relative utility of symptomatic evaluations of prostate cancer.

Although this study characterizes the use of PSA testing in a large, general-practice setting, there are potential limitations that should be considered. It was not possible to differentiate between screening and diagnostic PSA testing or to identify the underlying rationale for performing a physical exam. Nonetheless, the chart review–based validation sample demonstrated that less than half of those who underwent PSA testing also had a DRE, and few of them had abnormal findings. Thus, the continued role of physical examination in prostate cancer screening may be questionable. Although the managed care organization setting was an advantage of this study because it provided access to data necessary to characterize the evolution of screening practices, the generalizability of our study is limited. KPSC members are a fully insured population, albeit a diverse one with coordinated care services. Additionally, we were not able to capture data for PSA testing performed outside of KPSC. However, managed care organizations, which provide similar care as universal health care systems, encourage patients to obtain services through general practitioners and within the system. For KPSC, this means members seek fewer tests and services outside the network. Finally, because the inclusion criteria specified that men only had to be members for one day during the study period and reach age 45 before membership termination, the denominator of men eligible for PSA screening in this study may be inflated. As a result, estimates of PSA screening rates in this study may be conservative.

Conclusions

Among this large, managed care sample, approximately one quarter of eligible men underwent PSA testing from 1998 through 2007. Lower rates of screening among racial minorities and younger men and persistent testing among men age 75 years and older may be opportunities for practice-based interventions aimed at optimizing PSA screening practices.\textsuperscript{6}

Disclosure Statement

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Acknowledgments

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Leslie E Parker, ELS, provided editorial assistance.

References

A Colorectal “Care Bundle” to Reduce Surgical Site Infections in Colorectal Surgeries: A Single-Center Experience

Waleed Lutfiyya, MD, FASCRS; David Parsons, MD, FASCRS; Juliann Breen, RN, CPHQ

Abstract

Background: Kaiser Sunnyside Medical Center has participated in the American College of Surgeons National Surgical Quality Improvement Program (NSQIP) since January 2006. Data on general and colorectal surgical site infections (SSIs) demonstrated a need for improvement in SSI rates.

Objective: To evaluate application of a “care bundle” for patients undergoing colorectal operations, with the goal of reducing overall SSI rates.

Methods: We prospectively implemented multiple interventions, with retrospective analysis of data using the NSQIP database. The overall, superficial, deep, and organ/space SSI rates were compared before and after implementation of this colorectal care bundle.

Results: Between January 2006 and December 2009, there were 430 colorectal cases in our NSQIP report with 91 infections, an overall rate of 21.16%. Between January 2010, when the colorectal care bundle was implemented, and June 2011, there were 195 cases and 13 infections, a 6.67% overall rate. The absolute decrease of 14.49% is significant (p < 0.0001). The rate of superficial SSI decreased from 15.12% to 3.39% (p < 0.0001). The rates for deep and organ/space SSI also showed a decrease; however, this was not statistically significant. The NSQIP observed-to-expected ratio for colorectal SSI decreased from a range of 1.27 to 1.83 before implementation to 0.54 after implementation (fiscal year 2010).

Conclusions: Our institution was a NSQIP high outlier in general surgery SSIs and had a high proportion of these cases represented in colorectal cases. By instituting a care bundle composed of core and adjunct strategies, we significantly decreased our rate of colorectal SSIs.

Interest in improving surgical outcomes led to the National Veterans Administration Surgical Risk Study in the late 1980s, and from that, the National Surgical Quality Improvement Program (NSQIP) was developed in the mid-1990s. The American College of Surgeons NSQIP collects data on 135 variables from more than 300 different institutions around the country. NSQIP is the first nationally validated, risk-adjusted, outcomes-based program to measure and improve quality of surgical care. It provides participating hospitals with risk-adjusted outcomes on a biannual basis and expresses them as an “observed-to-expected” (O/E) ratio. An O/E ratio below 1 indicates that the hospital is performing better than expected, and an O/E ratio greater than 1 indicates that a hospital is performing worse than expected. These reports are blinded, allowing participating centers to compare their risk profiles and outcomes with those of peer medical centers and with national averages. As a result, NSQIP has become a catalyst for the development of quality-improvement programs designed to advance surgical care. Several studies have demonstrated that institutions can improve outcomes by directing quality initiatives in areas where they seem to be outliers.

Schilling et al examined 36 different procedure groups in the NSQIP and their relative contribution to morbidity and mortality, and they found that 10 procedure groups accounted for 62% of all complications. Colectomy, which composed 9.9% of all procedures, accounted for the greatest share of these adverse events. At the Kaiser Sunnyside Medical Center (KSMC) in Clackamas, OR, colorectal procedures comprised 13.4% of all general surgery operations but made up 33% of all the SSIs. We hypothesized that colorectal operations should be targeted to decrease SSIs in general surgery. The purpose of this study is to evaluate the application of a bundle of care designed to reduce SSIs in patients undergoing colorectal operations. The NSQIP database was used to evaluate the efficacy of the colorectal care bundle.

Methods

Study Design

The study design was prospective implementation of multiple interventions (Colorectal SSI Bundle) with retrospective analysis of data. KSMC has been participating in NSQIP since January 2006. Patients who underwent laparoscopic and open colorectal operations, whose data were submitted to NSQIP from January 2006 through June 2011, were included...
A Colorectal “Care Bundle” to Reduce Surgical Site Infections in Colorectal Surgeries: A Single-Center Experience

Table 1. Current Procedural Terminology codes

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colectomy</td>
<td>44140, 44141, 44143-44147, 41450, 44151, 44160, 44204-44208, 44210-44213</td>
</tr>
<tr>
<td>Proctectomy</td>
<td>44155-44158, 44211, 44212, 45110, 45111, 45113, 45114, 45116, 45119-45121, 45123, 45126, 45395, 45397</td>
</tr>
</tbody>
</table>


in the study. Patients were identified using Current Procedural Terminology codes (Table 1). Data were accrued into the NSQIP database by trained dedicated nurses, who prospectively collected information from the preoperative, intraoperative, and 30-day postoperative periods.

Development of the Colorectal “Care Bundle”

At KSMC, a 300-bed hospital in a large metropolitan city, approximately 250 to 300 major elective and emergency colorectal procedures are performed annually. In a review of our site-specific NSQIP data, general surgery SSI rates were statistically higher (high outlier) than at other NSQIP participating institutions. Between 2006 and 2009, we received 5 semiannual reports indicating that SSIs were an area of needs improvement. Inspired by our NSQIP risk-adjusted reports, in 2009 a program to eliminate SSIs at KSMC was developed, called “Pathway to Zero Surgical Site Infections.” There was a sense of urgency to drive down SSI rates. Colorectal surgery was identified as a subset of operations with the potential for high impact given their high rate of SSIs. On the basis of published literature, consensus views, and recommendations from individual surgeons, the colorectal “care bundle” was proposed (Table 2). Education of general surgery attending physicians and house staff regarding elements of the care bundle was done before its implementation and has become a part of orientation for all new staff. The colorectal care bundle was implemented in January 2010. Compliance with the steps of the bundle was not prospectively tracked in all areas.

Data Collection and Analysis

The SSI rates were compared before and after implementation of the colorectal care bundle. Established NSQIP definitions for superficial, deep, and organ-space infections were used. The SSI rates were calculated every month, a run chart was developed (Figure 1), and quarterly reports were established. The SSI Quality Group’s monthly meetings allowed for tracking data and provided for opportunities to increase awareness for recommended SSI prevention strategies to all appropriate care providers.

Each case of an SSI was identified and reviewed every month with regard to elements of the bundle. If any part of the bundle was omitted, the SSI was declared preventable and a standardized report regarding the specific case was provided to the surgeon. This allowed for identification of defects, and as they were identified, actions were taken, which included individual feedback and broad education to groups of providers. Some interventions were addressed more globally. One example was production of standardized tables for prophylactic antibiotics that were posted in the operating rooms and included appropriate redosing intervals and weight-based dosing guidelines. In addition, to decrease variation, the electronic medical record was leveraged.

Table 2. Colorectal surgery “care bundle”

<table>
<thead>
<tr>
<th>Preoperative</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Give patient the SSI patient education sheet</td>
</tr>
<tr>
<td>2. Encourage smoking cessation 30 days before surgery</td>
</tr>
<tr>
<td>3. Use preoperative antiseptic skin cleansing; with chlorhexidine wipes (night before and morning of surgery)</td>
</tr>
<tr>
<td>4. Mechanically prepare the colon the day before surgery</td>
</tr>
<tr>
<td>5. Administer nonabsorbable oral antimicrobial agents (neomycin and metronidazole) the night before surgery</td>
</tr>
<tr>
<td>6. Screen diabetic and nondiabetic patients using HbA1c levels</td>
</tr>
<tr>
<td>Holding</td>
</tr>
<tr>
<td>1. Check blood glucose levels; if &gt;140 mg/dL, start insulin infusion</td>
</tr>
<tr>
<td>2. Remove hair with clippers in holding area (SCIP 6)</td>
</tr>
<tr>
<td>3. Apply forced warm air gown to maintain normothermia</td>
</tr>
<tr>
<td>Intraoperative</td>
</tr>
<tr>
<td>1. Prescribe appropriate antibiotic (SCIP 1)</td>
</tr>
<tr>
<td>2. Dose prophylactic antimicrobial agent based on weight</td>
</tr>
<tr>
<td>3. Administer prophylactic antimicrobial agents IV on time (SCIP 1)</td>
</tr>
<tr>
<td>4. Redose prophylactic antibiotic based on duration of operation</td>
</tr>
<tr>
<td>5. Use standardized antiseptic agent for skin preparation: chlorhexidine gluconate (Chloraprep)</td>
</tr>
<tr>
<td>6. Use at least 80% fraction of inspired oxygen</td>
</tr>
<tr>
<td>7. Ensure double gloving for all scrubbed surgical team members</td>
</tr>
<tr>
<td>8. Maintain perioperative normothermia (SCIP 9)</td>
</tr>
<tr>
<td>9. Aggressively control glucose in all patients; start insulin infusions for any blood glucose level &gt;140 mg/dL</td>
</tr>
<tr>
<td>10. Perform pulse lavage of subcutaneous tissues for all open operations using 2 L of saline</td>
</tr>
<tr>
<td>Postoperative</td>
</tr>
<tr>
<td>1. Maintain control of serum blood glucose levels in all patients; glycemic control team consulted</td>
</tr>
<tr>
<td>2. Protect primary-closure incisions with silver-impregnated (Acticoat) or polyhexamethylene biguanide (AMD) dressing for 5 days</td>
</tr>
<tr>
<td>3. Use high fraction of inspired oxygen (nonrebreather mask) for 4 hours</td>
</tr>
<tr>
<td>4. Discontinue prophylactic antimicrobial agent within 24 hours of surgery (SCIP 3)</td>
</tr>
</tbody>
</table>

HbA1c = hemoglobin A1c; IV = intravenously; SCIP = Surgical Care Improvement Project SSI reduction measure; SSI = surgical site infection.
A Colorectal “Care Bundle” to Reduce Surgical Site Infections in Colorectal Surgeries: A Single-Center Experience

to standardize the preoperative orders, which include elements such as oral antibiotics and mechanical bowel preparation. Also, SSI “dashboards” were created and posted in the surgeon and operating room lounges for data transparency.

Every month the total number of documented SSIs was divided by the total number of patients at risk in that period and was expressed as the overall case rate. Rates for superficial, deep, and organ/space SSIs were calculated in a similar fashion. Case rates were compared by the difference of proportions test for two independent samples, before and after implementation of the colorectal care bundle (test for null hypothesis: H0: P1 − P2; 95% confidence interval limits set at α = 0.05). QI SPC Macros (1996-2011) version 2016.01 (KnowWare International; Denver, CO) was used for statistical analysis.

Results

Between 2006 and 2009, NSQIP captured 430 of the targeted Current Procedural Terminology codes, and overall there were 91 infections, a rate of 21.16%. In comparison, there were only 13 of 195 overall infections in the postintervention study period (January 2010 to June 2011), a rate of 6.67% (Table 3). This absolute decrease of 14.49% was highly significant (p < 0.0001). The rate of superficial SSIs decreased from 15.12% to 3.59% after the intervention, and this change was also highly significant (p < 0.0001). The rate of deep incision infections decreased from 1.2% to 0.5% after the intervention but was not statistically significant (p = 0.066). The rate of organ/space SSI decreased from 4.9% to 2.6% after the intervention, which was not statistically significant (p = 0.131).

General surgery Class II cases had a significant decrease in overall SSI rates from 11.75% before the intervention to 5.31% after the intervention (p < 0.0001; Table 4). For fiscal years 2006 to 2009, KSMC was a statistically high outlier institution in general surgery SSIs in NSQIP risk-adjusted reports (Table 4); our O/E ratios ranged from 1.40 to 1.68. The overall rate of colorectal SSIs at KSMC was 21.16% compared with 14.44% at other NSQIP participating hospitals, a difference that was statistically significant (p < 0.001), and O/E ratios ranged from 1.27 to 1.83 during this 4-year period. The rate of superficial SSIs was 15.11% for KSMC compared with 8.44% for other NSQIP institutions, and the difference was statistically significant (p < 0.0001). The rate of deep and organ/space SSIs was not statistically different between KSMC and other NSQIP hospitals.

After the intervention (2010 to 2011), there was a significant improvement in the O/E ratio in colorectal surgery SSIs at KSMC. In 2010, the O/E ratio was 0.54 and was the lowest since the Medical Center joined NSQIP. Compared with 2009, KSMC was no longer a high outlier institution. The rate of overall colorectal SSIs at KSMC was 6.67% vs 12.58% for other NSQIP hospitals, and this difference was statistically significant (p < 0.001). The rate for superficial SSIs at KSMC was 3.59% vs 7.19% for other NSQIP hospitals, a significant difference (p < 0.007). The rates for deep and organ/space SSIs between KSMC and other NSQIP hospitals were not significantly different (p < 0.084 and p < 0.210, respectively). Figure 2 shows the graphed rates of colorectal SSIs for both KSMC and NSQIP. In 2010, we also noted a corresponding drop in the O/E ratio for SSIs in general surgery to 0.70, placing KSMC in the low outlier category 1 year after implementation of the colorectal care bundle (Table 4).

Table 3. Colorectal surgery SSI rates at KSMC

<table>
<thead>
<tr>
<th></th>
<th>Preintervention (2006-09)</th>
<th>Postintervention (2010-11)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients at risk</td>
<td>430</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>SSI rate, no. (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>91 (21.16)</td>
<td>13 (6.67)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Superficial</td>
<td>65 (15.12)</td>
<td>7 (3.59)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Deep</td>
<td>5 (1.2)</td>
<td>1 (0.5)</td>
<td>0.066</td>
</tr>
<tr>
<td>Organ/space</td>
<td>21 (4.9)</td>
<td>5 (2.6)</td>
<td>0.131</td>
</tr>
</tbody>
</table>

KSMC = Kaiser Sunnyside Medical Center; SSI = surgical site infection.
Discussion

The most frequent complication after colorectal procedures is SSI, and few studies have been able to isolate results in such a way as to standardize care around the issue. One of the most challenging aspects of quality improvement has been the identification of best practice. The literature demonstrating direct cause and effect on relationships for a specific intervention is scarce, and there are few Category IA recommendations from the US Centers for Disease Control and Prevention (CDC). Recently, there has been some evidence that implementation of bundles of care elements can reduce the number of SSIs.11-13

The Surgical Care Improvement Project (SCIP), developed by the Centers for Medicare and Medicaid Services and implemented in 2006, was designed as an evidence-based initiative to be applied broadly across selected surgical services, with a stated goal of reducing morbidity and mortality rates 25% by the year 2010.14 The SSI reduction measures from SCIP include: 1) removal of hair with clippers, 2) use of appropriate antibiotics, 3) prophylactic antibiotics given intravenously in appropriate time, 4) discontinuation of antibiotics within 24 hours, and 5) maintenance of perioperative normothermia. These are so-called core strategies, based on high levels of scientific evidence with high levels of feasibility.

However, the overall success of SCIP has been decidedly mixed. Hedrick et al15 reported a 10% reduction in colorectal infection rate (26% to 16%) following implementation of the SCIP protocols. In a study involving a larger sample of patients undergoing colorectal resection, the investigators observed a significant increase in compliance with SCIP process measures over 2 consecutive 14-month study periods (p < 0.001).16 However, this greater compliance did not result in a significant reduction of SSIs in patients undergoing colorectal procedures (p < 0.92).16

In a retrospective study using the Premier Inc Perspective Database (Charlotte, NC), SCIP compliance data for 405,720 patients from 398 hospitals were analyzed using a hierarchical logistic model. No relationship was found between adherence to SCIP process measures and occurrence of SSIs. Indeed, the authors documented an increase in SSIs despite substantial improvement in SCIP compliance over a 2-year period.13 Furthermore, the authors suggested that even if compliance had been 100%, the stated SCIP goal of 25% reduction in SSI was unachievable.

At KSMC, despite following SCIP infection measures, NSQIP data continued to demonstrate high SSI rates. Like other researchers, we decided that the SCIP process has considerable shortcomings as a stand-alone intervention strategy.15,17 However, SCIP is the largest surgical patient safety and surgical infection reduction initiative in US history18 and should be viewed as more of a baseline to which other adjunctive strategies are added to create a total risk-reduction package. Supplemental strategies that have some scientific evidence with variable levels of feasibility are the adjunctive measures we added to complete the colorectal care bundle (listed below).

Table 4. KSMC NSQIP risk-adjusted SSI rates by calendar year: colorectal and general surgery

<table>
<thead>
<tr>
<th>Year</th>
<th>Overall (%)</th>
<th>O/E</th>
<th>CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>19.61</td>
<td>1.27</td>
<td>N/A</td>
</tr>
<tr>
<td>2007</td>
<td>24.77</td>
<td>1.48</td>
<td>0.98-2.09</td>
</tr>
<tr>
<td>2008</td>
<td>16.24</td>
<td>1.31</td>
<td>0.81-1.95</td>
</tr>
<tr>
<td>2009</td>
<td>24.51</td>
<td>1.83</td>
<td>1.20-2.69</td>
</tr>
<tr>
<td>2010</td>
<td>6.57</td>
<td>0.54</td>
<td>N/A</td>
</tr>
<tr>
<td>2011</td>
<td>6.90</td>
<td>N/A</td>
<td>N/A</td>
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a High outlier, needs improvement.
b Low outlier, exemplary.
CI = 95% confidence interval; KSMC = Kaiser Sunnyside Medical Center; N/A = not available; NSQIP = National Surgical Quality Improvement Program; O/E = observed-to-expected ratio; SSI = surgical site infection.

Figure 2. Rates of Colorectal SSI Between KSMC and NSQIP.

KSMC = Kaiser Sunnyside Medical Center; NSQIP = National Surgical Quality Improvement Program; SSI = surgical site infection.
These were deemed to be critical factors to achieve success in lowering the SSI rates. The SCIP infection measures were the base of the colorectal care bundle. Nurses and surgeons were trained in the importance of these processes. We sought to ensure consistent delivery of the interventions. Razors were removed from the operating room. Our anesthesia group “owned” (was responsible for) the normothermia measure and developed appropriate processes. Body warming devices were used in all cases. The electronic medical record was modified so that only approved and appropriate antibiotics could be chosen for prophylaxis and were given in the appropriate time frame before surgery. We expanded this SCIP measure so that it is best described as antibiotic management. Appropriate weight-based dosing and redosing based on duration of the case and the half-life of the antibiotic was addressed. Standard protocols were developed for the anesthesia team reflecting these factors as well.

The SCIP does not evaluate all the important surgical quality issues; however, it does begin to give surgeons infrastructure on quality improvement. In completing the bundle, we added adjunctive measures and believe they played a critical role in reducing the risk for SSIs. Although these measures have some evidence to support their use, we recognize that some remain controversial and they have varying levels of feasibility. Adjunctive strategies included the following:

1. Mechanical bowel preparation with oral antibiotics (neomycin and metronidazole)
2. Aggressive glycemic control
3. Chlorhexidine wipes, used the night before and the morning of surgery
4. High fraction of inspired oxygen (>80%) during and after surgery (15-L nonrebreather mask for 4 hours)
5. Double gloving for all scrubbed staff
6. Pulse lavage of subcutaneous tissues before skin closure with 2 L of normal saline
7. Standardized antimicrobial dressing.

The role of mechanical bowel preparation has been questioned recently in three meta-analyses of the randomized controlled trials (RCTs) evaluating omission of mechanical bowel preparation. Yet two other meta-analyses have found that oral antibiotics in combination with systemic antibiotics lead to the lowest SSI rates. Whether the oral antibiotics are as effective when a mechanical bowel preparation is omitted is a question that remains unanswered. Thus, we decided to proceed with use of a mechanical bowel preparation in addition to oral antibiotics as part of our bundle. Mechanical cleansing is completed the morning before surgery, and oral antibiotics are administered the night before.

There is ample evidence showing that perioperative hyperglycemia in noncardiac surgery has been associated with postoperative infections, increased length of stay, hospital complications, and mortality. Other studies have demonstrated that reductions in postoperative complications can be achieved with postoperative normoglycemia. In December 2006, KSMC developed a multidisciplinary glycemic work group that led to the formation and implementation of the “glycemic control team” in 2009. This team is made up of pharmacists and internists trained in postoperative glucose control. Since then, all patients undergoing inpatient surgery at KSMC have had a blood glucose level checked in the holding area and 1 hour into an operation. For any patient with a level greater than 140 mg/dL, insulin infusion is started. The glycemic control team then assumes management of the infusions, ensures proper transitions off the intravenous “drips,” and maintains a glucose level between 80 and 180 mg/dL using standard protocols.

Despite the limited evidence for other adjunctive measures in our bundle, we approached the bundle as an opportunity for thinking outside the box to find ways to reduce the risk of an SSI. For example, although preoperative chlorhexidine has been recommended for SSI prevention, a meta-analysis of the RCTs investigating the use of preoperative chlorhexidine cleansing in preventing SSIs failed to show a benefit. However, one study published in 2008 showed that individuals who used a 2% chlorhexidine gluconate polyester cloth to cleanse with had skin surface concentrations that approached 350X the minimal inhibitory concentration for staphylococcal skin isolates. Because of potential benefits with few side effects, the CDC and the Association of Perioperative Registered Nurses have endorsed the concept of preadmission skin cleansing. We use a dual skin cleansing done the night before surgery and then in the preoperative holding area.

Similarly, some studies have shown a benefit from high fraction of inspired oxygen during and after surgery in reducing SSIs. A meta-analysis in 2009 examined 5 RCTs evaluating the utility of perioperative hyperoxia to reduce the risk of SSIs and showed a statistically significant reduction from 12% to 9%, without an increase in pulmonary complications. The PROXI trial (PeRioperative OXygen Fraction—Effect on SSI and Pulmonary Complications After Abdominal Surgery), published after the 2009 meta-analysis, was an RCT that failed to show the positive influence of hyperoxia on SSIs; however, it also showed no increased risk of complications from it either. Again, hyperoxia is a low-cost intervention with little risk, and implementation makes sense. We routinely use 80% intraoperative oxygen and a nonrebreather mask at 15 L for 4 hours postoperatively.

We decided to make double gloving a requirement for all scrubbed personnel. In a large observational cohort study in Switzerland, the authors showed that without surgical antimicrobial prophylaxis, glove perforation increases the risk of SSI. To our knowledge, that was the first study to explore the correlation between SSI and glove leakage in a large series of surgical procedures. Other studies have demonstrated the increased risk of glove perforation as well as the increase in bacterial density with duration of an operation. Thus, double gloving may be beneficial in lowering the risk of an SSI and is a low-cost measure.

Before skin closure, the standard practice has been to rinse the wound with a pour of irrigation. This produces less than 1 psi of pressure and is of little clinical value. Lavage at greater than 10 psi can potentially protect wounds from gross contamination. In one retrospective review of laparotomies lasting greater than 4 hours, there was a significantly lower SSI rate when the subcutaneous tissues
were lavaged with 2 L of normal saline. This measure is inexpensive, is easy to do, and may further reduce the risk of SSI, and thus we employ this measure in all open colorectal cases before skin closure.

We also decided to standardize our wound dressings. Currently, the CDC Guidelines for Prevention of Surgical Site Infection recommend the use of sterile dressing to protect closed incisions for 24 to 48 hours postoperatively.4,33 However, there is no evidence to support this recommendation, and none exists with regard to dressing types. Topical silver is an effective bactericidal agent against a broad range of microorganisms that does not appear to induce bacterial resistance. Some single-center reports have demonstrated a lower risk of SSI with silver-impregnated dressings (Acticoat; Smith&Nephew; London, UK).4,34 Antimicrobial gauze coated with polyhexamethylene biguanide (AMD) has recently been introduced as another alternative with effective antimicrobial activity. We implemented use of a standard silver-impregnated (Acticoat) dressing or AMD gauze and leave it in place for 5 days postoperatively.

Despite our efforts to adhere to SCIP infection measures, KSMC continued to have high SSI rates compared with other NSQIP institutions. Thus, we hypothesized that incorporating multiple strategies into a single treatment bundle that involves not only these core strategies but also supplemental measures would have a synergistic effect on reduction of SSIs in colorectal operations. Since implementation, we have seen a significant reduction in the total number of infections in colon and rectal operations. Furthermore, we have seen significant reductions in overall general surgery infections and in Class II wounds, the class into which most colorectal operations fall. The O/E ratio for colorectal and general surgery SSIs fell as well after implementation.

In establishing a bundle of care, we were able to decrease variability for patients receiving a colorectal operation. One of the key features of this project was sharing our data openly. NSQIP provides risk-adjusted data that allowed us to examine how our Medical Center performs with respect to our peers. This information was distributed among all involved stakeholders at KSMC (administrators, surgeons, nursing staff, infection control, SSI Quality Committee). Although our data between 2006 and 2009 was not favorable, it provided a catalyst for all involved parties to improve SSIs, none more than the surgeons who “own” these outcomes. Despite not monitoring all elements of the bundle, the components that were monitored (SCIP) were posted in the surgical lounge and physicians’ lounge for all to see. We reviewed process measures and outcomes data on a monthly basis, and perceived gaps were addressed. The outcomes were reviewed on a regular basis at departmental meetings, which allowed for further opportunity to educate and share knowledge and to identify more barriers that had to be addressed.

Several limitations in this study exist. The current study is not powerful enough and was not designed to isolate specific strategies to eliminate SSIs. We felt an urgency to improve our SSI rates; thus, our goal was to eliminate SSI as quickly and efficiently as possible. Ultimately, this was a “just do it” project. Compliance with all elements of the colorectal care bundle was incomplete, and therefore the association of interventions with SSI prevention could not be assessed. Although some experts argue that aggregated metrics would be a better representation of the quality of care provided to each patient and would allow for better outcome comparisons, we hypothesized that patients who instead received multiple risk reduction interventions will have a lower risk of SSI. All or none metrics would capture this effectively and allow for better comparison of the actual complication rates; however, this is much more difficult to perform in our current system. Surgical risk mitigation is multifactorial, and our observed reduction in SSI rates may have been affected by an improved culture in the operating room, more attention by leadership, or improved skill and knowledge of the surgical team.

As a result of these factors, our reduction in SSIs may yet prove to be a statistical aberration; however, the sustained reduction through 18 months and the decrease in the risk-adjusted NSQIP O/E ratio is very promising. It remains to be seen if this 18-month reduction in SSI rate is sustainable long term or can be reduced even more. Further investigation will be required to assess the degree and sustainability of risk reduction delivered using this colorectal care bundle.

Conclusion

Participation in NSQIP can identify areas of increased hospital morbidity compared with peer hospitals on a national basis. Through NSQIP participation, KSMC identified SSIs as an area of critical need for improvement. We implemented a bundle of care elements incorporating both core and supplemental strategies and demonstrated a significant decrease in overall colorectal SSIs. Despite being only a single-center case study, the effectiveness of our bundle lends strength to the argument that a bundle of care can act in a synergistic manner to reduce SSIs. As hospitals, physicians, and nurses embrace the quality movement and adopt preventive strategies, large reductions in complications will likely be seen.

Disclosure Statement

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

Acknowledgment

Kathleen Louden, ELS, of Louden Health Communications provided editorial assistance.

References

Bacteriology

Every operation in surgery is an experiment in bacteriology.

— Berkeley George Andrew Moynihan, 1st Baron Moynihan, KCB, KCMG, 1865-1936, British abdominal surgeon
“Kayaks on the Suwannee”
photograph
Nikon Coolpix AW 100; f3.9, ISO 180, 1/250 sec

Mark M Cohen, MD

This photograph was taken at Stephen Foster State Park in White Springs, FL, during a Road Scholar adult learning trip.

Dr Cohen is a retired Ophthalmologist from The Permanente Medical Group.
Reductions in Pain Medication Use Associated with Traditional Chinese Medicine for Chronic Pain

Charles Elder, MD, MPH, FACP; Cheryl Ritenbaugh, PhD, MPH; Mikel Aickin, PhD; Richard Hammerschlag, PhD; Samuel Dworkin, DDS, PhD; Scott Mist, MD, MacOM; Richard Harris, PhD

Abstract

Context: Participants in a randomized trial of traditional Chinese medicine (TCM) for temporomandibular joint dysfunction (TMD) had a linear decline in pain over 16 TCM visits.

Objective: To investigate whether reductions in pain among participants receiving TCM can be explained by increased use of pain medications, or whether use of pain medications also declined in this group.

Design: One hundred sixty-eight participants with TMD were treated with TCM or enhanced self-care according to a stepped-care design. Those for whom self-care failed were sequentially randomized to further self-care or TCM. This report includes 111 participants during their first 16 TCM visits. The initial 8 visits occurred more than once a week; participants and practitioners determined the frequency of subsequent visits.

Outcome measures: Average pain (visual analog scale, range 0-10) and morphine and aspirin dose equivalents.

Results: The sample was 87% women and the average age was 44 ± 13 years. Average pain of narcotics users (n = 21) improved by 2.73 units over 16 visits (p < 0.001). Overall narcotics use trended downward until visit 11 (-3.27 doses/week, p = 0.156), and then trended upward until week 16 (+4.29 doses/week, p = 0.264). Among those using narcotics, use of nonsteroidal anti-inflammatory drugs (NSAIDs) declined linearly over visits 1–16 (+1.94 doses/week, p = 0.002).

Among the top quartile of NSAID-only users (n = 22), average pain decreased linearly over 16 visits (-1.52 units, p = 0.036). Overall NSAID doses/week declined between visits 1 and 16 (-9.95 doses/week, p < 0.001) and remained stable through 16 visits. NSAID use also declined among the third quartile (n = 23) and remained low and stable among the lower half (sorted by total intake) of NSAID users.

Conclusions: Among the heaviest NSAID users, we observed a short-term reduction in NSAID use that was sustained as TCM visits became less frequent. There was no indication that pain reduction during TCM treatment was influenced by drug use.

Introduction

Chronic pain management is a growing challenge for both primary care physicians and specialists. Many of the pharmacologic agents commonly used to manage chronic pain, such as nonsteroidal anti-inflammatory drugs (NSAIDs), have the potential for serious toxicity, including gastrointestinal bleeding and renal failure. In addition, recent decades have seen a large increase in the use of long-acting opiates for ongoing pain management. Yet, the long-term efficacy of these agents is poorly documented, and there is significant potential for addiction and abuse. Clearly, additional strategies are needed for managing chronic pain, especially behavioral and low-risk interventions with the potential to reduce or even eliminate the need for ongoing pain medication.

Some complementary and alternative medicine (CAM) interventions may be efficacious in pain management, including chiropractic manipulation and acupuncture. Although the supporting evidence for these modalities has evolved to provide a basis for wider acceptance of CAM as an adjunct to standard interventions for chronic pain, it may be that, given the magnitude of the pain management conundrum, such CAM modalities remain substantially underutilized. Several deficiencies in the supporting evidence may partially account for this phenomenon. First, although acupuncture has been studied principally as an isolated modality, in practice it is frequently offered within the context of a broader traditional Chinese medicine (TCM) multimodal intervention. Failure to study acupuncture within the appropriate systemic diagnostic context, and instead in isolation from other potentially synergistic modalities such as herbs and Qigong, may have produced an inherent bias in the literature. In addition, acupuncture has often been compared with sham interventions in mechanistic studies, making it difficult to estimate what if any benefit might be rendered to a patient receiving community-based, standard TCM care. Finally, although acupuncture has proven effective for many pain syndromes, the question of whether acupuncture leads to reduced use of pain medications and other potentially toxic or invasive interventions has not been adequately studied. Indeed, changes in concomitant medication use in an acupuncture trial may confound estimates of the effectiveness of acupuncture.

In our previously published phase II clinical trial of 160 women with temporomandibular joint dysfunction (TMD), participants assigned...
Reductions in Pain Medication Use Associated with Traditional Chinese Medicine for Chronic Pain

The current data analyses come from an adequately powered randomized controlled trial of multimodal TCM care compared with a validated self-care intervention for participants with TMD,\(^\text{11}\) using a stepped-care design.\(^\text{12}\) One hundred sixty-eight TMD participants received TCM or enhanced self-care. Those for whom self-care failed were sequentially randomized to either further self-care or TCM. Previous analyses have shown a linear decline in pain over 16 TCM visits for the 121 participants allocated to TCM.\(^\text{15}\)

**Objective**

We provide an observational analysis limited to those TMD participants who were treated with TCM. In particular, we investigate whether the reductions in pain observed in the TCM group can be explained by increased use of pain medications, or whether use of pain medications also declined in this group.

**Methods**

**Study Design**

In brief, participants who passed a phone screening were recruited, consented, and began a 4-step eligibility process that included 1) a baseline questionnaire, 2) clinical examination by a project dentist using the Research Diagnostic Criteria for Temporomandibular Disorders,\(^\text{14}\) 3) a standardized diagnostic interview by the project TCM diagnostician,\(^\text{16}\) and 4) a 2-hour educational session. Interested and eligible individuals were enrolled and began participation according to a stepped-care design. Those in whom self-care failed were sequentially randomized to either further self-care or TCM. At each step, participant data were collected by telephone, allocations were made to the TCM or self-care arm, and participants were treated for another 8 weeks. This continued for 2 rounds of 8 weeks each; after the third data collection, all those who still had pain exceeding criterion were offered treatment with TCM. The TCM study protocol permitted up to 20 TCM visits. The results of the short-term randomized study (first 16 weeks) are reported elsewhere;\(^\text{13}\) here we provide an observational analysis of the average pain outcomes and medication use reported at every TCM visit, pooled across timing of initiation of TCM visits.

**Study Setting and Recruitment**

Participants were recruited from Tucson, AZ, and Portland, OR, and all assessments and interventions occurred at community practices. There was enthusiastic response to newspaper advertisements, because of high local interest in complementary therapies and lack of insurance coverage for TMD, which is generally considered a dental condition. All phone contact, screening, data collection, and appointment scheduling were managed through our call center in Tucson. The initial phone screening addressed eligibility with regard to TMD symptoms, age, and willingness to comply with the visit schedule. Those who were eligible were scheduled for a local consent visit, during which they completed the baseline questionnaire. They were then scheduled for the other eligibility evaluations (clinical examination by a project dentist using the Research Diagnostic Criteria for Temporomandibular Disorders; and TCM diagnostic interview by a TCM practitioner).

**Participants**

Inclusion criteria were age 18 to 70 years, worst facial pain ≥5, research diagnosis of TMD (based on the Research Diagnostic Criteria for Temporomandibular Disorders),\(^\text{14}\) one of 10 TCM diagnoses (that together account for 90% of cases in the earlier study),\(^\text{6}\) and completion of TMD education. Exclusion criteria, evaluated at the consent interview or TMD clinical evaluation, included 1) serious pathology of the temporomandibular joint; cancer or acute infection of the teeth, ears, eyes, nose, or throat, or ongoing orthodontic treatment; 2) serious psychiatric conditions; 3) surgical implants for treatment of TMD; 4) bleeding disorders; 5) other life-threatening conditions, eg cancer, or uncontrolled severe hypertension; 6) severe joint/disk displacement; 7) full dentures; 8) medications for which study herbs are contraindicated; and 9) current pregnancy or plans to become pregnant during active treatment, because pregnancy would require different treatment approaches that are outside the scope of this study.

Study dentists attended training sessions by one of the investigators (S Dworkin) to improve inter-rater reliability (calibration) and were recalibrated midway through the study. TCM diagnosticians and practitioners were calibrated for TCM diagnosis by another investigator (S Mist) and recalibrated midway through the study.\(^\text{13}\) TCM diagnosticians, one per city, participated throughout the entire study.

All eligible subjects participated in a two-hour class on the nature of TMD, its patterns of progression and nonprogression, precipitating and relieving factors, and suggestions to improve jaw relaxation. If still interested, participants advanced to on-study status and the first on-study data collection.

**Interventions**

The TCM intervention protocol, developed in a previous study\(^\text{16}\) to provide the best individualized TCM care within the confines of a research study, included acupuncture, moxibustion, Chinese herbs, massage (Tuina), and lifestyle and nutrition counseling. Briefly, participants were permitted 20 acupuncture visits and 20 weeks of herbs within a one-year period from the first treatment visit. The initial 8 visits occurred more than once a week; participants and practitioners determined the frequency of subsequent visits. This was intended to permit the treatment schedule to adjust to remissions and flare-ups throughout the year. The practitioner’s initial diagnostic assessment of each participant included a detailed history, radial pulse assessment, and tongue examination. This diagnosis, which benefited from interpractitioner calibration,\(^\text{17}\) guided lifestyle recommendations and the selection of acupuncture points and herbal formulas.

Acupuncture treatments included a core set of points congruent with those identified in the literature,\(^\text{18}\) supplemented by diagnosis-specific points, not to exceed 20 points per visit. Herbal formulas were based on a core formula for...
each diagnosis that could be modified according to individual presentation. Practitioners documented the exact formulation prepared on each occasion, and participants were asked to keep a log of their herbal ingestion. The herbal protocol was submitted to the US Food and Drug Administration (FDA) as an investigational new drug (IND) application. The FDA determined that the trial design was not targeted at a specific formula for a specific indication and approved the protocol exclusively for evaluation of safety. All herbs were granules (Mayway Corporation; Oakland, CA). They were GMP (Good Manufacturing Practices) certified. Samples were retained from each lot for examination if problems were detected (none were). Per FDA requirements for investigational new drug approval, participants underwent laboratory tests for aspartate aminotransferase, alanine aminotransferase, total bilirubin, creatinine, blood urea nitrogen, INR (protime), complete blood count, and urinalysis upon assignment to the TCM protocol. Laboratory tests were repeated twice, at 6 weeks and at 1 year after beginning TCM treatment. Study Medical Directors at each site reviewed laboratory test results for out-of-range values and provided guidance to the principal investigator and (when needed) participants when any remediation or additional treatment was necessary.

Traditional Chinese Medicine Practitioner Qualifications and Training

The eight TCM practitioners who provided treatment (four at each site) had a minimum of five years’ experience with acupuncture and herbs; the two diagnosing practitioners each had more than ten years’ experience and were faculty members at collaborating TCM schools. Practitioners met in person or by conference call every three months with S Mist to review the protocol and discuss any unusual circumstances that were encountered.

Outcome Measures

Self-reported data were collected via study-administered questionnaires at prescribed intervals as well as at every treatment visit. We report the pain and medication data collected at each treatment visit. Participants completed standard self-report forms before the start of every visit, and the forms were immediately available for review by the practitioners. Participants summarized their pain and medication use over the past week. They rated their average pain when having pain on a visual analog scale with a range of 0 to 10, and reported use of “any medications for your pain” (not further defined). Reported data for pain medication were the name of the medication, amount per pill, pills per day, and number of days used in the past week. In the data analysis phase, all drugs were converted to their generic formulas. For aspirin, NSAID, and acetaminophen, we used the amount per pill, pills per day, and days per week to determine medication dose/week, which we then converted to equivalent weekly doses of aspirin (one dose of aspirin = 325 mg). For narcotic analgesics, we converted similar drug-specific intake into equivalent weekly doses of oral morphine (one dose of morphine = 7.5 mg). The advantage of using data reported at treatment visits is that they were collected much more frequently than the standard study-administered questionnaires; they therefore permit us to directly relate changes in pain and medication use to treatment visits. We report the first 16 visits, because 70% of participants made 16 or more visits, but sample sizes decrease and point estimates become increasingly unstable beyond 16 visits.

Statistical Methods

Trajectories of average pain, narcotics use, and NSAID use were analyzed over the first 16 TCM visits. Since the trends in average pain were linear, ordinary linear regression of pain on visit number was used, with random effects terms that took into account within-participant correlation. In contrast, medication use had a highly positively skewed distribution within each visit, so medication doses were analyzed using the same approach, after log transformation (ln [1 + x]). Moreover, the trajectories of medication use were either flat or included an early drop followed by a rise. Consequently, the dose outcomes were analyzed using a quadratic spline, with one quadratic to model the early fall and a second to model the later rise, and with the knot near the minimum drug dose. Fitted values were transformed back to the original scale (x → exp(x) - 1) for plotting and interpretation. All reported average doses were geometric mean doses, computed on the transformed scale and then untransformed, and changes over several visits were estimated from the fitted regressions, again untransformed back to the original scale. All analyses were carried out with Stata (version 9; College Station, TX).
Study Approvals and Safety

The human subjects protection programs at the University of Arizona and the Oregon College of Oriental Medicine approved all procedures affecting participants. The Office of Clinical and Regulatory Affairs at the National Center for Complementary and Alternative Medicine approved the overall protocol. The herbal protocol operated under investigational new drug status through the FDA. The study was run under the guidance of the Data and Safety Monitoring Board, an independent body that met twice yearly and reported its deliberations and findings to the study team, the National Center for Complementary and Alternative Medicine, and the institutional review boards. Protocols for reporting and adjudicating adverse events were approved by the institutional review boards and the Data and Safety Monitoring Board and were in place at both study sites.

Results

Descriptive Baseline Data

TCM treatment was provided to 121 participants; sufficient data were available for 111 (Figure 1). We classified the 111 participants as narcotics users (who reported use during TCM visits, n = 21) or NSAID users (who reported use of NSAID but not narcotics during TCM visits, n = 90). Table 1 summarizes overall and group-specific demographics and pain history at baseline. The overall average and standard deviation of pain before the first TCM treatment visit was 5.2 ± 1.9. Throughout all the visits, participants reported using a wide variety of medications for their pain (Table 2).

Participants Using Narcotics

For the 21 narcotics users, average pain at the first TCM visit was 5.7 ± 2.0 (standard deviation [SD]). The fitted geometric mean narcotics dose at the first treatment visit was 6.0 morphine dose equivalents (dose equivalent = 7.5 mg morphine). The average pain scores and smoothed trajectories of mean narcotics use across 16 TCM visits are shown in Figure 2. Average pain decreased at the rate of -0.16 units per visit (p < 0.001), for a total decrease of -2.73 (48%) over 16 visits. Although there were no significant changes in narcotics use from visit 1 through visit 16, the best-fitting model shows narcotics use trending downward until about visit 11 (the knot for the quadratic spline), for a change of -3.27 (p = 0.156) morphine dose equivalents per week, and then trending upward across visits 11 to 16 (+4.29, p = 0.264). Methadone use among the 3 methadone users remained static. NSAID use among these same participants declined linearly, with a decrease of 1.94 doses from 2.5 doses (fitted geometric mean) over the 16 visits (p = 0.002, Figure 3).

Participants Using Nonsteroidal Anti-Inflammatory Drugs Only

The distribution of NSAID use was also highly skewed, with many participants reporting little or no use at baseline.

<p>| Table 1. Baseline demographics and pain history for patients with TMD using narcotics or NSAID |</p>
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<tr>
<td>25,000–50,000</td>
<td>34</td>
<td>28</td>
<td>6</td>
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<tr>
<td>&gt;50,000</td>
<td>42</td>
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</tr>
<tr>
<td>Pain history</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Duration ± SD, year</td>
<td>13.3 ± 13</td>
<td>13.6 ± 13.2</td>
<td>11.8 ± 9.2</td>
</tr>
<tr>
<td>Continuous</td>
<td>54</td>
<td>42</td>
<td>12</td>
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<tr>
<td>Intermittant</td>
<td>56</td>
<td>47</td>
<td>9</td>
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<tr>
<td>Saw physician for TMD</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Yes</td>
<td>99</td>
<td>80</td>
<td>19</td>
</tr>
<tr>
<td>No</td>
<td>12</td>
<td>10</td>
<td>2</td>
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</tbody>
</table>

NSAID = nonsteroidal anti-inflammatory drugs; SD = standard deviation; TMD = temporomandibular joint disorder.

<p>| Table 2. Medications reported by 111 participants at baseline or during traditional Chinese medicine treatment |</p>
<table>
<thead>
<tr>
<th>Medication</th>
<th>n</th>
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<tbody>
<tr>
<td>Ibuprofen</td>
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<tr>
<td>Acetaminophen</td>
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<td>Aspirin</td>
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<td>Valium</td>
<td>4</td>
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<tr>
<td>Percocet</td>
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<tr>
<td>Codeine</td>
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<tr>
<td>Celebrex</td>
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<tr>
<td>OxyContin</td>
<td>3</td>
</tr>
<tr>
<td>Methadone</td>
<td>3</td>
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</tbody>
</table>
Reductions in Pain Medication Use Associated with Traditional Chinese Medicine for Chronic Pain

The fitted geometric mean weekly NSAID doses corresponding to the midpoints of the top (fourth) quartile (n = 22) and third quartile (n = 23) and the lower half of the distribution (n = 45) at the start of TCM treatment were 13.2, 2.4, and 1.3 doses, respectively (1 NSAID dose equivalent = 325 mg aspirin). Figure 4 shows the changes in pain and NSAID use for the 22 participants in the fourth quartile of NSAID use at start of treatment. Average pain before TCM was 5.9 ± 1.9 (SD) and declined linearly across 16 visits (-1.52, p = 0.036 [26%]). The minimum mean NSAID dose was taken to occur near visit 7 for the spline analysis. Drug use dropped by 9.95 doses/week (p < 0.001) across visits 1 to 7 and was stable for the remaining visits (overall increase of 0.49 doses/week from visit 7 through 16, p = 0.567). Significant declines in average pain over 16 visits were also seen in the third quartile (-2.08 units, p < 0.001 [65%]) and in the lower half (-1.39 units, p < 0.001 [34%]) of participants reporting NSAID use at the first visit. Average NSAID use for those in the third quartile also decreased linearly and significantly (-1.60 doses/week, p = 0.001, Figure 5). NSAID use did not change among those in the lower half of the distribution.

Discussion

Clinicians are under increasing pressure to curtail prescriptions for chronic pain medications. In the case of opiates, there are concerns about potential habituation and even diversion of drugs. NSAIDs can often be contraindicated in the presence of cardiovascular, renal, or gastrointestinal disease. Withdrawal of pain medication, however, can be difficult when the patient is indeed suffering from chronic pain. Viable, effective alternatives, possibly including behavioral modalities and CAM therapies, are needed. Paradoxically, although health care organizations advocate for reduced pain medication use, a major obstacle to this transition can be the very structure of
the health benefits provided to patients. Chronic drug therapy is commonly covered by benefits, whereas behavioral, CAM, or self-care interventions may have severe benefit limitations, or not be covered at all. This pattern provides strong economic and cultural incentives for the clinician and patient to favor drug therapy. A frequently cited justification for this pattern of coverage is lack of evidence supporting CAM interventions. Even when clinical evidence for efficacy exists (eg, acupuncture for back pain), it has been difficult to document concurrent reductions in use of traditional medication or other clinical resources as economic justification.

In this paper we provide preliminary evidence that whole-system TCM care may be associated with reductions in pain medication use among participants with chronic pain and TMD. Average pain decreased in association with TCM care for the overall study sample and for all subgroups. The improvements in pain cannot be attributed to increased medication use. Indeed, some medication use appeared to decrease over the course of treatment. Average narcotics use appeared to decrease during the early period of TCM treatment, when TCM visits were most frequent. This decline was offset during the later period of treatment, when TCM visits grew less frequent. In contrast, the substantial early decline in NSAID use among the heaviest users was essentially sustained through 16 visits. This finding is, potentially, of clinical significance in view of the high toxicity profile of NSAID agents, and the costs associated with managing gastrointestinal bleeding and other complications. This study was not explicitly designed to evaluate reductions in medication usage. However, the data suggest that TCM may contribute to reductions in both pain and pain medication use, at least during active treatment. The findings also warrant further research on the integration of TCM into efforts to reduce pain medication.

This study has multiple limitations, and the results are considered indicative rather than definitive. Although the data were collected within the context of a randomized controlled trial, the analyses presented here pertain only to TCM treatment, because the corresponding self-care comparison groups could not be followed up for 16 visits. This is because of the nature of the treatment and the stepped-care design. It is thus possible that the patterns of change in medication use are attributable to the Hawthorne effect (the participants’ response to observation and assessment), to some other study-induced effect, or to the natural course of TMD. Although our data suggest that medication use decreased early in the course of TCM treatment, data from the standardized questionnaire may indicate whether these changes persisted beyond the conclusion of therapy. At this time there appear to be few cures for chronic pain, and long-term TCM maintenance therapy may be an option for some patients. This issue is outside the scope of the present study.

Finally, drug use data were based solely upon participant self-report. These data were ambiguous for a few participants, and their reliability is uncertain. For these reasons, results should be interpreted with caution. Further research in more controlled settings, such as within health maintenance organizations and integrative care clinics, is warranted.

Conclusion

Pain reported by TMD participants at TCM treatment visits declined linearly over the treatment period of 16 visits. Changes in reported pain medication use cannot explain the pain reduction. Among narcotics users, pain declined while narcotic drug use remained steady. Among heavier NSAID users, there was clear evidence of a sharp decline in NSAID use followed by a plateau, with NSAID use remaining substantially below baseline for up to 16 weeks.

Disclosure

Clinical Trials Identifier #: NCT00856167. This work was funded by a grant (T01-A1002570) from the National Center for Complementary and Alternative Medicine, National Institutes of Health. The author(s) have no other conflicts of interest to disclose.

Acknowledgment

Leslie Parker, ELS, provided editorial assistance.

References

soul of the healer

“The Healing Touch”
acrylic on stretched canvas
24” x 36”

Mohamed Osman, MD

Dr Osman is formerly a physician from Group Health Permanente. He has relocated and owns an innovative private practice in North Carolina with an art gallery. He is a self-taught artist and credits his early life in Somalia, his medical education in Russia, and his medical experience in Kenya and Somalia as major influences on his art. Dr Osman has been published many times in The Permanente Journal and leaflet.

View Dr Osman’s gallery and art at: www.primarycareofstpauls.com.
Ultrasound Measurements in Hypertrophic Pyloric Stenosis: Don’t Let the Numbers Fool You

Meena Said, MD; Donald B Shaul, MD; Michele Fujimoto, MD; Gary Radner, MD; Roman M Sydorak, MD; Harry Applebaum, MD

Introduction

The current generally accepted ultrasound guidelines for hypertrophic pyloric stenosis (HPS) arise from work done by Rohrschneider et al. They found that pathologic limits were 3 mm for pyloric muscle thickness, 15 mm for pyloric length, 11 mm for pyloric diameter, and 12 mL for pyloric volume. Additionally, they concluded that muscle thickness was the most discriminating factor. However, clinical experience has led us to question the applicability of these findings to infants of varying ages and weights.

We postulated that infants with smaller weights and/or ages who had HPS may have had pyloric measurements that were within the normal accepted range (i.e., measurements that by current standards are not diagnostic of HPS). This study was aimed at determining whether preoperative pyloric measurements correlated with weight and age in patients with surgically proven HPS.

Methods

The study design was a retrospective chart review. The institutional review board at our institution approved this study. Data from a single institution over a five-year period (2005 to 2020) were reviewed. Patients were identified by diagnosis codes indicating that they had HPS. Operative reports were reviewed to verify the diagnosis. Demographic data on admission for surgery were collected about individual patients. These included sex, age (postgestational age in weeks), weight (in kilograms), and duration of hospital admission. The muscle wall thickness and length of the pyloric channel (both in centimeters), as documented on the ultrasound report, were obtained for each patient. Patients who did not have pyloric ultrasound measurements recorded or who did not have pyloric stenosis at the time of operation were excluded.

Pearson correlation analysis was used to determine if there were statistically significant associations between the following combinations of factors: patient age and pyloric muscle thickness, patient weight and pyloric muscle thickness, age and pyloric length, and weight and pyloric length. A linear regression analysis also was performed to analyze these relationships. Pyloric length and muscle thickness were the dependent variables, and weight and age were the independent variables.

Results

A total of 189 patients were identified who met the study criteria and underwent either laparoscopic or open pyloromyotomy, during which the diagnosis of HPS was confirmed. Complete data were available for 165 patients, and thus this was the number of patients included in the statistical analysis. The patients’ postgestational age ranged from 1 to 17 weeks, with a mean age of 4.6 weeks. Patients’ weights ranged from 2.5 to 8.0 kg, whereas the mean weight was 3.9 kg. Pyloric muscle length ranged from 0.8 to 2.8 cm, and the mean pyloric length was 1.89 cm. The mean pyloric wall thickness was 0.42 cm, and the range was 0.18 to 0.86 cm.

In addition to the study patients, we encountered an additional 5 patients who underwent surgical exploration who were not found to have HPS at surgery. Their weights ranged from 3.2 to 4.6 kg, and their ages ranged from 2 to 7 weeks. Two of these had numerical criteria below the standard cutoff for the ultrasonic diagnosis of HPS (muscle length, 0.8 cm, and muscle thickness, 1.1 mm, respectively), and it is not clear...
Ultrasound Measurements in Hypertrophic Pyloric Stenosis: Don’t Let the Numbers Fool You

Why the decision was made to take them to surgery. Three patients had ultrasound measurements that were within the diagnostic range (muscle length, 1.2 to 1.7 cm, and thickness, 0.3 to 0.7 cm). Thus, there were 3 false-positive ultrasound studies, all of which occurred in infants who were heavier and older than the others.

Pearson correlation coefficient analysis showed that there was a statistically significant relationship between pyloric muscle wall thickness and patient age ($r = 0.35$, $p < 0.001$) as well as wall thickness and patient weight ($r = 0.24$, $p = 0.001$), as shown in Figure 1. The same analysis proved that there was no significant relationship between pyloric length and patient age ($r = 0.07$, $p = 0.35$) or weight ($r = 0.09$, $p = 0.27$), which is demonstrated in Figure 2.

Linear regression analysis demonstrated that weight and age were predictors for increasing pyloric thickness (weight: $p < 0.0001$; 95% confidence interval [CI], 0.02 to 0.07; age: $p < 0.0001$; 95% CI, 0.01 to 0.03), as shown in Table 1. Linear regression confirmed that there was no relationship between pyloric length and age or weight ($p = 0.61$; 95% CI, $-0.02$ to $+0.03$; and $p = 0.74$; 95% CI, $-0.07$ to $+0.10$, respectively; Table 1).

**Discussion**

When ultrasonographic images of the pylorus were initially being generated, it was clear that some standard criteria were required to allow the widespread adoption of this modality as a diagnostic tool. One of the original reports by Strauss et al reported 20 cases. Fifteen patients had a pyloric diameter greater than 1.5 cm and all of these had pyloric stenosis, whereas the 5 infants with a diameter of 1.5 cm or less did not have pyloric stenosis. It soon became clear that other measurements were possible and potentially useful, although muscle thickness was found to be the most discriminating and accurate criterion to make the diagnosis. Blumhagen et al noted significant overlap among the 319 infants they studied who did and did not have HPS.

There are many ultrasonographic findings that suggest HPS. These include failure of the stomach to empty and failure of the pylorus to open as well as an enlarged pyloric muscle. To the experienced radiologist and surgeon, the hypertrophied pylorus often looks obvious at first glance: “the hot dog in a bun” appearance. Unfortunately, these criteria are not objective, and therefore numerical criteria have become the standard for ultrasonographic diagnosis. We observed empirically that in smaller, younger infants, the muscle thickness and length criteria were occasionally not diagnostic even though other criteria were strongly suggestive of HPS. Thus, we had the idea that sometimes the numbers can be misleading. In this series of more than 180 patients, there were 9 infants with surgically proven HPS with a muscle thickness at or below 3 mm and 15 infants with a pyloric channel length at or below 15 mm. Thus, 5% to 8% of patients with HPS had a numerically normal study. The question posed was whether a weight- or age-based criterion would be more accurate.

We attempted to develop a rigid criterion that would allow a diagnosis of HPS on the basis of age, weight, muscle thickness, and/or muscle length. The data in this large study clearly demonstrated that measurements of the pyloric length were quite varied and had no relationship to the age or weight of the infant. We believe that the primary reason for this is that when the antral muscle proximal to the pylorus is in spasm, it looks very similar to the pylorus, and therefore, measurements made by technologists may or may not include a portion of the antrum. This creates variability. We did find that muscle thickness showed a strong correlation to both the age and weight of the infant, but we could not find a foolproof method to avoid missing the diagnosis in smaller and younger infants. In these infants, other criteria must be considered.

Other authors have performed similar studies with varying results. In a study of 59 infants with pyloric stenosis, premature infants had a lower mean pyloric length, although it was not significantly lower, and the authors concluded that length did not correlate with prematurity. In a review of 91 infants, Haider et al found that the pyloric length was significantly greater in full-term infants than in preterm infants. They were unable to demonstrate a correlation between pyloric muscle thickness and prematurity.

The results from larger series mainly concur with the current study. Leaphart et al,
in their analysis of ultrasound studies from 60 infants younger than age 21 days with proven pyloric stenosis, concluded that muscle thickness was significantly lower in younger vs older infants. However, their findings diverged from the current study in that they also found a relationship between muscle length and patient age. In concordance with our initial hypothesis, their results illustrated that the mean ultrasound measurements for younger newborns with pyloric stenosis fell within currently defined normal or borderline ranges. Another relatively large study that had results similar to the present study was that of Houben et al. In their evaluation of ultrasound findings of 100 pyloric stenosis infants, they stratified the size of the pylorus into 3 groups—short, moderate, and large—and compared these sizes with age. They proved that there was a statistically significant increase in the size of the pylorus with advancing age.

One of the weaknesses of this study is the failure to report on the pyloric measurements of several infants of varying ages and sizes who did not have proven HPS. This would have allowed for the development of a more accurate acceptable range that evaluates pyloric muscle thickness and quotes both normal and diagnostic values for infants on the basis of their weight. Future studies should be directed along these lines in order to develop diagnostic criteria that are accurate in various sizes and ages of infants. The real difficulty in developing standards for “normal” infants who are vomiting and may have HPS is in measuring the thickness and length of the normal pyloric muscle. The relaxed pylorus is difficult to distinguish from the adjacent antrum, and the ultrasonographer has difficulty taking the measurement accurately.

In conclusion, this study found that among HPS patients, pyloric muscle thickness was directly related to age and weight. There was no similar relationship for pyloric length. The collective experience of the authors of this study includes more than 1000 cases of pyloric stenosis. What we have seen is that HPS in smaller and younger infants can be a disease in evolution, and that repeating an ultrasound a few days later can be useful as the muscle thickens. In some infants, criteria other than muscle thickness can be used to make the diagnosis. For example, in a vomiting infant, electrolyte determinations, which reveal an alkalosis, can be used to make the diagnosis. For example, in a vomiting infant, electrolyte determinations, which reveal an alkalosis, are strongly suggestive of HPS. Unfortunately, concurrent dehydration with lactate production may neutralize the alkalosis, limiting its usefulness.

We support the currently accepted ultrasonographic diagnostic criterion of a pyloric muscle thickness of 3 mm or more. Reliance on a length of 12 mm or more can be misleading. When smaller neonates have a clinical picture consistent with HPS, a lower threshold for ultrasonographic diagnosis of HPS should be used. This will avoid delays in diagnosis and additional unnecessary studies. For primary care clinicians wondering whether a vomiting infant has HPS, consideration of numerous signs may be required to avoid missing the diagnosis.

**Disclosure Statement**

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

**Acknowledgment**

Kathleen Louden, ELS, of Louden Health Communications provided editorial assistance.

**References**


**Without Cause**

Infants do not cry without some legitimate cause.

— Ferrarius, 12th century Italian alchemist
ORIGINAl RESEARCH & CONTRIBUTIONS

Living With Advanced Illness: Longitudinal Study of Patient, Family, and Caregiver Needs

Karen Tallman, PhD; Ruth Greenwald, MS, MA; Alice Reidenouer, SM; Laurel Pantel

Abstract

Background and Objectives: Inpatient palliative care (IPC) consults are associated with improved quality of care and less intensive utilization. However, little is known about how the needs of patients with advanced illness and the needs of their families and caregivers evolve or how effectively those needs are addressed. The objectives of this study were 1) to summarize findings in the literature about the needs of patients with advanced illness and the needs of their families and caregivers; 2) to identify the primary needs of patients, families, and caregivers across the continuum of care from their vantage point; and 3) to learn how IPC teams affect the care experience.

Methods: We used a longitudinal, video-ethnographic approach to observe and to interview 12 patients and their families before, during, and after an IPC consult at 3 urban medical centers. Additional interviews took place up to 12 months after discharge.

Results: Five patient/family/caregiver needs were important to all family units. IPC teams responded effectively to a variety of needs that were not met in the hospital, but some postdischarge needs, beyond the scope of IPC or health care coverage, were not completely met.

Conclusion: Findings built upon the needs identified in the literature. The longitudinal approach highlighted changes in needs of patients, families, and caregivers in response to emerging medical and nonmedical developments, from their perspective. Areas for improvement include clear, integrated communications in the hospital and coordinated, comprehensive postdischarge support for patients not under hospice care and for their caregivers.

Introduction

Fueled by shifting demographics and increasing public acceptance, the demand for palliative care services can be expected to expand in the coming years. The organization sought to understand the nature of the needs of patients with advanced illness, their families, and caregivers; describe any changes in needs; determine whether their needs were addressed; and learn their impressions of inpatient palliative care (IPC) consults. We report here on the results of a 2-pronged exploration: 1) a summary of the literature on needs, and 2) a longitudinal qualitative investigation of the experiences of 12 patients and their families with IPC teams and their subsequent experiences to inform quality-improvement efforts. After the findings are described, a narrative describing typical family experiences is provided.

Findings From the Literature: Needs of Patients, Families, and Caregivers

A broad survey of the literature was conducted to identify empirical studies and review articles that describe patient, family, and caregiver needs at end of life and how well those needs were typically met.

Information

Patients with advanced illness and their families sought clear, consistent information about the patient’s condition and treatment options, but they frequently received insufficient information. In one study, more than 50% of 276 patients with lung cancer reported that their physicians did not communicate about practical needs, choice of surrogate decision maker, spiritual concerns, emotional symptoms, life-support preferences, living wills, and/or hospice. This applied even to older patients with advanced disease.

The importance of understanding patient care preferences becomes apparent during a crisis. In a study of 179 patients recommended for withdrawal of life support, only 3.4% of those in intensive care units had the capacity to make known their wishes for care (physicians’ perspective), which leaves difficult decision making to distressed family members if there are no documented care directives.

The means of conveying information is pivotal. The importance of avoiding the perception of abandonment has been emphasized. A survey of bereaved family members found that high levels of distress and low satisfaction are associated with phrases such as, “There is nothing more I can do for you.” Discussing what actions can be taken to promote comfort might be more productive. A study analyzing speech patterns during IPC consults revealed that longer consults did not earn higher communication ratings than shorter consults. Better consult ratings were linked to a higher proportion of patient-family speech relative to physician speech. On average, families spoke 29% of the time.

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Access to Medical Care

Seriously ill patients and their families required timely access to coordinated medical care and symptom management. Patients wished to have a trusted personal physician; to be free of pain, symptoms, and anxiety; to avoid prolonged dying; and to maintain mental alertness.10,15,16 but families reported having too few visits with health professionals and inadequate symptom control.17,18 Various health system barriers were described by patients and families, including multiple physicians and conflicting information from physicians and staff unfamiliar with issues related to the dying.3

Ability to Make Care Choices

Patients wanted to consider their options, to put their choices in writing, and to have those choices honored.2,15 This occurred more frequently when the patient participated in advance care planning.39 Interviews with caregivers revealed that patient preferences for medical care can evolve. Some patients who initially sought invasive, life-sustaining treatment shifted toward palliative goals as their illness progressed.20

Well-being of Patients, Family, and Caregivers

Patients often focused on the well-being of their family members. Steinhauser10 found patients generally wished to avoid being a burden on family, to have conflicts resolved, to know the family was prepared for their death, and to have an opportunity to say good-bye. Patients typically valued having family members present during advance care planning meetings.

Coming to peace with God and being able to discuss spiritual beliefs was important to many patients.80 Caregivers often found supporting a loved one to be a meaningful experience, but it could deplete time, financial resources, mental health, and physical health.41 A study of 392 caregivers and 427 noncaregivers found mortality risks were 63% higher among stressed caregivers than among noncaregiver controls, after adjustments for demographics and subclinical disease.42 Information and support provided to caregivers have frequently been described as inadequate.1,3,10,17,18

Palliative Care Interventions Designed to Meet Needs of Patients with Advanced Illness

To meet the complex medical and communication needs of patients and families in the hospital setting, IPC consultations were developed to deliver holistic, patient- and family-centered care. They were designed with the objectives of managing symptoms, helping patients reflect on their values; explaining care options; appointing a proxy; documenting goals of care; meeting psychological, social, and spiritual needs of patients and family members; and supporting planning for future care.

Randomized controlled trials and other studies have demonstrated that palliative care consultations, especially by multidisciplinary teams, can have a favorable impact on readmissions, intensive care unit admissions, use of hospice, costs, and the care experience.10,25–31 Increased median longevity was observed among patients with small-cell lung cancer in early referral outpatient palliative care settings versus usual care.32 Patients provided with inpatient palliative care consultations were less likely to die in intensive care units and more likely to receive hospice referrals.33 Consults in outpatient and inpatient settings can improve pain management, symptoms, quality of life, depression, and anxiety.3,15

Patient and Family Satisfaction and Well-Being after Palliative Care Consults

Several studies have documented a positive impact of IPC consults on the care experience. A telephone survey of caregivers of patients receiving IPC services found that 95% of respondents said they would be likely to recommend the service.29 A multisite Veterans Administration survey of 524 family members found that patients who had an inpatient or outpatient consultation were significantly more satisfied with information, communication, access to care, emotional and spiritual support, well-being, and dignity and care at death than families of patients who did not.34 Early referral, which can increase the use of hospice services, maximizes the value of IPC consults. Longer hospice stays improved quality of life for patients, which in turn was associated with better quality of life for caregivers.35

Widespread Unmet Need

Despite the rapid growth of palliative care, many patients have not discussed or documented their wishes. The California Healthcare Foundation surveyed 1669 adult Californians and found that 70% preferred to die at home, but only 32% did. Nearly 80% would have liked to speak to their physician about end-of-life care if seriously ill, but less than 7% had ever participated in such a conversation.29 Another California Healthcare Foundation survey found that only 44% of 375 respondents who had experienced the death of a family member in the last 12 months felt that the patient’s wishes were completely followed and honored by providers.37

Longitudinal Video-Ethnographic Study

Background and Objectives

Implementation of IPC programs has spread rapidly across the US and abroad. In 2011, 85% of US hospitals with 300 or more beds had palliative care programs.37 Inpatient palliative care services are available at all Kaiser Permanente (KP) Medical Centers.38 To understand the care experience of patients and their families, KP Care Management Institute surveyed families of patients who had died several months before (unpublished data, 2009). A thematic analysis of 1212 verbatim comments and findings of the large-sample survey and inform strategies to improve the quality of IPC and the care experience.
Methods

A series of 12 case studies was conducted using a form of anthropologic inquiry, video-ethnography. Ethnographic research is designed to uncover participant perspectives through sustained, naturalistic observation of and engagement with informants over time. In-depth understanding of a few participants is acquired, in contrast to a limited understanding of a large number of participants.

The study included 12 patients who received care at 3 Medical Centers, and their families and caregivers. We recruited patients who were scheduled for an IPC consult on the days the study team visited the site. Exclusion criteria included families who did not speak English, patients whose death was imminent, and patients with no family member attending the consult. To the extent possible in a small sample, we targeted patients with diverse diagnoses and diverse ethnic and cultural backgrounds who were able to participate in consults and who had life expectancies longer than 3 months. Physicians and nurses who were most familiar with the patients invited them to participate. The interviewer administered consent forms to interested patients and families. Semistructured interviews were conducted from October 2009 through December 2010.

Patients and families were observed and videotaped by an interviewer-videographer team before, during, and after the IPC consult. Interviews took place before and after the consult. After the consult, they were asked about their impressions of the IPC team, about their own priorities, and whether they had unanswered questions. Participants were encouraged to share family stories. One or more follow-up IPC team visits were recorded in the hospital, followed by additional interviews.

During visits in the following weeks and months, patients and families were interviewed in their home, assisted-living facility, hospital, or skilled nursing facility. Participants were asked how they were faring, what events had transpired, what health care contacts they had made, what needs they had, and what concerns were most important for each family member. We observed the environment and how patients and families functioned.

We learned about consults and patient care from the perspectives of participants in different roles (patients, families, caregivers, and IPC teams) and on multiple occasions. The variety of data sources contributed to a deeper understanding of the context and course of the end-of-life experience (Table 1).

Initial need themes were based on the needs identified in the literature and the analysis of verbatim responses from the survey of bereaved family members. Themes and subthemes were developed iteratively using the constant comparative method. Transcribed interviews and 70 hours of videotape were reviewed to develop themes and later to apply the final codes.

Observers who participated in data collection contributed to theme development. Two coders independently applied the final codes to transcribed and videotaped interviews and resolved discrepancies. Analysis was conducted with ATLAS.ti qualitative analysis software (v5, ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) and Microsoft Excel (XP Professional, 2003, Microsoft, Redmond, WA). We tallied met and unmet needs in each case to determine the prevalence of each need and to test hypotheses. Selection criteria for final need themes were 1) on the basis of participants’ perspectives rather than an organizational perspective; 2) pervasive importance across patients and families; and 3) together the need themes should encompass all major issues raised by participants.

The study proposal was reviewed by the KP institutional review board. Participating patients and family members were informed of their rights and gave written, informed consent.

Results

Participants: Five IPC teams from 3 urban KP Medical Centers volunteered to participate. The classical elements of palliative care consults delivered by an interdisciplinary team (eg, the 4-discipline team observed by Gade et al23) were not present at all sites. Three teams comprised various combinations of team members (physician, nurse, social worker, and chaplain). Two teams provided consults by a single practitioner (nurse or physician) with follow-up visits by a social worker. Both approaches tended to include more than one visit with the patient, family, or both. Preparatory visits and follow-up visits were often attended by a subset of the team (just the physician, nurse, or social worker; or two members.) Thus the “team” intervention was not a fixed, single intervention. Visits included early assessment by one team member; full consults typically lasting 30 to 60 minutes; additional family conferences; visits to complete care directives; and meetings to help with postdischarge needs. Each visit offered opportunities for patients and family members to ask new questions and assimilate the information. When interdisciplinary teams sensed that a visit from a large team might be burdensome, they limited team size.

Patients referred for palliative care consults tended to be very old, have moderate to advanced dementia, and/or be close to death. The recruiting criteria aimed to maximize the number of patients who could participate in the consult with family members.

Table 1. Sampling approach

<table>
<thead>
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<th>Postmortem</th>
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</thead>
<tbody>
<tr>
<td>Patient and/or family</td>
<td>Observe, interview</td>
<td>Observe</td>
<td>Observe, interview</td>
<td>Observe, interview</td>
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<tr>
<td>IPC team</td>
<td>Observe preconsult huddle</td>
<td>Observe</td>
<td>Interview, observe team debrief</td>
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</tr>
</tbody>
</table>

1 Video recording.
2 When available.
3 IPC = inpatient palliative care.
Living With Advanced Illness: Longitudinal Study of Patient, Family, and Caregiver Needs

Sensitive, Effective Communication About Advanced Illness

During hospital stay, patients with advanced illness and their families had a variety of communication needs. Before the IPC consult, they sought information about the patient’s current status, test results, diagnosis, prognosis, etiology, what to expect, and what actions to take. Most reported being confused by medical jargon and being unable to integrate the information. One family reported feeling they were receiving conflicting information about the patient's condition and prognosis, with nobody explaining the “big picture.” Some families believed that a few hospital physicians and staff did not show respect for older, sick patients.

The IPC teams communicated effectively and sensitively. They were sometimes described as compassionate or caring. Patients and families frequently remarked that the team did not rush them. When in doubt, the teams sought permission to discuss sensitive topics. The patient and family were encouraged to share past experiences and honor or celebrate the patient’s accomplishments and relationships.

The team explained in nontechnical language the patient’s past and current condition and implications for functioning in the immediate future. When asked about the patient’s functioning at home, the patient and family gave answers that raised their awareness of a poor trajectory. The team helped to bring patients and families to an understanding the patient was not expected to improve. The teams set expectations for life after discharge, normalizing events the patient and family might experience. Families had many questions and especially valued having extended time with a physician.

Caring was communicated through touch, gestures, and attitude. One patient remarked, “The doctor smiled. I am so tired of sad faces.” Other team members responded to questions after the consult. Overall, the families felt their information needs were being met. After the team left, one family member said, “This is the first communication we have had!”

Team leaders frequently used reframing statements, metaphors, and analogies to help families and patients know what to expect, chart a course for the future, find meaning, and enhance family relationships.

Overall, the structure and sequence of the consults were similar across patients, although the content varied somewhat. For example, adult children with parents unable to make decisions struggled with the responsibility of making serious decisions and needed support. Patients with young children wanted their children to know they fought the disease valiantly, even when they understood their prognosis. Two mothers with cancer made a distinction between this battle and denial.

Two families were concerned that palliative care might imply giving up on the patient. Despite trepidation about having an IPC consult, these patients and families said they were comfortable with team communications. They felt the teams were helpful. (Over the following months, participants voiced a variety of complaints about their care experience, but IPC team communications were not a source of dissatisfaction.)

The most frequent comments about the IPC teams concerned their helpfulness, respectful treatment of patients and families, clarity of communications, and the amount of time they spent with the family.

Some barriers to effective communication with families were observed. One family member struggled to understand the meaning and purpose of “palliative care.” Three families had a member whose hearing impairment reduced the effectiveness of the consult.

Timely Access to Coordinated Medical Care

Before the consult, some patients and families felt they “had to push” to have their medical needs addressed. A few patients and family members felt their access to physicians with answers to their questions or test results was not timely. The teams worked as patient advocates to resolve problems, to coordinate care, and to answer questions.

Most patients needed help with pain or other symptoms that would reduce their ability to participate comfortably in the consult. Symptom control was improved before the family meeting and fine-tuned over time.

After discharge, challenges included some issues that were not covered by benefits. Discharges were generally smooth and medical needs were initially met. New symptoms or practical problems emerged later. Patients under hospice care and patients who reconnected with their primary care physicians soon after discharge were generally comfortable, and their medical needs were addressed. Some caregivers of patients who were...
not under hospice care observed new symptoms and were not sure how to help the patient. They sought a point of contact for questions about emerging medical conditions and practical needs (such as caring for the patient and transportation to the medical office). Four of the 12 patients were treated in the Emergency Department or were readmitted to the hospital on one or more occasions. One family was dissatisfied with the quality of medical care at the nursing home.

Respect For and Honoring Care Decisions
Most patients had strong preferences about where they would live after discharge and the intensity of care they would receive (eg, not wishing to be sent to a skilled nursing facility or not wanting hospice care). One patient had distressing memories of her husband’s living with advanced dementia in a nursing home and was terrified she would be sent there. One couple was haunted by the mechanical ventilation of their daughter after a stroke. They had to “pull the plug” and did not want to endure that again. Two patients initially sought expedited death.

Several patients and family members felt that some IPC teams or other physicians or staff they encountered in the past had pressured them into making a decision too soon or had pressured them into making a particular choice. They did not have that impression of any of the study teams. In contrast, several families appealed to the physician to help make decisions for them. The 12 patients and their families felt that the teams accepted and respected their decisions.

Preferences of three of the families shifted toward palliative care as patient fatigue increased. The patients and families in the study were pleased that their wishes were honored. All care at end of life was in accord with patient decisions.

Psychological, Social, and Spiritual Support
The IPC teams were sensitive and respectful to patients and families and responsive to individual and cultural differences. Patients and families had to process a substantial volume of new medical information. The teams adjusted their pace and approach to meet the needs of different families. They provided direction and promoted a sense of meaning and purpose. Although the five teams used a variety of interaction styles, patient and family impressions of their interactions with the teams were positive.

Some patients or families sought and obtained access to a psychotherapist for young children of mothers with cancer or for patients. Two families suggested psychotherapy outreach for young children.

Spiritual support was offered during consults, but families with religious affiliations in this sample said they would consult their own clergy and felt comforted by their faith. Only three families saw a team with a chaplain. Inclusion of more teams with chaplains might have produced more detailed information about spiritual experiences.

Caregiver Support
The need for caregiver support varied by the type of care received after discharge. Patients under hospice care tended to be close to death. Most described hospice care as “wonderful” and reported no unmet needs. The most frequently mentioned feature of hospice care was that hospice staff “knew just what to say.”

Some caregivers of patients not under hospice care felt ill-equipped to care for the patient. Two families sought education for safe caregiving in the home, such as moving, toileting, and bathing. For one family, costs associated with transportation to the primary care physician’s office were a barrier to receiving care. One caregiver whose father required hourly care took a leave of absence from her job to care for him. She was proud of keeping him free of pressure ulcers, but continuous caregiving took a heavy toll on her. Her faith sustained her, but she missed her career and her freedom. The daughter of another patient living at home greatly reduced her work hours to care for her father, who had increasingly unmanageable dementia. One caregiver became seriously ill while caring for her husband.

Discussion
Evolving Needs Over Time
The 5 need themes were evident throughout the patient/family journey, but the prominence of each need varied over time. Before the consult, most families had compelling needs for information; psychological, social, and spiritual support; and access to care. During the consult, all 5 needs were evident. In the weeks or months thereafter, the need for information, caregiver support, and access to care intensified for some families. Psychological, social, and spiritual needs were present throughout the observation period but appeared to be set aside when other urgent needs emerged. A composite case study (see section: Richard’s Palliative Care Experience, page 33) based on experiences of the 12 patients and their families highlights these findings and illustrates the developing needs and the strengths and challenges of the current care delivery system.

Limitations
The study design may have introduced bias from the following sources: convenience sampling of experienced IPC teams/sites; provider selection of patient/family units (possibly favoring gregarious, articulate, and stable families); unknown influences because of the presence of observers; limited number of consults addressing spirituality; and limited diversity. The study included only English-speaking patients and patients with family present at the time of the consult. The sample size does not permit analyses of subgroups based on factors of interest, such as team configurations and patient demographics.

Implications
This study opens a window into the end-of-life journey across the continuum of care. The findings point to the need for accessible language; respect for care decisions; and consistent, coordinated messages in the hospital. We observed the tendency of physicians to make IPC referrals for patients near death. The potential value of the teams is not realized by late referrals. Outpatient and inpatient consultations earlier in the disease process might improve appropriateness of care and increase the likelihood of patients receiving preferred care.

The most conspicuous gaps in the care experience were observed after discharge. The postdischarge support features that were essential in this sample were:
1. understanding normal symptoms versus red flags, and how to respond;
2. point-of-contact for information on medical and nonmedical needs; and
3. communication with medical provider soon after discharge (nonhospice patients);
4. training for in-home caregiving (eg, moving, toileting, and comfort needs);
5. care for the caregiver (including medical needs).

This list reinforces existing postdischarge checklists\(^{40,41}\) that include interventions to address gaps and adds caregiver needs. Many postdischarge needs were outside the scope and influence of IPC team care and sometimes beyond the reach of health care coverage. Families of patients who are at high risk but not ready or eligible for hospice may need enhanced support, including practical support for caregivers. The best-laid plans may fail in complex cases where transitions in patient care are not managed consistently and access to comprehensive, coordinated outpatient support is lacking. In the absence of such a tightly woven safety net, the Emergency Department becomes the default destination when new symptoms arise.

A variety of services could provide postdischarge supplemental or palliative care, including transitions management programs. Outpatient palliative support may play an important role in addressing deficiencies in the care experience.\(^{42-44}\)

In terms of new interventions, the nature of this study does not permit specific recommendations, but the findings point to five needs that are consistently experienced by patients and their families and caregivers.

Implications for future research include the need for large-sample studies to replicate the findings and estimate the pervasiveness of the needs in the larger population. Future studies could explore differences associated with team staffing, perceptions within a variety of patient subgroups, IPC team communication skills and strategies, and the effectiveness of interventions designed to improve the postdischarge experience. A study of the perceptions of palliative care services among hospital and ambulatory care physicians and nurses could help palliative care teams understand barriers to appropriate referrals.

**Richard’s Palliative Care Experience**: A Composite of Patient/Family Experiences

**Preparation for Richard’s Inpatient Palliative Care Consult**

Richard, age 72 years, was a high school teacher and football coach. This 10-day hospitalization was his third emergency admission this year. He was treated for acute renal failure and congestive heart failure and underwent hemodialysis. Richard was struggling with pain and dyspnea. His attending physician recommended the family meet with the IPC team.

Richard’s daughter Beth was pleased the family could meet with the team. She was confused because previous physicians had different perspectives on Richard’s status; she wanted to understand the big picture of her father’s condition and prognosis. Should she encourage out-of-state family members to come soon? Beth was concerned that family members were not all on the same page. Those without first-hand experience with his series of medical crises were insisting on heroic measures to extend his life. In contrast, Richard explained he was tired of fighting and wanted to go home and get back to his life.

Richard’s wife, Lisa, told the nurse she did not understand why her husband was so sick now. She said, “He was doing so well. What happened?” The last physician told her his condition had improved. She was certain he just needed to start walking again.

Dr Lewis, the IPC team lead, visited Richard before the full team consult. He determined that adjustments to Richard’s medications could reduce his symptoms and conveyed his recommendations to Richard’s physician. The IPC nurse scheduled a meeting with Richard, the team, and four family members. Before the consult, the IPC team met to discuss Richard’s clinical status, psychosocial needs, care preferences, and the family’s concerns and resources. They discussed the variation in family members’ understanding of Richard’s condition and developed a strategy tailored to the family.

**Richard’s Inpatient Palliative Care Consult**

After assessing Richard’s comfort level, Dr Lewis introduced the team, explained their role, and described how they could help Richard and his family:

“We are the palliative care team. We meet with patients and families of patients who have serious illnesses. We address all issues of comfort and quality of life to make sure that we’re doing everything we can to make Richard comfortable and be sure you have all the information you need. We try to understand what’s important to you and how your family is doing. It’s been a difficult illness for Richard, and it’s going to be a long, potentially difficult recovery process. We want to talk about that and plan for the future.”

He asked Richard and the family about his experiences and learned about Richard’s passion for the school’s football team. Richard was able to help a few boys enter college. Then Dr Lewis asked about Richard’s current activities, which transitioned naturally into a functional assessment.

As the family responded to questions, they recognized that Richard’s functional trajectory was not improving. Recently, Richard had stopped attending football games and had turned the household finances over to his wife. Lisa was his primary caregiver, but she had her own health problems (diabetes, hypertension, and arthritis), and he feared being a burden on her. The team inquired about the family’s resources to care for Richard.

Dr Lewis asked Richard to describe his understanding of his condition and his concerns. Richard had a sense of his overall status. Dr Lewis explained, “Richard, the concern the doctors have is that hospitalization is going to take some of your strength. You are going to feel different than before you came to the hospital.” He asked permission to advance the discussion. “Do you want to know how your body might be different?” Richard replied, “That is what I want to know.” Dr Lewis continued, “When you came in, you needed kidney dialysis. Your kidneys function half as well as they did when you were younger. The other thing that’s different is your heart isn’t as strong as it used to be, so you will feel tired faster … . Some function will come back, but not all. So we just have to go step by step.”
After the Inpatient Palliative Care Consult

After the IPC team left, the family was asked for their impressions. Richard was satisfied with the meeting. He asked his family to support each other instead of bickering.

Beth was pleased that the family now had a common understanding of Richard’s condition and a concrete post-discharge plan. She appreciated the hour with the physician, saying, “He answered questions in my language and said things in a way we can understand … The doctor said, ‘This is what’s going to happen,’ … and it wasn’t rushed. He spent time explaining. You have to spend time … especially in a situation like this.”

Lisa feared she lacked the skills and strength to care for Richard in his weakened condition. She said, “He is a big man and he is not walking now. Somebody’s got to tell me what to do. What’s the plan? How do I lift him?” Beth was concerned about her mother. During the previous two months of caring for Richard, Lisa would often have to stop and rest.

The IPC team debriefed after the meeting. They discussed whether they had advanced the conversation at the right pace and whether family members could assimilate what they heard. The nurse mentioned that Richard’s daughters had additional questions; she would meet with them before they left for the day. The recommended changes to the treatment plan, revised code status, goals of care, and the family’s perspectives were communicated to Richard’s physicians and nurses. Lisa and Beth later met with the team social worker to discuss Richard’s postdischarge needs and financial concerns. The nurse visited Richard and Lisa the next day to answer their new questions and formally document his wishes. Lisa said, “I know what I need to know. We have a plan, for now.”

After Discharge

Richard was discharged to his home, as he wished, with the support of home health care services, physical therapy, and his primary care physician. The transition was smooth, but Lisa struggled with moving Richard. Beth took leave from work to help with his care. Beth insisted her mother visit her physician to get a checkup.

The family felt Richard looked much better after leaving the hospital. He began spending time in the family room in a wheelchair. He was delighted to be visited by five of the students he coached. Ten days later, he experienced breathlessness, pain, and anxiety. Unsure whom to contact, they brought him to the emergency room. The palliative care team detected his readmission during their daily scan of palliative care patient admissions and visited him that day. They had another consult and adjusted the treatment plan. Richard reiterated his wish not to resume hemodialysis and was able to return home. A week later, he died at home under the care of a hospice team, surrounded by his family.

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

Acknowledgment
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1. Clayton JM, Butow PN, Tattersall MH. The needs of terminally ill cancer patients versus those of caregivers for information regarding prognosis and end-of-life issues. Cancer 2005 May 1;103(9):1957-64.
Treated to Death

I do not want to relinquish control over how I will die;  
I do not want to be “treated to death.”

— A Graceful Exit, Lofty L Basta, MD, cardiologist and author
Fred M Freedman, MD, is a retired Neurologist from the South Bay Medical Center. He enjoys painting in oil on canvas. The inspiration for many of his paintings are scenes from his travels. Dr Freedman has done artwork all his life, including etchings and painting in oil and gouache.
Sociodemographic Characteristics of Members of a Large, Integrated Health Care System: Comparison with US Census Bureau Data

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Perm J 2012 Summer;16(3):37-41

Abstract

Background: Data from the memberships of large, integrated health care systems can be valuable for clinical, epidemiologic, and health services research, but a potential selection bias may threaten the inference to the population of interest.

Methods: We reviewed administrative records of members of Kaiser Permanente Southern California (KPSC) in 2000 and 2010, and we compared their sociodemographic characteristics with those of the underlying population in the coverage area on the basis of US Census Bureau data.

Results: We identified 3,328,579 KPSC members in 2000 and 3,357,959 KPSC members in 2010, representing approximately 16% of the population in the coverage area. The distribution of sex and age of KPSC members appeared to be similar to the census reference population in 2000 and 2010 except with a slightly higher proportion of 40 to 64 year olds. The proportion of Hispanics/Latinos was comparable between KPSC and the census reference population (37.5% vs 38.2%, respectively, in 2000 and 45.2% vs 43.3% in 2010). However, KPSC members included more blacks (14.9% vs 7.0% in 2000 and 10.8% vs 6.5% in 2010). Neighborhood educational levels and neighborhood household incomes were generally similar between KPSC members and the census reference population, but with a marginal underrepresentation of individuals with extremely low income and high education.

Conclusions: The membership of KPSC reflects the socioeconomic diversity of the Southern California census population, suggesting that findings from this setting may provide valid inference for clinical, epidemiologic, and health services research.

Introduction

Data from the memberships of integrated health care organizations offer several advantages for health researchers, including large samples and availability of electronic health records (EHR) that provide diagnostic codes, pharmacy records, vaccination records, and membership characteristics. In some cases, these data may be augmented by comprehensive inpatient and outpatient progress notes, radiologic images, and reports. These features facilitate researchers in performing studies of health disparities, long-term patient outcomes, and comparative effectiveness in a timely and cost-efficient manner.

Most US health plan members, however, receive health insurance through the employer of at least one family member. This covered individual may be healthier and may have other advantages, such as more years of education than the general population, thus raising concern that findings from studies performed in integrated health care settings may not be generalizable to younger or disadvantaged portions of the US population. Furthermore, because low socioeconomic status may be associated with poor health outcomes, a healthy worker effect may bias findings from studies in these settings by underestimating the magnitude of the effect of important predictors for poor health outcomes that are also associated with low socioeconomic status or by failing to identify such predictors in entirety.

The purpose of this study was to compare the sociodemographic characteristics of the members of a large integrated health care organization, Kaiser Permanente Southern California (KPSC), with the census population of the Southern California coverage area.

Methods

Setting and Design

An integrated health care system, KPSC provides comprehensive health care for more than 3.4 million of the 23 million residents of Southern California. Members receive medical care in 14 hospitals and more than 197 medical offices in 10 counties of Southern California: Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura. Medical information is captured in complete EHR that include all inpatient and outpatient progress notes; pharmacy records; radiology reports and images; and membership characteristics, including race/ethnicity and language preference, both written and spoken. Members can obtain KPSC insurance coverage through employer-based plans, individual plans, and Medicare or state-subsidized health care for the indigent.

For this study, we identified all individuals who were members of KPSC at any time in the years 2000 and 2010. Sociodemographic information was collected at the time of Health Plan enrollment, and...
missing or incorrect information may have been updated during inpatient and outpatient medical visits. The institutional review board of KPSC reviewed and approved the study protocol.

Race and Ethnicity
We categorized race as white, black, American Indian/Alaskan Native, Asian/Pacific Islander, multiple races, and other races. Ethnicity was classified as Hispanic or non-Hispanic. Race and ethnicity information for KPSC members was extracted from administrative records, a method previously validated against birth certificate information.6

Socioeconomic Status
As indicators of socioeconomic status, we used three different measures: neighborhood education, neighborhood income, and participation in Medi-Cal (Medicaid) or other state-subsidized health care coverage programs. Neighborhood education and neighborhood income were estimated on the basis of the linkage of Health Plan members’ addresses via geocoding (Geospatial Entity Object Coding) with US Census block data.17

Reference Populations
The reference populations included all residents of the 10 counties of Southern California who were included in the 2000 and 2010 censuses. Information about the Southern California census populations was retrieved from the US Census Bureau files using the full data set through the Web-based query portal (www.census.gov). Census information on sex, race, ethnicity, education, household income, households with income below the poverty level, and public assistance income were extracted from demographic profile summary files. To match Health Plan administrative records, we collapsed the available race categories from the census questionnaire to the following categories: white, black, American Indian/Alaskan Native, Asian/Pacific Islander, multiple races, and other race.

Statistical Analysis
We report descriptive statistics for variables of interest in the KPSC population and the Southern California reference population. We report similar descriptive statistics stratified by age group only for the year 2000, because these data were not available for the census population in 2010. We did not perform formal statistical tests to identify differences between the two populations. Because of the large population size, even small—but not necessarily relevant—differences between populations would result in a significant test result.

Results
Members of KPSC in 2000 and 2010 represented approximately 16.1% of the census reference population in the KPSC coverage area (Table 1). The overall distribution of gender and age of KPSC members appeared to be similar to the census reference population in 2000 and 2010, with the exception that the 40- to 64-year-old age group was marginally

<table>
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aData are percentages of subjects unless otherwise indicated. Some data do not total to 100% because of rounding.

bFor KPSC, information about race and ethnicity was based on administrative records among those with known race ethnicity (members with unknown race: 43.7% in 2000 and 24.9% in 2010).

cNeighborhood income and education are not reported income and education but are estimated on the basis of members’ addresses using neighborhood income and education from US Census tract information. KPSC = Kaiser Permanente Southern California.
overrepresented among KPSC members (30.8% vs 27.6% in 2000 and 34.1% vs 31.3% in 2010; Table 1).

The proportion of Hispanics/Latinos was comparable between KPSC and the census reference population in 2000 (37.5% vs 38.2%) and 2010 (45.2% vs 43.3%). However, KPSC members included more blacks in both 2000 and 2010 (14.9% vs 7.0% in 2000 and 10.8% vs 6.5% in 2010). Non-Hispanic whites were slightly over-represented among KPSC members in 2000, but in 2010 this group was somewhat underrepresented (46.3% vs 42.3% in 2000 and 34.0% vs 36.4% in 2010).

Whereas the KPSC membership and the census reference population had similar proportions of Hispanics in both 2000 and 2010, the census population included fewer self-reported Hispanic whites and more individuals who classified themselves as “other race” in these years.

Neighborhood educational level and neighborhood household income were generally similar between KPSC members and the census reference population (Table 1). However, slightly fewer KPSC members in 2010 resided in neighborhoods with household incomes below $25,000 (17.7% vs 21.6%, respectively), or in neighborhoods with a higher percentage of college graduates (25.7% vs 28.6%).

Approximately 1.7% of KPSC members received services paid by Medi-Cal, California’s state-subsidized health care program (Figure 1). The proportion of KPSC members who received health care coverage by Medi-Cal and other state-subsidized programs increased from 0.7% to 1.6% among adults and from 4.4% to 16.1% among youths between 2000 and 2010. In the coverage area of Southern California, an estimated 11.6% had an income below the poverty level, and 5.1% received public assistance in 2000, whereas in 2010 an estimated 16.2% had an income below the poverty level and 4.0% received public assistance.

Members of KPSC between 0 and 19 years of age were generally similar in demographic characteristics to the census reference population in 2000 (Table 2). Members of KPSC represented 15.2% of 0 to 9 year olds, 16.5% of 10 to 14 year olds, and 16.5% of 15 to 19 year olds in the Southern California coverage area. Differences in racial/ethnic groups between KPSC youth and Southern California census youth were similar to the differences observed in the overall populations of all ages, although the higher proportion of blacks seen in KPSC was even more pronounced among 10 to 19 year olds.

Table 2. Demographic characteristics of youth in 2000, by age group

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>0 to 9 years</th>
<th>10 to 14 years</th>
<th>15 to 19 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total population (N)</td>
<td>510,477</td>
<td>267,431</td>
<td>248,709</td>
</tr>
<tr>
<td>Sex (%)</td>
<td>51.0</td>
<td>50.8</td>
<td>50.7</td>
</tr>
<tr>
<td>Male</td>
<td>51.2</td>
<td>51.2</td>
<td>51.7</td>
</tr>
<tr>
<td>Female</td>
<td>48.0</td>
<td>49.2</td>
<td>49.3</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>28.0</td>
<td>27.5</td>
<td>36.4</td>
</tr>
<tr>
<td>Hispanic white</td>
<td>42.0</td>
<td>37.0</td>
<td>34.3</td>
</tr>
<tr>
<td>Black</td>
<td>13.0</td>
<td>19.0</td>
<td>18.9</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>7.4</td>
<td>6.9</td>
<td>7.0</td>
</tr>
<tr>
<td>Other races</td>
<td>9.0</td>
<td>8.9</td>
<td>8.2</td>
</tr>
<tr>
<td>Multiple races</td>
<td>0.4</td>
<td>0.5</td>
<td>0.6</td>
</tr>
<tr>
<td>Hispanic or Latino (%)</td>
<td>50.4</td>
<td>47.2</td>
<td>43.2</td>
</tr>
</tbody>
</table>
| a Some data do not total to 100% because of rounding.

KPSC = Kaiser Permanente Southern California.
Adult KPSC members were generally similar to the census reference population in 2000 (Table 3). Members of KPSC represented 15.1% of 20 to 39 year olds, 19.9% of 40 to 64 year olds, and 14.6% of people aged 65 years and older in the Southern California coverage area. Differences in racial/ethnic groups between KPSC adults and Southern California census adults were similar to the differences observed in the overall populations of all ages, although in both KPSC and census reference populations the proportion of Hispanics was significantly lower in adults 40 years and older.

**Discussion**

The main finding of this study is that the KPSC population appeared to be similar to the Southern California census reference population in 2000 and 2010. All ages and all racial/ethnic and socioeconomic groups were represented in the KPSC population. Adults aged 40 to 64 years, who likely represent a stable working population, were only marginally overrepresented among KPSC members, and the extremely poor and highly educated were only marginally underrepresented among KPSC members in 2010. In general, there were no grossly apparent differences in education or income level between KPSC and the reference population, as would be expected with a healthy insured effect or healthy worker bias. The similar proportions of low-income individuals in KPSC and the reference population likely reflect the large number of Medi-Cal recipients who are KPSC members. Despite small differences in the proportion of demographic groups, we demonstrated large numbers of KPSC members in all subgroups across the spectrum of age, race and ethnicity, and socioeconomic groups, including a large number of individuals under the poverty threshold and enrolled in subsidized programs to cover health insurance. Our findings suggest that results from studies conducted in the KPSC population may be generalizable to the Southern California population.

The healthy worker bias is an example of a selection bias that can lead to an underestimation of morbidity because of a better health status of the workforce compared with the general population (which also includes people who are too sick to work). Comparably, an insured population may be healthier than the general population because health insurance is often employer sponsored. On the other hand, about 83% of individuals in California had health insurance coverage in 2009. Managed care organizations provide care for a wide range of individuals receiving care through different channels, including employer-based care, family members, and programs subsidized by the state. This diversity makes healthy worker bias and gross differences in socioeconomic characteristics between the insured and the underlying population less likely to occur.

Although we did not find strong evidence for a healthy worker bias, we cannot exclude the possibility of a mixture of healthy insured effect through attractive KP benefit plans masked by an overrepresentation of members with chronic illnesses because competitor plans are more expensive or do not cover expensive drug costs. If a strong healthy worker bias were present, one would expect an overrepresentation of the stable working population manifested by more men aged 40 to 65 years, and with a higher socioeconomic status compared with the geographic reference population.

Beyond healthy worker bias, health insurance benefit structures also influence the health of its members by discouraging chronically ill members through caps, high copays, and/or deductibles, and by attracting the healthiest of the healthy by offering very low premiums. However, it is possible that competitor plans, by offering high copays for medications and restricting access to specialists, for instance, are more expensive than KPSC and less convenient for those with chronic illnesses. It is not possible to determine how such factors influence the health of the KPSC membership by examining demographic characteristics alone.

On a national level, our findings indicate that the KPSC population may be particularly useful for examining the comparative effectiveness of interventions across sociodemographic subgroups.

**Table 3. Demographic characteristics of adults in 2000, by age group**

<table>
<thead>
<tr>
<th>Demographic characteristic</th>
<th>20 to 39 years</th>
<th>40 to 64 years</th>
<th>≥65 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KPSC</td>
<td>Census</td>
<td>KPSC</td>
</tr>
<tr>
<td>Total population (N)</td>
<td>969,395</td>
<td>6,403,335</td>
<td>1,024,723</td>
</tr>
<tr>
<td>Sex (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>48.6</td>
<td>51.5</td>
<td>48.1</td>
</tr>
<tr>
<td>Female</td>
<td>51.4</td>
<td>48.5</td>
<td>51.9</td>
</tr>
<tr>
<td>Race (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic white</td>
<td>35.7</td>
<td>36.2</td>
<td>48.4</td>
</tr>
<tr>
<td>Hispanic white</td>
<td>32.4</td>
<td>16.6</td>
<td>20.6</td>
</tr>
<tr>
<td>Black or African American</td>
<td>14.6</td>
<td>6.9</td>
<td>14.7</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>0.3</td>
<td>1.0</td>
<td>0.2</td>
</tr>
<tr>
<td>Asian/Pacific Islander</td>
<td>8.8</td>
<td>10.5</td>
<td>9.7</td>
</tr>
<tr>
<td>Other races</td>
<td>7.8</td>
<td>24.1</td>
<td>6.4</td>
</tr>
<tr>
<td>Multiple races</td>
<td>0.5</td>
<td>4.7</td>
<td>0.1</td>
</tr>
<tr>
<td>Hispanic or Latino (%)</td>
<td>48.0</td>
<td>44.0</td>
<td>29.8</td>
</tr>
</tbody>
</table>

*Some data do not total to 100% because of rounding.
KPSC = Kaiser Permanente Southern California.
Sociodemographic Characteristics of Members of a Large, Integrated Health Care System: Comparison with US Census Bureau Data

The diversity and large number of KPSC members make it possible to conduct subgroup analyses aimed at identifying sources of heterogeneity on the basis of demographic factors and estimating risks within such subgroups. In this way, studies conducted in KPSC could help to accomplish this important objective of comparative effectiveness research. Risk estimates generated from such subgroups and general trends are likely to be generalizable in most instances. However, findings from such studies, particularly absolute rates, may not always be generalizable on a national level. On the other hand, the spectrum of illness and conditions seen in this setting are more likely to mirror the general population than studies conducted in tertiary care centers or referral clinics.

Health disparities have previously been attributed to the lack of health insurance. The ethnic and racial diversity of the KPSC population and the large size of these racial and ethnic groups make KPSC an ideal setting to investigate health disparities that persist despite equal access to care.

Limitations of these data include the well-known limitations of the US Census, including undercounting certain minority groups and misclassification of Hispanic whites as “other.” Another issue is missing race and ethnicity information among KPSC members, particularly in 2000. We cannot exclude that differences in the proportion of missing values may partially explain the observed differences between KPSC members in 2000 and 2010 or differences between KPSC members and the census population. This may be especially true for the higher proportion of blacks among KP members. Previous research investigating the quality of race and ethnicity information in KPSC children has shown that missing race is mostly at random with the exception of black children, who have a slightly higher chance of having race information in their EHRs.

Another potential limitation is the reliance on geocoding to obtain a KPSC member’s neighborhood education and income instead of self-reported education and income. Neighborhood education and income may or may not exactly reflect an individual's education or income living in that neighborhood. However, it will accurately reflect the distribution of the population when used for studies that include very large populations, as seen here. In addition, we were unable to compare education, income, and demographics by age group strata with the 2010 US Census because these data are not available. Finally, because our goal was to evaluate overall comparability, we did not perform formal statistical tests to identify differences between the two populations. Given the very large samples, we would expect that differences between groups would be highly significant even when trivial in magnitude or importance.

Strengths of the KPSC population include its similarity to the geographic reference population from which it is drawn, resulting in relatively large Hispanic, black, and Asian populations among children and adults.

In conclusion, the diversity of the KPSC membership along with the comprehensive medical records make this an ideal population to address clinical, epidemiologic, and health services-related questions where race or ethnicity, age, and all but the extreme ends of the income spectrum play key roles.

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

Acknowledgments
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References
Engaging Patients in Managing Their Health Care: Patient Perceptions of the Effect of a Total Joint Replacement Presurgical Class

Mary-Louise Lane-Carlson, EdD, MPH, RD, CDE; John Kumar, MD

Abstract

Objective: To engage patients in managing their health care especially in relation to a total joint replacement (TJR). With the aging of the American population and the advent of new technology, there is an increase in TJRs. As the pendulum swings from evidence-based medicine to patient-centered medicine, presurgical education is preparing patients for their surgical experience. Most research studies on such education are quantitative in nature, preventing patients’ voices from being heard.

Methods: Using a success case narrative design, 24 patients mainly from the Kaiser Permanente Downey Medical Center were interviewed regarding their pre- and postsurgical experiences.

Results: The study findings demonstrate that patient education, in the form of classes, with recognition of the participants’ physical needs, social needs, concrete supports, and psychological needs as well as the willingness of the participants to work with their health care team can promote patient engagement and improved quality of life.

Conclusion: The TJR class was found to promote a sense of social connectedness and fostered participants’ independence. The results of this study can assist health care professionals to improve their practice by designing presurgical programs to meet the needs of their patients.

Introduction

As the pendulum swings toward patient-centered medicine, presurgical education has been thrust to the forefront. Health care professionals are now expected to address the physical needs, social needs, concrete supports, and psychological needs of surgical patients rather than simply telling patients what to do. Patient education programs help patients improve their decision-making skills and self-efficacy. The long-term goal is for patients to take increased responsibility for their health care and to enjoy an enriched quality of life.

Information provided to patients before total joint replacement (TJR) surgery appears to have an empowering effect. However, few research reports have addressed patient perspectives of the effect of preoperative educational programs. Qualitative research based on patient perceptions can inform health care professionals so that they can implement effective programs. This study was approved by the Kaiser Permanente (KP) Southern California and University of California Los Angeles institutional review boards.

Purpose and Significance of the Study

Few narrative studies have been done for patients to communicate and give meaning to their experience of TJR. The majority of the literature considers patients from the health care professional’s perspective.

With shorter hospital stays and with an increasing number of discharges to home rather than to a skilled nursing facility after TJR, there is a greater demand for presurgical education and support. How best to provide this education is up for debate.

Implications of the Study

Qualitative methods can help bridge the gap between scientific evidence and clinical practice. The success case narrative design of this study allowed patient voices to be heard through the din of health care professionals’ pronouncements. Awareness of patient perceptions of presurgical educational programs will inform patient education and enable health care professionals to develop strategies to further facilitate return to health.

Theoretical Framework

The study design was guided by a theory of change and a logic model. The theory of change is a pathway depicting steps toward goals. The logic model lists the planned steps for implementing the program. In addition, this study integrates theories that engage patients to take more responsibility in managing their health care: adult learning theory and role theory.

Theory of Change

The model defined the dimensions and related concepts of the study (Figure 1). This theory of change model shows the major areas (steps) to be considered in reaching the goals of patient engagement and improved quality of life. A major benefit of this model is that it identifies expected results, including minor areas (ministeps) along the way.

Logic Model

The logic model (Table 1) on which the research is based reflects the work of the WK Kellogg Foundation. The logic model is built on the big-picture view rather than the nuts and bolts of the program. In attempting to promote a theoretical change, this study used a logic model that incorporates the premises of the TJR Program. These include the stakeholders and the activities, such as the products, services, infrastructure, and relationships. Short-term and long-term outcomes of the program are also...
considered, including specific changes in attitudes, behaviors, skills, knowledge, status, and level of functioning; and overall effects on the organization and community.

**Research Questions**

A success case narrative research design, which uses a short survey to identify individuals who are extremely successful or not successful, followed by in-depth interviews, allowed patients to give voice to their experience of TJR. The research questions were designed to offer patients the opportunity to tell their story regardless of class attendance.

1. How do patients, whether they attended a TJR class or not, describe their overall TJR experience?
2. What are the differences in perceptions, if any, between patients who have taken the TJR class and those who have not, in terms of physical needs, social needs, concrete supports, and psychological needs, both before and after the surgery?
3. Whether the patients have attended the presurgical education program or not, what activities or materials do patients say helped them prepare for or recover from TJR surgery?
4. From the patients’ perspectives, whether they have attended the presurgical program or not, what can Medical Groups do to enhance quality of life after surgery?

**Methods**

The gap in the literature addressed by this study is that patient voices are rarely expressed in research studies examining medi-

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**Table 1. Logic model for the total joint replacement class**

<table>
<thead>
<tr>
<th>Assumptions</th>
<th>Inputs</th>
<th>Activities</th>
<th>Outputs</th>
<th>Short- and long-term outcomes</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>To accomplish our set of activities, we have based the program on the following principles:</td>
<td>Stakeholders involved:</td>
<td>To address our problem, we will accomplish the following activities:</td>
<td>We expect that, once accomplished, these activities will produce the following evidence or service delivery:</td>
<td>We expect that, if accomplished, these activities will lead to the following changes in 1 to 3, then 4 to 6 years:</td>
<td>We expect that, if accomplished, these activities will lead to the following changes in 7 to 10 years:</td>
</tr>
<tr>
<td>Patients have a right to be involved in their health care.</td>
<td>Patients, families, friends, orthopedic surgeons. Medical center nursing staff. Physical therapists. Medical center discharge planners (case managers).</td>
<td>Creation of a TJR class that demonstrates physical therapy skills and gives patients an opportunity to discuss their surgery and postsurgical care. Schedule patients to attend the class once their surgery is scheduled (generally a month before surgery). Offer the class 2 to 3 times per month.</td>
<td>Preoperative education enables patients to better understand and prepare for their surgery and postsurgical care and to meet their physical and psychological needs. It also gives them an opportunity to obtain answers to their questions in a group setting. Patients will have a say in their medical care, leading to improved decision making and self-efficacy. They will take more responsibility for their care and experience an enriched quality of life.</td>
<td>Expectations for short-term and long-term outcomes are enhanced quality of life, increased satisfaction with the care received from the medical center, and increased patient numbers because of satisfied surgical patients who remain with the institution and recommend it to family and friends.</td>
<td>Improved health and empowerment of patients.</td>
</tr>
<tr>
<td>Recovering health in as short a time as possible is important to the patient and his/her family.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Additional patient-centered research that will contribute to health care programs designed to better meet patient needs.</td>
</tr>
<tr>
<td>By providing a TJR class, medical centers can assist with physical, social, and psychological needs of their patients, including reduction of anxiety before surgery.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>More presurgical classes for a variety of conditions.</td>
</tr>
</tbody>
</table>

TJR = total joint replacement.
Engaging Patients in Managing Their Health Care: Patient Perceptions of the Effect of a Total Joint Replacement Presurgical Class

Site Selection
KP, a prepaid group model health maintenance organization, was selected as the site for the interviews because it is the largest provider of total hip and knee replacements in the US.6 KP has a culture of preventive care, including many health education classes for patients.

The TJR class, which covers pre- and postsurgical information and physical therapy exercises, began at the Bellflower (now Downey) Medical Center in April 2007. The class was a response to KP orthopedic surgeons’ concerns about patients approaching surgery with excessive fear and unrealistic expectations. The existing educational method was to provide the patient a Krames Staywell Company (Evanston, IL) pamphlet outlining the TJR procedure as well as a 1997 KP 24-minute DVD discussing preparation for total hip or knee surgery and recovery. It did not seem to be working. Development of the 2-hour class was a collaborative effort of the Departments of Health Education, Orthopedics, Physical Medicine and Rehabilitation, and Utilization Management and included both inpatient and outpatient staff. The class is offered at least twice a month in English and monthly in Spanish. KP orthopedic surgeons strongly recommend that their patients attend the TJR class before surgery because the class has a strong reputation of assisting patients to better manage their health care.

We are not aware of any study that has been done at KP to document patient perceptions of the TJR class. In an era of budget slashing, including patient education programs, such a qualitative research study can corroborate or refute the anecdotal evidence and serve as a foundation to determine if there is a place for presurgical classes at health care institutions.

Participant Characteristics
The study sample came from KP Southern California’s population of patients who underwent either total hip replacement or total knee replacement surgery. The sample comprised English-speaking patients (non-KP employees) mostly from the KP Downey Service Area who preferably had either a unilateral hip (total hip replacement) or knee replacement (total knee replacement) within 2009 to 2011. More than 500 patients undergo total hip or knee replacement surgeries each year at the Downey Medical Center.8

KP employees were excluded from the sample because they may have knowledge about the surgery and the KP system that non-KP employees typically do not. Patients who had undergone previous joint replacement (more than five years earlier on the same joint type or less than five years on a different joint type) or who elected to have bilateral replacements were included. Therefore, patients who had had a previous joint replacement were interviewed at least one or more years after the initial surgery to avoid perception bias related to the previous procedure. Although the perspectives of people who underwent bilateral replacements may differ from those of patients who had a single joint replacement, their perspectives were considered valuable because this type of surgery is becoming more prevalent.9,10 Because TJR is not common in pregnant women and children, these groups were excluded.

Data Collection Methods
To answer the four research questions, an interview approach was used. By using interviews and narrative analysis, the researcher looked beyond the quantitative research regarding presurgical classes.11

Selection of Participants
Participants were selected by the following criteria: Southern California KP membership, primarily in the Downey Service Area, English speaking, and non-KP employee patients, who had either a total hip or knee replacement. Prospective participants were given a recruitment letter by the discharge planner or orthopedic nurse practitioner (NP) before they were discharged from Downey Medical Center. Patients were also able to obtain an invitation letter during their postoperative orthopedic or physical therapy appointment. The letter asked patients to call the researcher within six weeks after surgery to learn more about the study.

Patient screening tool to determine group placementa

<table>
<thead>
<tr>
<th>Screening questions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Did the patient optimize his/her health before surgery, such as performing presurgical exercises; reducing blood sugar, if necessary, or losing weight?</td>
</tr>
<tr>
<td>2. Did the patient have sufficient knowledge regarding the TJR surgery to reduce his/her anxiety; for example, knowing that the day after surgery s/he will be getting out of bed with the assistance of a physical therapist?</td>
</tr>
<tr>
<td>3. Did the patient have realistic goals about the TJR surgery and its outcomes such as the need for a caregiver for a few days when discharged from the hospital?</td>
</tr>
<tr>
<td>4. Was the patient able to adequately manage his/her pain? For example, did the patient ask for pain medication in the hospital when needed, or take pain medication before physical therapy if needed?</td>
</tr>
<tr>
<td>5. Did the patient go home after hospital discharge? (Did the patient have support of family/friends at home?)</td>
</tr>
</tbody>
</table>

and

Did the patient attend the TJR Class?

Criteria for patient selection and placement:
- If answers to at least 3 out of the 5 numbered questions were “Yes” and the patient attended the TJR Class or
- If answers to at least 3 out of the 5 numbered questions were “No” and the patient attended the TJR Class or
- If the patient did NOT attend the TJR Class

If one of the above criteria was met, the patient was asked if s/he would be willing to participate in an UCLA doctoral research study about patients’ engagement in their medical care. If the patient was interested in participating in the study, s/he was given an opportunity to ask questions and, if the patient was still interested in participating, an interview was scheduled.

a No Kaiser Permanente employees, pregnant women, or underage patients were considered. Only English-speaking patients were considered.
TJR = total joint replacement; UCLA = University of California Los Angeles.
Patients were screened after contacting this researcher (M L-C) by telephone and verbally agreeing to consider participation. The screening tool was developed with assistance from the KP Downey Medical Center discharge planners, physical therapists, orthopedic surgeon physician champion, and orthopedic NP. This group described characteristics of a successful versus unsuccessful patient after TJR surgery. This information was corroborated by the literature. Depending on patient responses to the screening tool, an interview was scheduled at least 3 weeks after surgery. At their request, 7 patients were interviewed over the phone because of transportation difficulties or work-related issues. The average time from the surgery (hip or knee) to the interview was 13 weeks, excluding the one outlier. Because of the difficulty of finding eligible patients who had not taken the TJR class, one patient who was interviewed about 2 1/2 years after surgery was included. This researcher was interested in participant perceptions of their surgical experience, not in quantifying their behavior. Therefore, the time frame for postsurgical interviews was not a significant consideration.

Patients who attended the TJR class were assigned to 1 of 2 groups on the basis of whether they had answered “yes” to at least 3 questions or “no” to at least 3 questions on the screening tool (see Sidebar: Patient Screening Tool to Determine Group Placement). During screening, patients were asked questions including if they had optimized their health before surgery, eg, by losing weight or by reducing blood sugar level if needed; and if they believed that they had realistic goals about the surgery and its outcomes. These 2 groups represented patients who had been successful with their surgery and patients who were not so successful, as identified with the patient survey. The third group, a comparison group, comprised patients who did not attend the TJR class, regardless of their responses to the survey. This third group was small and difficult to capture, because the majority of KP Downey Service Area patients attended the class. According to the Downey Service Area orthopedic NP, 70% to 80% of total hip or knee replacement patients attend the class (Lori Auman, NP; personal communication, 2011 Mar 23). Therefore, recruitment for this third group was expanded to include other areas of Southern California, such as Baldwin Park, Orange County, and South Bay.

Although the original design of the study was to recruit an equal number of men and women patients who had TJR surgery, early on this researcher observed that sex was not associated with perceptions. The type of joint replacement seemed to have a greater influence. This observation was supported by the literature. In the 74 studies reviewed by Ethgen and colleagues, patients who had a total hip replacement appeared to recover more functionality sooner. Therefore, at least 4 patients for each type of joint replacement (regardless of sex) and for each of the three constructs were interviewed. Twenty-four patients were asked to recount how they found meaning in their surgical experience. Figure 2 illustrates placement of recruited study participants.

**Interview Method**

Interviews were scheduled with eligible patients. The interview consisted of open-ended questions that allowed patients to express their views and reflections of their TJR surgery, including preparation and recovery. Probing questions were asked only to further understand patient perceptions, especially regarding decision-making ability, self-efficacy, responsibility for managing their health care, quality of life, and other means of enhancing quality of life after surgery.

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**Figure 2. Flow chart of study participants.**

TJR = total joint replacement.
Peer Review

Once the data had been analyzed, the researcher’s interpretations were reviewed by the orthopedic NP. The orthopedic NP works closely with orthopedic patients before and after TJR surgery. Hence, the knowledgeable NP was able to verify patient perceptions or challenge researcher assumptions. Although triangulation is not a foolproof strategy to establish the credibility of a study, it reduces the risk of relying on only one method of data collection.13

Results

The 24 study participants explained their overall experience of TJR surgery in a variety of ways. All but 1 study participant (a woman hip-replacement patient who did not attend the class) expressed varying degrees their satisfaction with the benefits of the surgery and the need for individual responsibility. The major benefits were increasing functionality of the new joint, reduced pain, and fewer limitations in daily activities. Before surgery, a participant stated, “I felt handicapped. The pain was so intense I felt like I couldn’t do anything.” One participant stated, “When I can bicycle, then I’ll be back to normal.” Study participants prepared themselves mentally and physically for their surgery by a variety of methods, including the TJR class, which provided a feeling of social connectedness and stressed the importance of being independent, talking with family and friends who had already had the surgery, surfing the Internet, viewing the KP presurgical DVD, talking extensively with the orthopedic surgeon, reviewing the Krames Staywell pamphlet, and doing physical activity before the surgery. As one study participant commented, “It [the TJR class] prepares you. It wakes you up to more or less what you have to know to prepare yourself [for] the challenges.” Another person said, “...initially you feel alone going into surgery ... Once you take the class, you see so many other people going through the surgery.” Another participant noted, “Yeah, just being with a bunch of people that are going to be going through the same thing with you is very comforting.” During recovery, study participants relied on assistance from family and friends, information obtained during the TJR class, and answers provided by physical therapists.

Patient Needs

This study uncovered many different perceptions regarding patient needs. In terms of physical needs, most patients, irrespective of study category, increased their exercise after surgery rather than before surgery. This study participant’s comment captured the majority of participants’ feelings about exercising after surgery: “Of course, I am doing my exercise where I can lay in bed and stretch my knee. I am getting a little better ... I know it is not going to get better just lying there and watching TV.” Most were able to manage their chronic diseases both before and after surgery. However, the majority of participants had difficulty managing pain before surgery but not so much after surgery. Support from family was more prevalent than support from friends, both before and after surgery. Most study participants had a concrete support, such as a caregiver, in place before the surgery. Anxiety was predominant in those who had a knee replacement and did not attend the TJR class. Pain management issues were associated with a perception of poor quality of life and depression before and after the surgery.

Patient Education

Patient education, in the form of activities or materials accessed before or after surgery, was associated with better outcomes. As one participant noted, “Information can’t hurt.” Another stated, “I mean it’s very personal having your hip replaced. So I felt like I owed it to myself to be informed. You know the old saying that knowledge is power.” The materials participants used to obtain information regarding recovery were similar to those they used to prepare for surgery. The major difference was that after surgery, patients asked physical therapists questions instead of their orthopedic surgeon. A participant pointed out, “I referred to all that information that I have been given [referring to the TJR materials] several times to see if I was where I should be at that point [after surgery].” With everybody saying you’re doing just great, you know, for the amount of time. It’s hard to appreciate that when you’re hurting.”

Patient Perspectives

Whether they attended the TJR class or not, study participants made several suggestions for improving outcomes and patient engagement during surgery preparation, hospital stay, and recovery. Their suggestions included pain management issues and post-surgical exercises to be incorporated into educational materials. Although the participants listed a variety of preferred educational methods to enhance their experience before or after surgery, the top five were, in order of preference, the TJR class, the Krames Staywell pamphlets on total hip or knee replacement surgery, the KP presurgical DVD, talking with orthopedic surgeons and physical therapists, and talking with people who had undergone TJR surgery. Many participants mentioned more than one method. As one participant stated, “I just had a lot of really neat people that kind of came into my path throughout this experience.”

Peer Review

The orthopedic NP reported that these findings corresponded to what she had observed and experienced in hospital and clinic settings. Her vast professional experience and insight into the expectations and concerns of patients undergoing TJR validated these findings.

Discussion

The findings of this study indicate that a multidisciplinary TJR class can foster a sense of social connectedness and independence among surgical patients undergoing total hip or knee replacement. In addition, it is important to use qualitative methods in health care research and to move forward with patient-centered rather than evidence-based medicine.

Presurgical classes promote beliefs among patients that they are not alone and that others will be undergoing similar surgical
Engaging Patients in Managing Their Health Care: Patient Perceptions of the Effect of a Total Joint Replacement Presurgical Class

The Permanente Journal/Summer 2012/Volume 16 No. 3

Procedure. Patients are more confident in their ability to recover from surgery, with enhanced independence, if they participate in a presurgical class that provides essential information about preparing for and recovering from surgery and that (if possible) engages patients in practicing related skills before surgery. When educational needs are met before surgery, patients are more engaged in their medical care and sense an improvement in their quality of life.

Because of the multidisciplinary character of the team that developed and taught the TJR class, which the literature supports, the study participants received consistent messages throughout their care and learned from specialty practitioners. Surgery is stressful enough without patients receiving contradictory messages from their health care team. With accurate knowledge and understanding of how to prepare for and recover from TJR, the study participants had more control over their health care.

Study participants who attended the TJR class noted that it was an integral part of their preparation and recovery from surgery. As health education budgets become tighter and budget allocations demand data-driven decision making, patient satisfaction needs consideration. Satisfied patients communicate with family members and friends about their experience, promoting growth of the Medical Group’s patient base.

Lastly, patient-centered medicine, which focuses on the individual patient’s concerns rather than an evidence-based process, needs to be advanced. Patient participation in health care, such as presurgical class attendance, is important. This premise is supported by the findings of this study: the TJR class provided study participants with the knowledge and skills they needed to make decisions and manage their surgical experience, leading to an enriched quality of life.

Conclusion

In the context of surgical advances, patient perspectives are sometimes neglected. The findings of this study suggest that patients’ experience improved quality of life before and after surgery when an educational program encourages them to be a part of their medical team and engages them in their medical care. As Albert Schweitzer, MD, German/French philosopher and physician, is purported to have said, “Every patient carries her or his own doctor inside.” Our job as health care professionals is to release the physician within our patients.

Practice Implications

The American population is living longer with the expectation of a more active lifestyle. Additionally, TJRs are being done on a younger population because of technological advances. Therefore, research in the area of joint replacement is expanding to assist patients to return to their lifestyles sooner. In addition, as the medical field shifts from evidence-based medicine to patient-centered medicine, patients are wanting to participate more in medical decision making. Areas for further research identified by this study are pain management, methods of patient education, and success or lack of success in patients who do not take a presurgical class. The role of caregivers should also be explored.

Disclosure Statement

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

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References


*Orthopedic Nurse Practitioner, Kaiser Permanente Downey Medical Center, Downey, CA.*
“Star Ferry, Hong Kong, 1961”
oil on canvas
14” x 18”

J Richard Gaskill, MD

Exotic British Crown Colony
Tiny blip on the south China coast
Three dozen years on the lease
Before Vietnam
Mao’s Cultural Revolution
And the major building boom.

Merchant ships of all flags
In Victoria Harbour
Where Star Ferries continually steam
Ten cents Hong Kong, 1½ US
Photographs of drowned bodies
On the landings.

Uniformed officers in shorts
Direct traffic to the left
On Nathan, Gloucester, and Queens
Rolls-Royces and rickshaws
And double-deck trams
Bicycles piled high with goods.

Floating restaurants and shops
Children begging on shore
Cluttered open-air markets
Laundry fluttering above
Live fowl hanging from poles
Caged puppies trembling in fear.

Lovely women in cheongsams
Businessmen in dark suits
Young sailors on leave
Chinese workers in droves
An occasional neck mass
Postnasal cancer with mets?*

British English in shops
Where bargains abound
Stereos, cameras, and pearls
Illicit ivory and gems
Suits and shoes in two days
Custom shirts while you wait.

Boat people of Aberdeen
On their sampans and junks
Refugee shacks in the hills
Outsiders beware—
The Wan Chai rooftops
And Walled City of Kowloon.

In the New Territories
Far from the bustle
Small villages and farms
Water buffalo in fields
And China ominously looms
Beyond the barbed wire. ♦

* Cantonese people have a high incidence of nasopharyngeal carcinoma, which often presents with cervical metastases.

Dr Gaskill is a retired Otolaryngologist from the Santa Clara Medical Center. In 1961, he was a young Naval Medical Officer on board a troop ship in the South China Sea. This painting and poem recall fond memories of a week of R&R in Hong Kong.
CME credits available for this article — see page 80.

ORIGINAL RESEARCH & CONTRIBUTIONS

Special Report

A Framework for Making Patient-Centered Care Front and Center

Sarah M Greene, MPH; Leah Tuzzio, MPH; Dan Cherkin, PhD

Abstract

The concept of patient-centered care has received increased attention in recent years and is now considered an essential aspiration of high-quality health care systems. Because of technologic advances as well as changes in the organization and financing of care delivery, contemporary health care has evolved tremendously since the concept of patient-centeredness was introduced in the late 1980s. Historically, those advocating patient-centered care have focused on the relationship between the patient and the physician or care team. Although that relationship is still integral, changes to the health care system suggest that a broader range of factors may affect the patient-centeredness of health care experiences. A multidimensional conceptualization of patient-centered care and examples from our health care system illustrate how clinical, structural, and interpersonal attributes can collectively influence the patient's experience. The proposed framework is designed to enable any health system to identify ways in which care could be more patient-centered and move toward a goal of making it a “systems property.”

Introduction

Patient-centeredness has long been recognized as a desirable attribute of health care. Proponents have described patient-centered care as that which honors patients’ preferences, needs, and values; applies a biopsychosocial perspective rather than a purely biomedical perspective; and forge a strong partnership between patient and clinician.1,2 Until recently, most studies of patient-centered care and its impact on care processes and outcomes were largely focused on the patient’s relationship to his or her clinician or care team.3,4 However, much of what a patient experiences occurs outside of the encounter in the physician’s office. Interactions between patients and care clinicians have expanded beyond the in-office visit to include virtual medicine, peer support groups, and a range of information and communication technologies to support care. Moreover, the clinician’s or team’s ability to provide patient-centered care is affected by the context in which they operate; for example, a large hospital, small private practice, freestanding urgent care facility, or integrated multispecialty group practice.

As a result of changes to the notion of a care visit and the proliferation of care delivery arrangements, much of medical care and coverage in the US is fragmented; patients may visit a number of clinicians in different clinics or systems, especially for complex and chronic conditions, and continuity and coordination across clinicians and settings is often lacking.5 Moreover, the electronic medical records held in one health care setting are often not shareable or interoperable,6 further contributing to fragmentation. Hence, the absence of a true health care system has been detrimental to patient centeredness and continues to present obstacles to making care more patient centered.

Nevertheless, we believe that efforts to make the health care environment more responsive to patients’ needs, preferences, and values will be most likely to succeed if they are based on a clear understanding of the full range of factors that promote or impede patient-centered care—that is, making patient-centeredness a “systems property.” Thus, given the changes in contemporary medical care over the past two decades, it is worthwhile to revisit the opportunities for increasing patient-centered care.

In this article, we offer a multidimensional characterization of patient-centered care that could be applied to a variety of care delivery systems and settings. We describe attributes within each of three dimensions of health care that can affect patients’ experiences, for better or for worse. Our goal is to provide a framework and real-world examples to readers interested in improving the patient-centeredness of their health care organizations. We use insights from the literature and illustrative examples collected from Group Health Cooperative (Group Health), an integrated health care delivery system in Seattle, WA, to show how the attributes of patient-centered care can be embraced at a systems level.

What Is Patient-Centered Care, and Why Is It Important?

The Institute of Medicine7 has defined patient-centered care as “care that is respectful of and responsive to individual patient preferences, needs, and values.” Following a series of focus groups with patients, iterative feedback from research colleagues, and consultation with national advisers, we modified this definition slightly to describe patient-centered care as care that “honors and responds to individual patient preferences, needs, values, and goals.” It is through this lens that we describe why and how patient-centered care should be an imperative for all health care systems, whether that “system” is a solo practitioner, a large multispecialty group practice, or a federally qualified health center providing care to underserved populations.

Several important arguments for making care more patient centered have been offered. Patient-centered care results in improved care processes8 and health outcomes, including survival.9 Two systematic reviews identified promising patient-centered interventions directed at patients, clinicians, or both, which

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resulted in improved communication and health outcomes.\textsuperscript{3,7} Patient-centered care is the right thing to do.\textsuperscript{13} In fact, it is hard to imagine how care that has not been patient centered could ever have been justified. There is a business case for patient-centered care, on the basis of evidence that patients who report stronger relationships with their clinicians undergo fewer tests and are less inclined to pursue legal action if a medical error is handled in a sensitive, patient-centered fashion.\textsuperscript{12} Finally, it has been argued that clinicians and their teams may benefit from a patient-centered orientation by knowing that they have more effectively addressed the needs of their patients.\textsuperscript{5,14} Collectively, these studies demonstrate that patient-centered approaches can lead to improved healing relationships.

**Our Approach to Studying and Improving Patient-Centered Care**

Group Health coordinates health care and coverage for more than 660,000 individuals in Washington state and operates as a consumer-governed nonprofit system. Nearly two-thirds of members receive care in Group Health-owned and operated medical centers, and promoting patient-centered care is an organizational guiding principle. Nevertheless, the complexity of patient-centered care in a large system—where every patient, clinician, team, and encounter varies across time and place—means that embedding patient-centeredness into all daily work remains challenging.

In 2009, Group Health Research Institute, the research arm of Group Health, initiated the Patient-Centered Care Interest Group to serve as a venue for stakeholders from across the organization to discuss timely topics, articles, projects, and related initiatives. The diversity of departments that are represented—including research, clinical care (primary, specialty, and nursing), health plan product development, organizational communication, quality improvement, measurement, and analysis, and patient safety—shows that this is indeed a topic of interest across our system. The group provides a forum for formal and informal interactions with internal colleagues as well as outside colleagues who are regularly invited to share their expertise, and it fosters improvements to internal care delivery initiatives as well as research projects. Topics have included measuring patient experience in real-time, best practices for patient advisory boards, and user-centered design methodology, among many others. Medical Directors are among the regular interest group participants. As a marker of widespread leadership support for this work, patient-centered care was a featured topic of Group Health’s annual internal conference targeted to all personnel in our integrated group practice (approximately 500 participants) in 2010 and 2011. The conference is a unique opportunity to describe high-profile organizational initiatives and to disseminate key messages to medical leaders and frontline staff simultaneously. Showcasing patient-centered care has spurred greater participation in the interest group.

The Group Health Cooperative Human Subjects Research Committee reviewed and approved this manuscript. However, no information on human subjects is included in this commentary.

**What Are the Dimensions and Attributes of a Patient-Centered Health System?**

The literature on patient-centered care spans a broad range of subtopics, including physician communication training, patient-centered health information technology, the built environment (the spaces and products in health care facilities), and strategies for measuring patient-centeredness. For this reason, Bensing\textsuperscript{15} describes patient-centered care as a “container concept” that envelops several different attributes and behaviors. It is useful to acknowledge and differentiate patient-centeredness from

| Table 1. Dimensions and attributions of a patient-centered health care system |
|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|-------------------------------------------------|
| **Interpersonal dimension (relationship)** | **Clinical dimension (provision of care)** | **Structural dimension (system features)** | **Built environment** | **Access to care** | **Information technology** |
| Communication | Clinical decision support | Provides calm, welcoming space | Eases appointment-making process | Supports patient and clinician before, during, and after encounters |
| Begins with listening | Ensures shared decision making on the basis of best-available evidence coupled with patient preferences | Provides patient, clinician, and family needs | Minimizes clinic wait times | Tracks patients’ preferences, values, and needs dynamically |
| Creates a fabric of trust | Supports self-management | Emphasizes easy “way-finding” and navigation through the system | Payment system accommodates patients’ circumstances | Provides self-management tools and information |
| Promotes clear, empathic communication, tailored to patients’ needs and abilities | | | | |
| Welcomes participation of family, friends, and caregivers | | | | |
| **Knowing the patient** | **Coordination and continuity** | | | | |
| Uses knowledge of patient as a whole and unique person for effective interactions | Manages care transitions and seamless flow of information—whether for a broken arm or life-altering illness | Eases appointment-making process | | |
| Finds common ground on the basis of patient preferences | Coordinates with community resources | Minimizes clinic wait times | | |
| Facilitates healing relationships | | Payment system accommodates patients’ circumstances | | |
| **Importance of teams** | **Types of encounters** | | | | |
| Ensures responsiveness by entire care team to patient and family needs | Accommodates virtual visits (phone, e-mail) as well as in-office visits | Coordinated, consistent, efficient | | |
| Recognizes that actions of both clinicians and staff can influence perceptions of care | Reimbursement structure supports range of encounters that meet patients’ varied needs | | | |

A Framework for Making Patient-Centered Care Front and Center
The patient-centered medical home model, which has gained traction in primary care as a practice model and is predicated on how a practice is organized to better support the patient’s experience. With or without adoption of the patient-centered medical home model, care can be very patient centric, or not. For example, a clinic or practice may incorporate features in the evidence-based care plans and same-day appointments, or other operational improvements, but one unpleasant interaction with a team member can leave its imprint—a perception that the patient was not put at the center. Thus, patient-centeredness is a quality that must be earned time after time, encounter by encounter, and it is fragile, even in a medical home setting.

Within Group Health, we sought to make the overarching concept of patient-centered care more concrete and operational by identifying attributes of patient-centered care that recur in the literature, and organizing them into the three dimensions that we believe must be present and integrated to make patient-centered care part of the culture of care. Table 1 shows the attributes in these three dimensions: interpersonal, clinical, and structural. We have organized these dimensions to be applicable, and the attributes to be actionable, in any health care setting. These attributes build on and extend previous conceptualizations of patient-centered care by explicitly acknowledging the role of the entire health care team, emphasizing new modes of patient-clinician interactions, and characterizing aspects of the health care system beyond the built environment. Indeed, many of these attributes are part of the medical home model, but a practice model and a mindset are not synonymous. Group Health has adopted the medical home model systemwide and is endeavoring to fully embed patient-centeredness into the culture and fabric of the organization.

Table 2 presents examples of specific changes we have made and how these changes tie to the attributes in Table 1. Leadership support is imperative, and Group Health leaders have endorsed specific tactical changes and embraced the philosophy of patient-centered care. Still, culture change is a dynamic and living process, especially in a large organization, and ours is a journey in progress.

In the course of reviewing the literature to identify key attributes, we also identified two fundamental tenets of patient-centered care that were reflected in all of the attributes. The first is consistency. Whether the patient is communicating with a physician or a radiology technician or a claims adjuster, whether being seen for a lifelong condition or an acute illness, whether the “visit” is in a clinic or via e-mail, and whether the patient’s preferences are stable or change according to their health status, the patient should be able to rely on the health system to consistently provide a patient-centered experience.

The second underlying tenet is trust. Does the patient trust that the clinician is fully present and listening with the patient’s needs in mind? Also, the patient and clinician must be able to trust the system on which the clinician relies to support high-quality, patient-centered care. Can the patient trust that the environment in which s/he is receiving care is safe and committed to error-free care? Can the patient and clinician trust that someone is looking out for the patient’s interests as s/he transitions between health care settings? Can the patient trust the skills of the medical assistant who is inserting an intravenous catheter? All of these

<table>
<thead>
<tr>
<th>Patient-centered feature</th>
<th>Related dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online self-management program introduced to accommodate growing demand for peer-support</td>
<td>Clinical</td>
</tr>
<tr>
<td>workshop for individuals who could not attend in-person version of workshop</td>
<td></td>
</tr>
<tr>
<td>Previsit outreach to patients by medical assistants to ensure that encounter focuses on</td>
<td>Clinical</td>
</tr>
<tr>
<td>most important problem, and that patients bring relevant history and medications to visits</td>
<td></td>
</tr>
<tr>
<td>Direct access to specialty care clinicians</td>
<td>Clinical</td>
</tr>
<tr>
<td>Secure e-mail access to clinician for virtual visit</td>
<td>Clinical</td>
</tr>
<tr>
<td>Smartphone “app” to give patients mobile access to their medical record, ability to reach</td>
<td>Clinical</td>
</tr>
<tr>
<td>their clinician or 24/7 nurse service, find locations, check symptoms, and view wait</td>
<td></td>
</tr>
<tr>
<td>times for laboratory and pharmacy services</td>
<td></td>
</tr>
<tr>
<td>Regular surveys of patient experience, with feedback to individual clinicians and</td>
<td>Interpersonal</td>
</tr>
<tr>
<td>comparative data across facilities</td>
<td></td>
</tr>
<tr>
<td>Patient-centeredness training for new clinicians, and retraining as needed on the basis</td>
<td>Interpersonal</td>
</tr>
<tr>
<td>of patient ratings of clinician communication</td>
<td></td>
</tr>
<tr>
<td>Electronic medical record tracks patient preference for “what I’d like to be called”</td>
<td>Structural</td>
</tr>
<tr>
<td>Integrated electronic medical record and participation in regional “Care Everywhere”</td>
<td>Structural</td>
</tr>
<tr>
<td>program to promote continuity and coordination within and outside of Group Health system</td>
<td></td>
</tr>
<tr>
<td>Way-finding signs and maps improved following ethnographic study of how patients see</td>
<td>Structural</td>
</tr>
<tr>
<td>and interpret signage in facilities</td>
<td></td>
</tr>
<tr>
<td>New clinic designed with input from patients to improve flow, decrease wait times, and</td>
<td>Structural</td>
</tr>
<tr>
<td>colocate frequent services</td>
<td></td>
</tr>
<tr>
<td>Billing statements modified following input from patients about unclear elements</td>
<td>Structural</td>
</tr>
<tr>
<td>Design of new clinics included patients as part of the team with clinicians, nurses,</td>
<td>Structural</td>
</tr>
<tr>
<td>technicians, and architects to collaboratively address “the ideal patient experience”</td>
<td></td>
</tr>
</tbody>
</table>
questions require both a system-level commitment to organizing care processes to meet patients’ needs, preferences, and goals, and a philosophical commitment on the part of all of the participants in the health care setting.

In the next section, we explore the dimensions and attributes in depth, and provide examples of how they are being applied at Group Health. In some instances, the examples may evoke more than one dimension, again illustrating that patient-centeredness has a permeable quality and “contains” many aspects.15

**Interpersonal Dimension**

This dimension unites several well-studied aspects of patient-centered care: communication, knowing the patient, and acknowledgment that all members of a team affect the team’s relationship with the patient. Effective communication must begin with active listening—empathically attuning to both the patient’s medical and nonmedical needs (eg, values, fears, life events)—that can have a major impact on both the process and outcomes of the interaction. Effective communication will facilitate the ability for patient and clinician to find common ground.14,18 It is often critically important to involve the patient’s friends, family, and/or caregivers, especially in times of stress (eg, acute events or serious illness) or when family support is important for achieving clinical goals (eg, management of chronic disease). Defining the team to include both clinical and service providers can also contribute to patient-centeredness of care. Sevin and colleagues41 note that becoming a patient-centered, highly functional care team takes deliberate work to define roles and responsibilities, and to ensure that everyone has the necessary information to meet the needs of the patient. Moreover, placing responsibility on everyone who interacts with a patient helps create and reinforce a culture of caring. Everyone on a team or in a system must recognize that one unpleasant or uncaring encounter can have a lasting negative impact on the patient and makes the lives of coworkers who have to deal with an upset patient more difficult.

Group Health has undertaken several initiatives in recent years to improve this interpersonal dimension:

- Enriching its physician- and nurse-training programs to focus on the importance of interpersonal communication both with patients and between clinicians
- Enhancing engagement among all employees through frontline improvement workshops that bring entire teams together to identify strategies to improve care
- Surveying patients regularly about their care experience, and using results to identify opportunities to improve communication at the individual clinician level
- Actively piloting patient advisory boards that tap into specific ways to improve ancillary clinical departments within our system, for example, pharmacy services.

**Clinical Dimension**

Many attributes in the clinical dimension—particularly decision support, coordination, care management, and continuity—are prominent in the health care improvement literature.19-21 These attributes are more important than ever, considering today’s diverse and increasingly fragmented health care delivery landscape. Recent innovations in delivery system design, notably virtual medicine and redesign of primary care around the medical home model, lend themselves particularly well to ensuring a patient-centered experience. By its very name and nature, the patient-centered medical home model is intended to more fully support clinicians in delivering coordinated care across settings and types of encounters. For care to be fully patient centered, it should allow patients the option of interacting with their clinician or care team without visiting a facility. Similarly, the system should have a routine approach for equipping patients with the skills needed to prevent or manage illness outside of the clinician’s office and should be able to connect patients with community-based agencies that provide social, instrumental, or emotional support.

Among the patient-centered improvements that Group Health has made in the clinical dimensions are:

- Leveraging health information technology to extend care options beyond the office visit, via secure e-mail to clinicians, a smartphone “app,” and online health risk assessment with personalized feedback
- Longer in-person appointments
- Ability to self-refer to medical specialists
- Both online and in-person peer support programs for persons with chronic illnesses
- For preference-sensitive conditions, (eg, bariatric surgery, prostate cancer treatment), a formal shared decision-making program has been established to give patients and clinicians a foundation from which to carefully explore trade-offs when more than one clinical option may be available.

**Structural Dimension**

The built environment is outmoded in many ways. Many existing facilities were designed to facilitate the clinician’s experience and navigation; signage is often in medical jargon, as is paperwork (claim forms, test results, prescription instructions). The nurses’ station in a hospital ward is often physically distant from patient rooms, which may contribute to patients feeling isolated. Patients are physically moved to procedures or services, rather than having the procedure or service performed wherever they are. System-level investments can go a long way toward creating a more humanized care experience, and principles for improving the health care environment have been articulated in the Planetree Model, which aims to shift the health care environment from one designed around the convenience of clinicians to one centered around the patient, with a more personalized and holistic approach.22 Design of Group Health’s newest clinical facilities was undertaken with extensive input from its consumers as well as care delivery personnel, with the goals of making clinic visits more efficient and less stressful, by colocating patient services (laboratory, pharmacy, imaging), and developing more comfortable examination rooms.

Similarly, access to care—where clinic wait times are minimized, appointment making is efficient, and payment structures
accommodate patients' ability to pay—can greatly enhance patients' experiences. Making patients wait 40 minutes to be seen, while feeling unwell or being around others who are ill, is likely to have negative consequences for the rest of the encounter for both the patient and the clinical team who must then deal with an upset patient. Finally, information technology innovations in health care, if developed and used properly, hold tremendous value and promise and have the potential to greatly enhance the patient-centeredness of care, especially as the “meaningful use” provisions of electronic health record adoption come to fruition. These provisions are designed to help clinicians better know their patients and use this knowledge to inform and improve care. As an example, increased use of electronic health records can dynamically capture and store a range of patient information around needs, goals, values, and preferences. Group Health regularly adds such features to its electronic medical record system. Another information technology-enabled enhancement at Group Health is the incorporation of laboratory and pharmacy wait times by clinic, built into the smartphone application.

Conclusion

Bergeson and Dean\(^1\) observed that “well-designed support and delivery systems are essential if care is going to center reliably and consistently on patients’ needs and priorities.” We have provided a new conceptualization of patient-centered care by identifying pertinent attributes in the interpersonal, clinical, and structural dimensions of health care, along with concrete examples of ways in which those wishing to improve the patient-centeredness of their care can intervene at various levels, using this actionable framework. However, because the attributes typically do not exist in isolation, all have the potential to affect a patient’s care experience. Hence, a comprehensive, integrative, consistent approach to making patient-centered care a system property is most likely to succeed.

Although the goal of delivering an optimal patient-centered care experience may seem aspirational, the mounting pressures on health care settings make this a particularly opportune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes. A parallel tune time to explore the ability of patient-centered innovations to improve care processes and health outcomes.

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Disclosure Statement
The authors are employees of Group Health Cooperative. They have no other conflicts of interest to disclose.

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Women in Surgery: Bright, Sharp, Brave, and Temperate

Elisabeth C McLemore, MD; Sonia Ramamoorthy, MD; Carrie Y Peterson, MD; Barbara L Bass, MD

Abstract

Women make up an increasing proportion of students entering the medical profession. Before 1970, women represented 6% or less of the medical student population. In drastic contrast, nearly half of first-time applicants to medical schools in 2011 were women. However, the ratio of women to men is less balanced among graduates from surgical residencies and among leadership positions in surgery. Less than 20% of full professor, tenured faculty, and departmental head positions are currently held by women. However, this disparity may resolve with time as more women who entered the field in the 1980s emerge as mature surgeons and leaders. The aim of this article is to review the history of women in surgery and to highlight individual and institutional creative modifications that can promote the advancement of women in surgery. A secondary aim of the article is to add some levity to the discussion with personal anecdotes representing the primary author’s (ECM) personal opinions, biases, and reflections.

An Unrecognized Personal Bias

During the Second Annual Women in Surgery Conference at the University of California, San Diego on November 16, 2011, Carol Scott-Conner, MD, referenced a 15th-century author describing the attributes of an ideal surgeon: “the mind of Aesculapius, the eye of an eagle, the heart of a lion, and the hands of a woman.” At first one might conclude that this refers to the physical characteristics of a woman’s hand; however, the author was more likely highlighting the temperate nature of women and the respect and care with which they care for patients and treat illnesses.

Patients frequently ask why I (ECM) became a surgeon. Women are attracted to surgical careers for reasons similar to their male colleagues: influential role models, intellectual challenges, technical aspects, and decisiveness.1 My reasons for entering the field of surgery are not unique. I wanted to effect immediate change in individuals afflicted with disease amenable to surgical intervention. During my surgical rotations in medical school, I had an immediate sense of belonging. I had an instant affinity to the surgical leadership principles that prioritize respect, honesty, efficiency, problem solving, and praise for executing arduous tasks.

I have been fortunate to have both men and women mentors. However, it was not so long ago that women in medicine, much less surgery, were not so fortunate as to have examples of both men and women who had gone before them. They were the first women in medicine, surgery, academics, private practice, boards of governors, departmental leadership, and in every imaginable position.

Despite my (ECM’s) firsthand experience as a woman in surgery, I recently discovered that my own perceptions were heavily influenced by stereotypes. I was stunned by my naiveté regarding the following riddle: One evening, a father was driving with his son. The two were heading home from an awards banquet. The father was a prominent surgeon and had been nominated for Surgeon of the Year. Unfortunately, the father and son were involved in a car accident. The paramedics arrived at the scene and the father and son were taken to different hospitals for medical evaluation. The father suffered a minor concussion and was admitted to the hospital for observation. Unfortunately, the son needed emergency surgery for his injuries. The surgeon on call that evening upon seeing the son said, “I cannot operate on this patient, this is my son.”

How is this possible? My initial solution proposed that the patient was the son of a same-sex couple and had two fathers who were both surgeons. Then, it dawned on me … the surgeon on call was the patient’s mother. How could I, a woman, a wife, a mother, and a surgeon, be so shortsighted? Despite my own personal journey, my unconscious bias still drifted toward the assumption that the surgeon was male.

History of Women in Surgery: Foreign Film, Documentary, or Action-Adventure?

If Hollywood created a film on the history of women in surgery, it might be difficult to categorize: foreign film, documentary, or action-adventure? Furthermore, how do we categorize women in medicine? Is the proper descriptor “woman physician” or “physician who happens to be a woman”? Similarly, is the proper phraseology “woman surgeon,” or “surgeon who is also a woman”? My (ECM’s) preference is for the latter in both instances. However, the lengthy wording may be prohibitive in written and spoken language.

The history of women in surgery has been well documented by Debrah A Wirtzfeld, MD. Women held prominent positions as surgeons in ancient times, as is recorded in surgical texts from Egypt, Italy, and Greece. However, during the Middle Ages, the notion of a woman’s ability to lead dissipated. This was particularly true in medicine and surgery, but also in a variety of other professional and nonprofessional roles in which leadership was deemed a necessary attribute. Similarly, in the last century, pioneering women surgeons in North America were frequently denied surgical residency positions despite having graduated from prestigious medical schools and universities.
Modern surgical training in North America was a frontier rarely explored by women in the 19th century. One of the most memorable stories illustrating some of the initial difficulties faced by women in medicine and surgery is the account of James Barry, MD (1795–1865). Dr Barry graduated from the prestigious Edinburgh Medical School at the age of 17. Thereafter, he joined the army and was a surgeon during the Napoleonic wars. In 1820, he performed one of the first successful cesarean sections at the request of a wealthy patron whose wife was unable to progress during labor. Dr Barry was often referred to as the “beardless lad.” Rumor had it that he was involved in at least one long-term relationship with another man. At the time of his death, it was discovered that Dr Barry was actually a woman, with findings at autopsy consistent with a history of pregnancy. 

In 2005, in an invited editorial describing her experience as a woman in surgery, Jo Buyske, MD, wrote, “Most women surgeons of my era, and certainly those before, have spent our careers being as sexually invisible as possible while attending to the business of learning and practicing surgery. The goal was to be accepted as a surgeon, not a woman surgeon. Now, to be a surgeon and thrown into the spotlight as women is blinding. Being asked to write this editorial made me both proud and uneasy.” I ( ECM) experienced similar feelings of uneasiness when asked to write this article.

First Things First: Women Trailblazers in Surgery

Mary Edwards Walker, MD, (1832–1919) was the first recognized woman surgeon in the US and the second woman to graduate from a medical school in the US (Syracuse Medical College, New York, 1855; Elizabeth Blackwell, MD, was the first woman graduate, in 1849). Dr Edwards Walker’s husband was a fellow classmate in medical school, Albert Miller, MD. Dr Edwards Walker went into practice with her husband, however the surgical practice failed. Thereafter, she practiced medicine as a nurse for several years. In 1863, she became the first woman surgeon in the US Army. Two years later, she received the Congressional Medal of Honor for service during the Civil War. This honor was revoked in 1917 by the US Congress, as she—like many other earlier recipients—did not serve directly on the front lines of battle. She had not returned the medal at the time of her death, in 1919. In 1977, the Congressional Medal of Honor was reinstated by President Jimmy Carter. A postage stamp was issued in 1982 to commemorate Dr Edwards Walker. An unintentionally incomplete list highlighting many firsts for women in surgery can be found in Table 1. The information contained in Table 1 is the cornerstone of this article, offering an opportunity to learn about the major accomplishments that have been made by women in surgery during the last few centuries.

Current State of the Union: Women in Surgery

Thankfully, the field of surgery has significantly evolved. Tamar Earnest, MD, said it best: “Were it not for the undaunted spirit of a few exceptional women, many barriers would still exist to discourage women from becoming surgeons.” These exceptional women frequently give praise to the influential mentors throughout their careers, who should also be recognized for their part in this evolution. One fine example among many is Claude Organ, MD. Dr Organ’s 1993 editorial entitled “Toward a more complete society” details the goals and societal benefits of participation, contribution, and leadership of women and other minorities in the field of surgery. Julie A Freischlag, MD, Halsted Professor, Surgeon-in-Chief, and Chair of Surgery at Johns Hopkins Medical Institutions, has a revolutionary and refreshing perspective on diversity: “We need to recognize that diversity—managing and leading across differences—is not an initiative or a program; it should be a competency that anyone who manages people must learn if he or she is to be an effective leader.”

Before 1970, women represented 6% or less of the medical student body population. In drastic contrast, the number of first-time applicants to medical schools in 2011 reached an all-time high, and nearly half were women (32,654 students, 2.6% increase from 2010, 47% women). In 2010, more than 2500 medical students applied for a general surgery residency, with 35% of the applicants being women (932 women, 2662 total applicants). However, despite these improvements, women continue to be a minority in other surgical specialties, numbering less than 15% of applicants to residency training programs in thoracic surgery, urology, orthopedic surgery, and neurological surgery.

The proportion of women among graduates from surgical residencies and in leadership positions in surgery is less balanced. In the academic setting, approximately 41% of assistant professors are women. At first glance, it is encouraging to see so many women in academic medicine. Unfortunately, there is a steep downward trajectory. Women represent only 29% of associate professors, 17% of full professors, and 19% of tenured faculty. Only 12% of departmental head positions are currently held by women. However, we remain cautiously optimistic.

“Attaining leadership is a long process. Women only began entering surgery in significant numbers in the late 1980s and the 1990s … Those residents from the 1980s are starting to emerge as mature surgeons and leaders. There is a certain mandatory developmental lag while those same women first learn the skills of surgery, develop a body of research, and then learn how to work on a committee, to mediate, negotiate, chair a group, and finally to emerge a leader. These women are all in the pipeline.”—Jo Buyske, MD, 2005.
Field Guide: The Obstacle Course

To maneuver through an obstacle course, you first need to know where it is. Left to your own devices, you may quickly find yourself ten miles up the wrong mountain. You need a mentor, a guide to show you land mines to avoid—quite literally in some instances. The more mentors you have throughout your career, the better the variety of perspectives, recommendations, and advice you will receive. There are two main types of mentors: active and passive. The active mentor will invest time and energy to get to know your strengths, weaknesses, goals, and aspirations. The active mentor will assist you in your development and maturation and will often keep a watchful eye on your career, creating doors of opportunity without your immediate knowledge. The passive mentor is less likely to invest time but may unknowingly provide a great role model for what to do or not do. You will need to seek out mentorship in most cases. Interestingly, structured mentoring (assigned mentoring within a department...)

Table 1. Pioneering women in the field of surgery

<table>
<thead>
<tr>
<th>Pioneering surgeon</th>
<th>First for women in surgery</th>
<th>Year</th>
<th>Additional accomplishments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mary Edwards Walker, MD</td>
<td>First woman to become a surgeon in the US</td>
<td>1863</td>
<td>Congressional Medal of Honor (1865)</td>
</tr>
<tr>
<td>(Mary) Alice Bennett, MD</td>
<td>First woman to obtain a PhD from the University of Pennsylvania (anatomy)</td>
<td>1880</td>
<td>Improved the treatment of women patients with mental illness by abolishing restraints and</td>
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<td></td>
<td>First woman superintendent of the women's section of the State Hospital for the Insane</td>
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<td>introducing occupational therapy at a state hospital</td>
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<td></td>
<td>in Norristown, PA</td>
<td></td>
<td>First woman President of the Montgomery County Medical Society of Pennsylvania (1890)</td>
</tr>
<tr>
<td>Harriet B Jones, MD</td>
<td>First woman licensed to practice surgery</td>
<td>1885</td>
<td>One of the first women to serve in the West Virginia legislature</td>
</tr>
<tr>
<td>Mary Amanda Dixon Jones, MD</td>
<td>Proposed and performed the first total hysterectomy for uterine myoma</td>
<td>1888</td>
<td>Trailblazer in portraying herself in a nontraditional female role</td>
</tr>
<tr>
<td>Bertha Van Hoosen, MD</td>
<td>Founder and first President of the American Medical Women’s Association</td>
<td>1915</td>
<td>Honorary member of the International Association of Medical Women</td>
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<td></td>
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<td></td>
<td>Author of Petticoat Surgeon, an autobiography (1947)</td>
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<tr>
<td>Barbara B Stimson, MD</td>
<td>First woman certified by the American Board of Surgery</td>
<td>1940</td>
<td>First woman member of the New York Surgical Society and American Association for the</td>
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<td></td>
<td></td>
<td></td>
<td>Surgery of Trauma</td>
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<td></td>
<td></td>
<td></td>
<td>Major in the Royal Army Medical Corps throughout World War II</td>
</tr>
<tr>
<td>Major Margaret Craighill, MD</td>
<td>First woman commissioned as an officer in the US Army</td>
<td>1943</td>
<td>A surgeon and obstetrician</td>
</tr>
<tr>
<td>Alma Dea Morani, MD</td>
<td>First woman admitted to the American Society of Plastic and Reconstructive Surgery</td>
<td>1947</td>
<td>First woman surgical resident at the Woman’s Medical College of Pennsylvania (1931)</td>
</tr>
<tr>
<td>Tenley Albright, MD</td>
<td></td>
<td></td>
<td>First woman to serve as an officer on the US Olympic Committee</td>
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<td>Chair of the National Institutes of Health National Library of Medicine’s Board of</td>
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<td></td>
<td>Regents</td>
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<td>First American woman to win a gold medal in figure skating</td>
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<tr>
<td>Nina Braunwald, MD</td>
<td>First woman elected to the American Association for Thoracic Surgery</td>
<td>1960</td>
<td>Led the operative team that performed the first successful prosthetic mitral heart valve</td>
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<td></td>
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<td>replacement in the world, which she designed (1960)</td>
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<td></td>
<td>Developed the first cardiothoracic program at University of California San Diego (1968)</td>
</tr>
<tr>
<td>Virginia Kneeland Frantz, MD</td>
<td>First woman President of the American Thyroid Society</td>
<td>1961</td>
<td>First woman surgical intern at New York Presbyterian Hospital (1922)</td>
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<td></td>
<td></td>
<td></td>
<td>Along with Dr Whipple, described the secretion of insulin by pancreatic tumors (1935)</td>
</tr>
<tr>
<td>Nina Braunwald, MD</td>
<td></td>
<td>1961</td>
<td>First women certified by the American Board of Cardiiothoracic Surgery</td>
</tr>
<tr>
<td>Ann McKiel, MD</td>
<td></td>
<td></td>
<td>First woman surgical intern at Stanford University Hospital (1966)</td>
</tr>
<tr>
<td>Nermine Tutunju, MD</td>
<td></td>
<td></td>
<td>First woman to finish the San Francisco’s Bay to Breakers Foot Race (1971)</td>
</tr>
<tr>
<td>Frances Conley, MD</td>
<td>First woman tenured full professor at a US medical school</td>
<td>1971</td>
<td>First African-American woman surgeon in the South (1957)</td>
</tr>
<tr>
<td>Dorothy Lavinia Brown, MD</td>
<td>First African-American woman to become a Fellow of the American College of Surgeons</td>
<td>1971</td>
<td>First African-American woman to serve in the Tennessee state legislature (1966)</td>
</tr>
<tr>
<td>Ernestine Hambeck, MD</td>
<td>First woman certified by the American Board of Colorectal Surgery</td>
<td>1973</td>
<td>Founder of the STOP Colon/Rectal Cancer Foundation (1997)</td>
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(Continued on next page.)
or institution) has been found to be a cost-effective measure that translates into improved skill acquisition and improved retention in academic medicine.\(^{15}\)

All women attempting to perform dual professional and domestic roles will encounter obstacles. A variety of domestic assistance options are available, from cleaning services to food preparation to household maintenance to child care. There is also a wide variety of creative solutions. For instance, our coworkers’ domestic partners have firsthand experience and a comprehensive understanding of the demands of the surgical profession. If a coworker’s household is primarily managed by a domestic partner, they will likely have well-researched recommendations for child care, education, medical and dental care, social networks, local dining venues, reliable contractors, home remodeling agencies, etc. Befriend your colleagues’ domestic partners if the

<table>
<thead>
<tr>
<th>Pioneering surgeon</th>
<th>First for women in surgery</th>
<th>Year</th>
<th>Additional accomplishments</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>First Mary A Fraley Fellow at the Texas Heart Institute (1980)</td>
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<td></td>
<td></td>
<td></td>
<td>Founding member of the Society of Black Academic Surgeons and the Association of Black Cardiovascular and Thoracic Surgeons</td>
</tr>
<tr>
<td>Alexa Irene Canady, MD</td>
<td>First African-American woman to become a neurosurgeon in the US</td>
<td>1984</td>
<td>Chief of neurosurgery at Children’s Hospital of Michigan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Woman of the Year, American Women’s Medical Association (1993)</td>
</tr>
<tr>
<td>Olga Jonasson, MD</td>
<td>First woman in the US to chair an academic department of surgery</td>
<td>1987</td>
<td>Director, Department of Education and Surgical Services of the American College of Surgeons (1993)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>First woman to receive the Nina Starr Braunwald Award (1994 Foundation Award, Association of Women Surgeons)</td>
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<td></td>
<td></td>
<td></td>
<td>Editor, Archives of Surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Associate Editor, American Journal of Surgery</td>
</tr>
<tr>
<td>Susan Veronica Karol, MD</td>
<td>First woman of the Tuscarora Indian Nation to become a surgeon</td>
<td>1988</td>
<td>First woman appointed Chief of Surgery at Beverly Hospital in Beverly, MA</td>
</tr>
<tr>
<td>Brigadier General Rhonda L Cornum, MD</td>
<td>First woman flight surgeon to enter combat</td>
<td>1991</td>
<td>Author, She Went to War: The Rhonda Cornum Story</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Director, US Army Comprehensive Soldier Fitness Program</td>
</tr>
<tr>
<td>Kathryn Dorothy Duncan Anderson, MD</td>
<td>First woman appointed officer of the American College of Surgeons</td>
<td>1992</td>
<td>Secretary of the American College of Surgeons (1993)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Chief of Surgery, Children’s Hospital Los Angeles</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2005</td>
</tr>
<tr>
<td>Karen Guice, MD</td>
<td>First woman elected President of the Association of Academic Surgery</td>
<td>1993</td>
<td>Military Health System’s chief information officer</td>
</tr>
<tr>
<td>Patricia Numann, MD</td>
<td>First woman Chair, American Board of Surgery</td>
<td>1994</td>
<td>Founder of the Association of Women in Surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Second woman elected President of the American College of Surgeons</td>
</tr>
<tr>
<td>Linda Graham, MD</td>
<td>First woman elected President of the Society of University Surgeons</td>
<td>1994</td>
<td>Adjunct Professor, Case Western Reserve University</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Department of Biomedical Engineering</td>
</tr>
<tr>
<td>Lori Arviso Alvord, MD</td>
<td>First Navajo woman to be board-certified in general surgery</td>
<td>1994</td>
<td>Bridged traditional Navajo healing and conventional Western medicine to treat the whole patient</td>
</tr>
<tr>
<td>Leigh Ann Curl, MD</td>
<td>First and only woman orthopedic surgeon in the National Football League</td>
<td>2002</td>
<td>Inducted into the Academic All-America Hall of Fame (1998)</td>
</tr>
<tr>
<td>M Jennifer Derebery, MD</td>
<td>First woman President of the American Academy of Otolaryngology</td>
<td>2003</td>
<td>Advancing the science of autoimmune inner ear diseases with National Institutes of Health-funded research</td>
</tr>
<tr>
<td>Ann Lowry, MD</td>
<td>First woman elected President of the American Society of Colon and Rectal Surgeons</td>
<td>2007</td>
<td>President and CEO of Colon and Rectal Surgery Associates (2008)</td>
</tr>
<tr>
<td>Jo Buyske, MD</td>
<td>First woman elected president of the Society of American Gastrointestinal and Endoscopic Surgeons</td>
<td>2010</td>
<td>Associate Executive Director, American Board of Surgery (2007)</td>
</tr>
<tr>
<td>Carol Scott-Conner, MD</td>
<td>First woman member of the Southern Surgical Society</td>
<td>2011</td>
<td>Second woman Chair of a Department of Surgery</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Author, A Few Small Moments, an autobiography (2011)</td>
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REVIEW ARTICLE

Women in Surgery: Bright, Sharp, Brave, and Temperate

opportunity presents itself—these may very well become some of the most grounded friendships you will have.

Without further delay, let’s address the topic of pregnancy—the “nine-letter word” in most professional environments, closely followed by the other “nine-letter word,” maternity, and maternity leave. I will make no declarations as to the ideal timing of pregnancy or parenting style. I have come to the understanding that the term “planned parenthood” is an oxymoron. It would be nice if a survivorship screening program was developed for parents and families during the first five years after childbirth. All malapropism and intentional humor aside, parenthood during surgical training and professional practice is going to occur so long as there are human beings inhabiting the earth. Therefore, we prepare for it in a fashion similar to the way we prepare for coverage during holidays, societal meetings, and business meetings. Appropriate maternity and paternity policies within our own institutions and practices exist and foster an environment of equality. “Parent leave,” if you will, for newborn care, parent-teacher meetings, and scholarly and extracurricular events should be so common that we find ourselves surprised when there is no one currently on parent leave, rather than being shocked at the coverage that is needed to support the leave.14

Although considerable improvements have been made in the realm of sex discrimination in the workplace, there is always room for improvement. Zhuge and colleagues have identified notable barriers to achieving leadership positions and recommended adaptive interventions.11 The reader is encouraged to review the article by Zhuge and colleagues as individual and institutional interventions are revealed and may enlighten both parties as to some creative solutions. For example, at the individual level, renegate assignment of family responsibilities. At the institutional level, schedule departmental meetings at more practical times. The absolute need for mentorship is also emphasized.11

Dyrbye and colleagues recommend additional creative institutional strategies, including daycare in the workplace, adjustable timelines for promotion and tenure, and domestic partner employment assistance during recruitment of women surgeons.19 Creative adaptations of surgical residency programs, including part-time maternity and maternity leave, are of increasing interest to students and trainees.2 These creative residency employment tracks continue to train competent surgeons.20,21

A career in surgery includes an often daunting time commitment to clinical work. Despite the longer work days required of surgeons, a study comparing women who are surgeons with other women who are physicians found that career satisfaction was similar between both groups.22 Women in surgical careers were not more likely to report feeling that they worked too much, had too much work stress, or less control of their work environment. Women in surgical careers were less likely to want to change their specialty if they had the option of relieving their lives.21

“Yes, it is worth it. And yes, you can be a successful surgeon, parent, and spouse—just not always at the same time.”

My (ECM’s) answer to these questions is, “Yes, it is worth it. And yes, you can be successful in all three areas—just not always at the same time.” Some days you will be most successful as the surgeon. Other days you will be most successful as the parent. And other days, you will be most successful as the spouse or domestic partner. For the other roles you play—daughter, sister, co-worker, mentor, mentee, friend, coach, teacher, etc—you will have various degrees of success as well. One of my (ECM’s) mentors from medical school had engraved on her mantel the mock-Latin aphorism: Illegitimis non carborundum. The underlying message is similar to the well-known phrase from the children’s story The Little Engine That Could. “I think I can, I think I can, I think I can . . .” Mind your health, cherish your friends and family, learn from your mistakes, and take pleasure in all of your successful moments.

Conclusion: Nurture the Creative Pipelines to Success

As women continue to increase in number and mature in leadership positions in surgery, active mentorship is vital to nurture the variety of pipelines to success. Leaders in surgery, unite and assist your colleagues in attaining a sense of control over lifestyle. Although there will always be roadblocks, regardless of race, ethnicity, sex, and a myriad of other differences associated with unjustified perceptions, it is important to persevere in the ongoing education and evolution of our minds and craft.21

It is often easier to lose momentum at a roadblock and turn back than to forge a new path. However, true greatness, true happiness, true meaning is found in the discovery of new frontiers, both professional and personal. In the field of surgery, there is a multitude of frontiers awaiting bright, sharp, brave, and temperate leaders. Let us continue to promote the advancement of women and other minority groups in surgery, including positions of leadership. In her presidential speech at the American Society of Colon and Rectal Surgeons Annual Meeting, Ann C Lowry, MD, very appropriately referenced Robert Frost, “Two roads diverged in a wood, and I—I took the one less traveled by, and that has made all the difference.”25
Acknowledgments
Leslie E Parker, ELS, provided editorial assistance.

References

A Surgeon Should Be
A surgeon should be youthful or at any rate nearer youth than age; with a strong and steady hand which never trembles, and ready to use the left hand as well as the right; with vision sharp and clear, and spirit undaunted; filled with pity, so that he wishes to cure his patient, yet is not moved by his cries, to go too fast, or cut less than is necessary; but he does everything just as if the cries of pain cause him to emotion.
—De Medicina, Aulus Aurelius Cornelius Celsus, 25 BC – 50 AD, Roman encyclopaedist
CASE STUDY

Lymphoepithelial Carcinoma: A Case of a Rare Parotid Gland Tumor

Christopher G Tang, MD; Thomas M SchmidtKnecht, MD; Grace Y Tang; Luke J Schloegel, MD; Barry Rasgon, MD

Perm J 2012 Summer;16(3):60-62

Abstract

A 29-year-old woman presented from another hospital with a 10-month history of an enlarging left-sided facial mass. Computed tomographic scan revealed a mass in the superficial lobe of the left parotid gland with left-sided cervical lymphadenopathy. The patient received a total left parotidectomy and a selective neck dissection. Histopathologic slides revealed lymphoepithelial carcinoma (LEC) that stained positive for cytokeratin, as well as Epstein-Barr virus (EBV). An LEC of the parotid is a rare salivary gland tumor accounting for less than 1% of all salivary gland tumors. As reaffirmed in our case, LEC is more common in women, occurs primarily in the parotid gland, and has an ethnic predilection. Histologic analysis reveals an infiltrative, poorly differentiated tumor nestled in a lymphoid stroma, with near 100% positivity for EBV in endemic areas. Complete resection of this poorly differentiated carcinoma followed by postoperative radiation is essential for local control.

Case Report

A 29-year-old woman referred from an outside hospital presented to our clinic with a 10-month history of an enlarging left-sided facial mass. At that time, the patient had no pain, and her facial nerve was intact, with House-Brackmann grade I. Fine-needle aspiration (FNA) biopsy was done at the referring facility and showed cells suggestive of a poorly differentiated neoplasm with spindle cell and epithelioid features. However, additional biopsy material was needed for a definitive classification. A computed tomographic (CT) scan obtained at that time showed a 4.1 × 2.9 × 3.7-cm mass in the superficial lobe of the left parotid gland with left-sided cervical lymphadenopathy (Figures 1 and 2).

The patient was seen at our facility 9 days after the initial FNA and CT scan were performed. Because pathologic results may have altered surgical planning, a core needle biopsy was completed to rule out lymphoma. Core needle biopsy revealed tumor cells that stained negative for CD20, C3, CD45, synaptofysin, and CD30, and confirmed the FNA results of a poorly differentiated carcinoma.

Six days after the core needle biopsy, the patient received a total left parotidectomy and a selective neck dissection involving the level 2 nodes only. A complete neck dissection was not performed because results of a frozen section of level 2 nodes were negative for carcinoma. A specimen was sent for pathologic analysis and revealed an intraparotid lymph node adjacent to the mass with a lymphoplasmacytic cell infiltrate surrounding nests of tumor cells. An adjacent lymph node appeared reactive with a “starry sky” pattern (Figure 3). A brown cytokeratin stain (CK 5/7), an immunoperoxidase stain, revealed cells staining positive for cytokeratin in the mass as well as an intraparotid lymph node (Figure 4). All other lymph nodes had negative test results. Epstein-Barr encoded RNA (EBER) stain showed Epstein-Barr virus (EBV) positivity in the mass as well as in an intraparotid lymph node (Figure 5). A high-power view of the specimen demonstrated classic lymphoplasmacytic cell infiltrate among nests of poorly differentiated cells (Figure 6). The diagnosis was lymphoepithelial carcinoma (LEC).

Figure 1. Computed tomography scan reveals a left-sided parotid mass in the coronal plane. White circle marks the site of the tumor.

Figure 2. Computed tomography scan reveals a left-sided parotid mass in the axial plane. White circle marks the site of the tumor.
CASE STUDY

Lymphoepithelial Carcinoma: A Case of a Rare Parotid Gland Tumor

Postoperatively, the patient was referred for radiation therapy to the primary site and neck basins.

Discussion

Lymphoepithelial carcinoma accounts for 0.4% of malignant salivary gland tumors and is a variant of anaplastic carcinoma with a dense lymphoid stroma. Although Schminke first described lymphoepithelial carcinoma in the nasopharynx in 1921, it was not until 1952 that Godwin described the first case series of benign lymphoepithelial lesions of the salivary gland in 11 patients.

Epidemiologically, LEC accounts for less than 1% of all salivary gland tumors and has a unique ethnic predilection for Arctic region natives (particularly Eskimos and Inuits), southeastern Chinese, and Japanese. Hamilton-Dutoit et al first published the association between EBV and undifferentiated carcinomas of the salivary gland among the Eskimo population. They showed that the EBV genomes were detected in cases of undifferentiated carcinoma of the Eskimo population, but not in similar tumors of non-Eskimo ancestry. The current theory is that when the EBV incorporates into the DNA of certain susceptible populations, it has a predilection for tumorigenesis (ie, turning off tumor suppressor genes such as p53). The most common site of occurrence is the parotid gland, and LEC has a nearly 100% association with EBV in endemic areas. Patients usually present with a mass swelling with or without facial nerve paralysis and pain. There is a high frequency (10% to 40%) of concurrent cervical lymphadenopathy.

The patient in our case had all these clinical risk factors, as she was of southeastern Chinese/Asian descent, had disease in the parotid gland, and histologic specimens stained positive for EBER (Figure 5). The patient did present with facial swelling but did not have any facial nerve paralysis or any pain. She did not have any cervical lymph node involvement, and pathologic specimens of level 2a nodes showed 19 negative lymph nodes. The patient did have one lymph node involved that was directly adjacent to the tumor (Figure 3), but no regional metastases.
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CASE STUDY

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The tumor was classified as a stage II, T2N0M0, grade 3, poorly differentiated LEC, according to the American Joint Committee on Cancer staging system because the tumor was greater than 2 cm and less than 4 cm and did not appear to have any lymph node or distant metastases. The patient did not have any perineural invasion, and all margins were clear. Postoperatively she had a facial nerve palsy with incomplete eye closure, a House-Brackmann grade IV, and she recovered to baseline grade I within a month.

There were 3 primary reasons why a total parotidectomy was performed instead of a superficial parotidectomy. The patient had a deep lobe tumor, the FNA showed a high-grade malignant tumor, and the tumor was relatively large (roughly 4 cm). At our institution, the senior author tends to perform total parotidectomy on all high-grade malignancies. Sometimes superficial parotidectomy may be sufficient for small, low-grade malignancies.

Regarding the decision to perform only a selective level 2a neck dissection, the patient had abnormal-appearing lymph nodes on CT that measured 2.1 x 1.2 cm and 1.7 x 1.1 cm in level 2a. These tumors are very radiosensitive, and the patient was scheduled to have postoperative radiation therapy locally to the tumor bed of the parotid. It was decided that the abnormal-appearing lymph nodes would be removed and sampled as frozen sections to rule out regional metastases. Because the patient would be receiving postoperative radiation to the local tumor bed if the nodes were negative, she would receive radiation to the cervical lymph node basins instead of an elective neck dissection. If the lymph nodes were positive for cancer on the frozen section, a selective neck dissection would be performed.

Histologically, specimens of LEC normally are characterized by a rich nonneoplastic lymphoplasmacytic cell infiltrate present between and around tumor nests (Figures 3 and 6). Abundant histiocytes may be present, demonstrating a starry-sky appearance. Immunohistochemical analysis shows neoplastic cells that stain positive for cytokeratin (Figure 4) and epithelial membrane antigen, with variable expression of EBER. Lymphoid cells are reactive for both CD20 and CD3 markers suggestive of B-cell and T-cell presence, respectively.

With current treatment modalities, the recurrence rate of high-grade salivary gland tumors has decreased, and survival rates have increased. According to a 30-year review of the Mayo Clinic’s surgical experience with 1360 primary tumors of the parotid gland, nearly 17% (228) of those tumors were malignant. Of the 228 malignant tumors, 11 (<5%) were undifferentiated. The recurrence rate decreased from 83% in the 1940s to 40% in the 1960s.

Current treatment recommendations involve completely excising the primary lesion, with a selective neck dissection followed by postoperative radiotherapy to the local site as well as to the neck if there was positive lymph node involvement. Because most LECs of the parotid gland are radiosensitive, combination therapy with surgery and radiation therapy is desirable to control the disease. Our patient received a total parotidectomy on the affected side with selective lymph node sampling. Because the lymph nodes were negative on the frozen section intraoperatively, a complete neck dissection was not performed. Postoperatively, the patient was referred for radiation therapy to the primary site and neck basins.

There have been reports of LECs in several other sites in the head and neck region, including the floor of the mouth, tonsil, thymus, larynx, and sinonasal tract. Histologically, LECs of the parotid are identical to nasopharyngeal lymphoepitheliomas. Similar to lymphoepithelioptoma of the nasopharynx, LECs of the parotid are very sensitive to radiation. Any high-grade malignant tumor of the parotid usually is treated with radiation therapy because it may be difficult to obtain clear margins.

In conclusion, LEC of the parotid is a rare parotid tumor that requires surgical excision and postoperative radiotherapy. The workup of any parotid mass should begin with an FNA of the mass. Once a pathologic diagnosis of the parotid mass is obtained, surgical excision can be discussed depending on the pathologic results. An elderly patient with multiple medical comorbidities may not need to have a benign pleomorphic adenoma excised. Any malignant neoplasm would require surgical excision, radiation therapy, or both. After the FNA is obtained, imaging with either magnetic resonance imaging or positron emission tomography/CT is appropriate. Magnetic resonance images are preferable for anatomic delineation, whereas positron emission tomography/CT scans allow one to look for regional and distant metastases. In many cases, both types of images can be obtained, especially in cases of high-grade malignancies. Finally, referral to a multidisciplinary head and neck tumor board including head and neck surgeons, a radiation oncologist, and medical oncologists, for evaluation of advanced-stage disease may help facilitate management from a multispecialty approach.

Disclosure Statement
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References

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CASE STUDY

Neurothekeoma in the Posterior Fossa: Case Report and Literature Review

Daniela Alexandru, MD; Radha Satyadev, MD; William So, MD

Abstract

Neurothekeoma is a benign nerve sheath tumor, also known as nerve sheath myxoma. It arises from the cutaneous nerves of the head and neck region. In certain cases, neurothekeoma has been reported in the breast, oral cavity, tongue, maxilla, and spinal intradural space. Intracranial neurothekeoma, however, is an extremely rare entity, with only three cases reported in the literature: one in the parasellar region, one in the deep white matter, and another one in the cerebellopontine angle. We present the case of a 40-year-old man with a very large neurothekeoma present in the posterior fossa who had no neurologic deficit on presentation.

Introduction

Neurothekeoma is a benign nerve sheath tumor that arises from small cutaneous nerves and has a predilection for the upper part of the body: the head, neck, and shoulders.1-5 Sometimes it can be found in the breast, oral cavity, tongue, maxilla, and spinal intradural space.5,6 Neurothekeoma of the head and neck is quite common, with hundreds of reported cases in the literature.7 Intracranial neurothekeoma, however, is a very rare tumor, with only three cases reported in the literature, to our knowledge.6-10

We herein report a case of intracranial neurothekeoma, which had a unique location in the posterior fossa, mimicking a meningioma or a schwannoma.

Case Report

A 40-year-old man presented to the emergency room with a 2-week history of headaches. The patient complained of occipital headaches, which came on gradually and increased in intensity over the 2-week period. The day before the hospital admission, he also experienced transient numbness of the lower extremities. He did not have any difficulty ambulating or any balance problems. The patient had a history of type 2 diabetes, which was controlled with medications.

On neurologic examination, the patient had no cranial nerve deficits, no weakness, and no sensory deficits. He did not have dysmetria or dysdiadochokinesia. A head computed tomographic (CT) scan performed in the emergency room to evaluate for headache showed a left cerebellar mass. Thus, a magnetic resonance image (MRI) was obtained to better characterize the mass in the posterior fossa.

Imaging Findings

A noncontrast-enhanced CT scan of the head showed a mass in the left cerebellum with compression and distortion of the fourth ventricle. There was also evidence of ventriculomegaly.

Axial, coronal, and sagittal MRIs of the head displayed a round, well-delineated lesion in the posterior fossa compressing the left cerebellar hemisphere, with distortion of the brain stem and compression of the fourth ventricle. The tumor was hypointense to brain on T1-weighted images (Figure 1A) and hyperintense on T2-weighted images (Figure 1B). Fluid-attenuated inversion recovery images showed minimal edema around the tumor (Figure 1C). The tumor had faint enhancement with gadolinium administration, in a heterogeneous pattern (Figure 1D).

To better characterize the lesion, an angiogram was obtained. Common carotid injections bilaterally showed no vascular abnormality. Vertebral injections showed filling of the basilar artery and the posterior circulation without a tumor blush. Right external carotid artery injection showed no abnormality. Left external carotid artery injection showed a faint vascular blush over the left cerebellar region. There was no distinct vessel supplying the mass. The occipital artery was cannulated, and injection of contrast showed small branches supplying the vascular blush, without evidence of a large vessel supplying the mass. Embolization was not performed.

Surgical Approach

The decision was made to proceed with surgery, for tissue biopsy and for attempted gross total resection. A standard left-sided posterior fossa craniotomy was performed. The dura mater was opened over the tumor, which had a well-demarcated capsule. The tumor was dissected carefully off the cerebellum. The tumor had areas that were soft and easily removable, mixed with areas of fibrotic tissue. It was quite avascular.

Figure 1. Axial magnetic resonance images of the tumor.
A) T1-weighted images show hypointense tumor. B) T2-weighted images show hyperintense lesion. C) Fluid-attenuated inversion images show minimal edema. D) T1-weighted images with contrast agent show heterogeneous enhancement of the lesion.

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Pathologic Examination

On pathologic examination, the tumor had the appearance of a well-circumscribed, myxoid lobulated lesion. Histologically, the tumor was encapsulated by a thin fibrous connective tissue and was composed of ovoid lobules separated by fibrous septae. The lobules contained stellate and spindle-shaped cells with reticular cellular processes forming a myxoid network in an abundant basophilic matrix (Figure 2A, B). There was no necrosis and no mitoses (Figure 2A, B). The cells had a bland morphologic appearance despite cellular pleomorphism, as well as variable positivity for S100 immunohistochemical stain (Figure 2C) and negativity for glial fibrillary acidic protein stain (Figure 2D) characteristic of neurothekeoma.

Postoperative Course

Following complete total resection of the tumor, the patient had an uncomplicated postoperative course, without any neurologic deficits. Because of the benign nature of this tumor, the patient did not receive chemotherapy or radiation.

Discussion

Cutaneous neurothekeomas are classified into myxoid and cellular types. Both types of tumor are benign, and there have been no reported cases of metastases.7,11 Thus, radiation and chemotherapy are not recommended for treatment of cutaneous neurothekeoma.7,11 However, there are reported cases of recurrence. Although these cases were attributed to incomplete resection of the tumor,11 regular follow-up for surveillance is necessary to detect recurrence of these lesions.7,11

The most common type of intracranial neurothekeoma is myxoid. This tumor is characterized by hypocellularity, with small spindle or stellate cells loosely arranged in abundant mucinous stroma. On immunohistochemical staining, the tumor cells are positive for S100 antibody, nerve growth factor receptor (p75NGFR), collagen type IV, CD34, glial fibrillary acidic protein, and CD57.12

Our case initially was suspected of being a meningioma because of the appearance on MRI. The tumor was a well-circumscribed mass in the posterior fossa, located intradurally in an extra-axial location, and was pushing, rather than invading, the associated structures. The differential diagnosis for such a mass in the posterior fossa can also include schwannoma; other myxoid tumors such as sarcomas with myxoid degeneration, cardiac myxoma metastatic to the brain, primary intracranial myxoma, soft-tissue myxoma penetrating the skull; and gliomas.6,9,9

The most likely origin for the tumor presented in this case is the perineural cells of the nerves in the dura mater or around the blood vessels. Similar to cutaneous neurothekeomas, this intracranial tumor in the posterior fossa was not attached to a major cranial nerve. This made the resection easier and did not cause neurologic deficit for the patient. Cumulative experience from the literature regarding cutaneous neurothekeomas leads us to believe that intracranial neurothekeomas can be treated by gross total resection, with good outcomes, and do not require adjuvant chemotherapy or radiation.6

Disclosure Statement

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

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References

A 22-year-old man presented with complaints of chronic diarrhea, general weakness, and easy fatigue. He had been progressively symptomatic for 6 months. On examination, he had pallor and spoon-shaped nails (Figure 1). The rest of the examination findings were normal. Laboratory studies revealed anemia (hemoglobin, 8 g/dL; total leukocyte count, 5400/mm³; platelet count, 452,000/mm³; and peripheral blood smear suggestive of microcytic and hypochromic pattern). The iron profile was suggestive of iron-deficiency anemia. Stool was normal. Immunoglobulin A antitissue transglutaminase was elevated, at 43 U/mL (normal, <8 U/mL). Gastroduodenoscopy was suggestive of grooving in the second part of the duodenum. Duodenal biopsy revealed increased intraepithelial lymphocytes and crypt hyperplasia. The patient was started on a gluten-free diet and iron supplementation. At a 6-month follow-up, the anemia had resolved, and antitissue transglutaminase antibody levels had normalized.

Koilonychia is an abnormality of the nails that is also called spoon-shaped (concave) nails. It is primarily recognized as a manifestation of chronic iron deficiency, which may result from a variety of causes, such as malnutrition; gastrointestinal blood loss; worms; gastrointestinal malignancy; and celiac disease, as in the present case. Other causes of koilonychia are high altitude, trauma, and exposure to petroleum products, and it can even be hereditary. Therefore, spoon-shaped nails should prompt an evaluation for possible iron deficiency and the underlying cause.

Figure 1. Photograph showing spoon-shaped nails.

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References
A 59-year-old man with a history of poorly controlled type II diabetes and hypertension presented to the Emergency Department complaining of 5 hours of severe right foot pain and drainage from the plantar surface. He denied trauma or inciting injury. The patient was unable to walk because of the pain. On physical examination, his temperature was 100.2°F; his heart rate was 105 beats/minute; and he had marked tender erythematous induration with a fluid-filled bulla over the dorsum of his foot. There was foul-smelling exudate draining from the first web space. Palpable crepitus was appreciated.

Anterior-posterior (Figure 1) and lateral (Figure 2) films of the foot demonstrate subcutaneous air originating in the dorsum of his foot tracking both to the plantar surface and the posterior ankle region. The patient was treated with broad-spectrum intravenous antibiotics (vancomycin, gentamicin, and metronidazole) and taken to the operating room where an open transmetatarsal amputation took place because of necrotizing fasciitis. Tissue ischemia and “bubbly tissues in the subcutaneous layer” were noted. Tissue cultures grew *Enterobacter cloacae*, *Streptococcus agalactiae*, and *Staphylococcus aureus*. This patient recovered without further complications and was discharged on hospital day 7.

Necrotizing fasciitis is characterized by widespread necrosis of the subcutaneous tissue and fascia (as evidenced by air on this patient’s plain films). Typical sites for this infection are the lower extremities, abdomen, and perineum. The incidence of such infections in the US is estimated at 500 to 1500 cases per year, with a case-fatality rate of 24% and is more commonly associated with injection drug use, diabetes mellitus, immunosuppression, and obesity.

References

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CLINICAL MEDICINE

Development of a Computerized Intravenous Insulin Application (AutoCal) at Kaiser Permanente Northwest, Integrated into Kaiser Permanente HealthConnect: Impact on Safety and Nursing Workload

Christine Olinghouse, MPH/MSN, FNP-BC, BC-ADM, CDE

Abstract

Context: The electronic medical record, HealthConnect, at the Kaiser Sunnyside Medical Center in the Northwest used scanned paper protocols for intravenous insulin administration. A chart review of 15 patients on intravenous insulin therapy using state-of-the-art paper-based column protocols revealed 40% deviation from the protocol. A time study of experienced nurses computing the insulin dose revealed an average of 2 minutes per calculation per hour to complete.

Objective: To improve patient safety and to reduce nursing workload burden with a computerized intravenous insulin calculator application connected to HealthConnect.

Solution: Using Kaiser iLab developers through innovation funding, a computerized protocol was developed and integrated into HealthConnect, with a computerized tracking system used to store and to analyze intravenous insulin data.

Outcome: A review of 35 patient charts using computerized insulin infusion tool indicated 100% accuracy in computations with a reduction of nursing workload from 2 minutes to 30 seconds per calculation.

Conclusion: Development and operationalizing an integrated intravenous insulin calculator into HealthConnect was successfully completed at the Kaiser Sunnyside Medical Center, with 97% nursing satisfaction scores and a promise to generate data on intravenous insulin therapy to refine the protocol.

Introduction

The ideal blood glucose target for hospitalized patients is controversial, yet there is no controversy over the importance of glycemic control to patient outcomes. Intravenous (IV) insulin is the most effective way to provide glucose control in hospitalized patients, but state-of-the-art paper column-based protocols are labor intensive and can result in errors. Commercial computerized IV insulin programs currently do not integrate into Kaiser Permanente (KP) HealthConnect, the electronic medical record. Therefore, there is a definite need for an integrated, computerized IV insulin dose application that is easily accessed by the bedside nurse.

Stress hyperglycemia, inflammatory mediators, underlying β-cell failure, hyperalimentation, corticosteroid therapy, and vasopressor therapy are just a few of the contributors to hyperglycemia creating the perfect glycemic storm in hospital medicine. According to the National Center for Chronic Disease Prevention and Health Promotion, diabetes affects 25.8 million Americans. Among these US residents, 10.9 million, or 26.9% of those aged 65 years and older, had diabetes in 2010. Medical expenses for patients with diabetes are more than 2 times higher than for those without diabetes. Direct medical costs account for $116 billion, and indirect costs account for $58 billion for disability, work loss, and premature mortality.

Diabetes and hyperglycemia are very common in hospitalized patients. Studies continue to reveal associations between uncontrolled hyperglycemia and poor outcomes in clinical conditions such as stroke, myocardial infarction, coronary artery bypass grafting, other surgeries, cancers, and critical illness. Although diabetes may not be the primary admitting diagnosis, hyperglycemia is a potentially catastrophic catalyst under the stress of illness or surgery, making it a critical hospital care issue that can no longer be overlooked. Improvements in the delivery of care to patients with diabetes and hyperglycemia are therefore needed to reduce poor patient outcomes and improve efficiencies in inpatient diabetes care.

Insulin has long been the gold standard for management of hyperglycemia in the hospital, but the delay in onset and variability in absorption of injectable subcutaneous insulin can present an obstacle in the acute care setting in some clinical situations. The fastest acting injectable analog insulins have an onset of 15 to 30 minutes, a peak of 60 to 120 minutes, and a duration of 3 to 5 hours. Intravenous insulin is different. Intravenous insulin has a very short half-life of 5 to 7 minutes and a biologic effect of 15 to 20 minutes. The pharmacokinetic differences allow the clinician to rapidly titrate the dose of insulin on the basis of the individual patient’s sensitivity to response to insulin with hourly dose changes. The effective results of immediate and continuous IV delivery of insulin are hampered only by potential safety hazards, as insulin is one of the top 5 high-alert medications, and by the increased workload of hourly point-of-care blood glucose testing to determine the drip rate.

Protocol orders are considered medication orders and, as such, deviation from the protocol without a physician order is considered a medication error. With dozens of protocols to choose from, the ideal protocol is one that can be executed by nursing staff in response to a single physician order and is simple enough to compute in a reasonable amount of time.
with a low margin for error. Currently no single protocol has proved ideal for all situations. In fact, comparison of various published protocols has proved difficult because of variations in the definition of hypoglycemia, methods employed for blood glucose measurement, and types of blood samples used in assays as well as the wide range of patients from surgical to medical populations and the variability of nursing workloads.

In a study by Malesker and associates in 2007, nurses’ perceptions on the impact of tight glycemic control on workload was studied. Deviations from the protocol accounted for 75% of glucose measures, averaging greater than 9 per patient. Various explanations were given for the deviation, but 2 reasons that compared with the KP Northwest (KPNW) experience were time to calculate insulin infusion rate and the perceived fear of hypoglycemia, which gave way to adjusting the medication order without consulting a physician. In the state of Oregon, registered nurses cannot legally change medication orders independently without consulting a physician. In addition, a physician cannot expand nursing scope of practice by directing a nurse to perform an activity that is not recognized by the nursing profession as proper to be performed by a nurse in Oregon.

The Kaiser Sunnyside Medical Center Experience

Kaiser Sunnyside Medical Center (KSMC), a 250-bed tertiary care community hospital in Clackamas, OR, has a very high incidence of diabetes and hyperglycemia, with the attendant challenges in inpatient management. A review of 35 paper medical charts from various units at KSMC from January to March 2006 indicated that 62% of these patients had some degree of hyperglycemia, defined as fasting blood glucose levels above 140 mg/dL. Since 1995, KSMC has reaped the benefits of IV insulin therapy not only in intensive care units (ICUs) and step-down units but also on medical-surgical units. It has allowed patients to stay on the general wards while being actively treated for hyperglycemia with the precision permitted by an IV insulin protocol. Since 2007, KSMC has used a column-based protocol, which has been periodically revised in response to targeted quality improvement chart reviews as well as changing recommendations for glycemic targets (see Kaiser Sunnyside Medical Center Insulin Infusion Protocol [target 90-140] on our Web site at: www.thepermanentejournal.org/files/Summer2012/InsulinInfusion-Protocol.pdf).

The frequency of IV insulin therapy was determined using pharmacy dispensing data and verified with chart audit. IV insulin is used in 3 to 8 patients a day at KSMC, which translates into 72 to 192 insulin dose decisions made each 24 hours, or 2160 to 5760 potential chances for medication error per month. In late 2008, a review of 15 charts in which IV insulin was the therapeutic modality was conducted to determine the current efficacy and safety of the existing column-based IV insulin protocol. Surprisingly the actual protocol was difficult to evaluate because only 172 of the 262 decision points, or approximately 65%, demonstrated adherence to the protocol, from which we inferred there were frequent unintentional errors in calculating the insulin drip rate. This presented a safety concern.

The time it takes an experienced registered nurse to figure out the insulin dose was investigated. A time study, using a video camera recording of a nurse determining the insulin rate from the paper protocol, revealed an average of 2 minutes to calculate the insulin infusion rate. For safety, the protocol requires a double check on each calculation. Therefore, in a 12-hour shift, this would translate into 24 minutes for the first nurse plus 24 minutes for the verifying nurse, for a total of 48 minutes spent on calculating the rate.

The recognition that experienced nurses spent 48 minutes each shift, with 65% accuracy, became the platform for looking for a safer and more efficient way to deliver care. In addition, KPNW began to roll out the inpatient electronic record, HealthConnect, in 2009. As the hospital changed to electronic documentation and order entry, the dilemma of managing an algorithm-based protocol necessitating computer documentation of hourly blood glucose measurements, insulin doses, and paper-column protocol became an added challenge. The paper 9-column protocol became a scanned document in HealthConnect, and there were challenges transferring patient data from the paper protocol to HealthConnect.

Innovating a Solution

Although limited, the safety data on computerized medical decision-making programs appeared promising. Technology...
seemed the logical solution to the repetitive compliance of following a prescribed algorithm. Initially we looked at commercial Web-based products such as Glucommander (Glytec Systems, Greenville, SC) and EndoTool (Hospira, Lake Forest, IL) but found at that time most commercial products required the purchase of hardware and software. Integration with an electronic medical record required one computer for HealthConnect and one computer for the IV insulin program. In addition, local hospitals using these products were using IV insulin therapy only in the ICU. The sheer volume of implementing a commercial computerized Web-based product throughout KSMC was cost prohibitive.

In March 2009, we applied for and received funding from KP Information Technology Innovation Fund for Technology. Collaborating with the developers from the Innovation and Advanced Technology iLabs allowed us to translate the paper-based protocol into a Web-based application, which we nicknamed AutoCal. KP developers were able to rapidly prototype a Web-based calculator in 6 months, with weekly check-ins for revisions and updates based on input from staff nurses experimenting with the application. We pilot tested the use of AutoCal from September 2009 to December 2009 (Figure 1). AutoCal replaced the paper version on the cardiovascular ICU and 3 South, a medical-surgical telemetry unit specializing in caring for patients with diabetes and renal disease. These units were chosen because cardiovascular surgical patients with dysglycemia receive IV insulin therapy for at least 48 hours postoperatively, and because 3 South has a population that frequently requires IV insulin management.

At the end of the 3-month pilot test, charts were reviewed. The results were impressive, revealing 100% adherence to the protocol using AutoCal compared with 65% accuracy with paper (Figure 2). A follow-up time study, again using a video camera, demonstrated an average of 30 seconds per dose calculation using AutoCal compared with 2 minutes with the paper version (Figure 3). A nursing satisfaction survey was also administered demonstrating 87% satisfaction with the stand-alone version of AutoCal. When asked what would make this tool easier to use, the overwhelming response from the nurses was to integrate the tool into HealthConnect.

The pilot test’s initial success allowed funding to continue into 2010, and efforts to integrate into HealthConnect were begun. The developers programmed a “bridge” designed to launch AutoCal directly from the patient’s chart to the insulin infusion calculator, which was completed by December 2010. A follow-up survey of nurse users demonstrated an impressive 97% satisfaction. Training of all nursing staff at KSMC was completed, and refinement of the application continued into 2011. As of October 2011, AutoCal has been fully integrated and is now used to calculate insulin infusion rates on every hospital unit at KSMC. Using AutoCal data from October 2011 forward, we can generate hospitalwide IV insulin data, which will be used to refine the tool.

**Next Steps**

Currently, analysis of IV insulin therapy safety and efficacy remains a time-consuming process of manual chart review. AutoCal was built with the promise of electronic storage of glucose values and insulin dose changes available for faster, more rigorous data analysis. The current protocol is not logarithmic, and the application was built to allow clinicians with administrative privileges the ability to change doses to the protocol. Now KPNW is poised to make rational adjustments as needed to our current IV insulin protocol based on data from hundreds of patient-hours on IV insulin regimens. AutoCal will now allow us to offer patients ongoing improvements in glycemic management while continuing to give the bedside nurses tools to safely and cost-effectively deliver care.

**Conclusion**

Hyperglycemia should not be treated as a casual finding in hospitalized patients. IV insulin therapy can be more safely and efficiently delivered on hospital wards with the use of computerized IV dose calculators. AutoCal has simultaneously increased nurse satisfaction in caring for patients with hyperglycemia who require IV insulin management. There is also the capacity to use historic data gathered from actual runs of IV insulin infusions to continuously analyze and improve the safety and efficacy of the IV protocol. AutoCal, a HealthConnect-integrated IV insulin dose calculator, promises to remain an essential tool in caring for patients with hyperglycemia. 

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**Disclosure Statement**

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**References**


Development of a Computerized Intravenous Insulin Application (AutoCal) at Kaiser Permanente Northwest, Integrated into Kaiser Permanente HealthConnect: Impact on Safety and Nursing Workload

Blessings of Humanity

The trained nurse has become one of the great blessings of humanity, taking a place beside the physician and the priest, and not inferior to either in her mission.

—Sir William Osler, MD, 1849-1919, physician, clinician, pathologist, teacher, diagnostican, bibliophile, historian, classicist, essayist, conversationalist, organizer, manager, and author
Solving the Emergency Care Crisis in America: The Power of the Law and Storytelling

John Maa, MD

Abstract

An Emergency Department visit that ended tragically prompted my yearlong journey to Washington, DC, and emergency rooms across the country to search for solutions to the national crisis in emergency care. I reached the conclusion that the crisis is entirely solvable, and I developed a three-part solution that includes 1) nationally standardizing and coordinating care, 2) prioritizing resources and incentives in the delivery of emergency care, and 3) inspiring young clinicians to careers in emergency care. Physicians across America should now harness the power of storytelling to strengthen both the delivery of patient care and health care reform efforts on Capitol Hill.

Meaning of the Music

Combining music with surgery is what many surgeons do routinely. In a concert lecture I attended years ago, San Francisco Symphony conductor Michael Tilson Thomas shared his strategy to draw out the best performance from the orchestra. He challenges each member with three questions as they prepare for a new composition. First, what was the political and social historic context that was the inspiration for the music's creation? Second, what was the composer trying to communicate? But these questions only serve as the foundation for the third most important question: what does the music mean to you? Perhaps we should all carefully reflect what strengthening the emergency care system means to us individually before we collectively attempt to define its future.

A Patient’s Story

My personal answer to Michael Tilson Thomas is revealed through the story of a patient. This particular patient was 69 years old, and in December of 2008 she woke with an irregular heart beat and mild shortness of breath. Her heart accelerated to 130 beats/minute on a home blood pressure cuff, but her blood pressure was stable later that day when she was seen in the Emergency Department (ED). She was diagnosed with rapid atrial fibrillation and admitted around 8 pm on a Thursday evening for anticoagulation therapy with heparin, and a plan for electrical cardioversion the next day after a transesophageal echocardiogram.

Because an inpatient bed was unavailable, she spent the entire night in the ED. She was not admitted to a hospital bed until late Friday morning, after other patients had been discharged. She had slept poorly in the ED hallways, and was hungry after having fasted for the procedures that day. The cardiologist spoke with the patient and her family in the afternoon on Friday, and explained that because of the delays in her admission, the planned procedures had been cancelled, and she would remain on blood thinners over the weekend until the transesophageal echocardiogram and cardioversion could be performed on Monday.

Unexpectedly, on Saturday afternoon, the patient suffered a sudden and massive stroke with complete occlusion of the carotid artery from the arch of the aorta to the intracranial branches of the middle cerebral artery. She was rushed to the operating room where a neurosurgeon attempted to remove the blood clot, but the carotid artery tore, leading to massive intracranial bleeding and brain death. She was kept alive in the Intensive Care Unit until preparations for her funeral could be completed. She died at noon on the following Tuesday, 112 hours after she first stepped into the hospital. The patient was my mother.

Some of you may recognize this story from an article in the New England Journal of Medicine that was published on the 2½-year anniversary of my mother’s passing “The Waits that Matter.” I was amazed by the response from around the nation, and even the world, to the coverage the story received in The New York Times and The Wall Street Journal.

Four months after the article was published, I received a surprise in the mail, a $300 check—the honoraria granted to Perspectives authors by the Massachusetts Medical Society. I decided to use the money to pay for a copy of my mother’s medical record. It was difficult to relive the final hours before my mother’s devastating stroke, to hear her final words as recorded in the nurse’s notes. After reviewing the 811 pages, it became clear that there was more to the story of my mother’s death. The admission notes documented that she should have been started on heparin shortly after being admitted with a heart rate as fast as 160. However, the heparin was not started until 11 am the next day, almost 15 hours later. It is unclear whether the medication was unavailable from the pharmacy, an order was missed, or there was difficulty prescribing the anticoagulation. A transthoracic echocardiogram had been normal the evening of admission, and I believe the lethal thrombus propagated during a prolonged period without anticoagulation.

A National Crisis

Tragedies like this are not uncommon in the US. An Institute of Medicine report detailed a national crisis in emergency care in 2006; six years later, many of the challenges of overcrowding, ambulance diversion, and the boarding of admitted patients (like...
my mother) in the ED have only become more dire. A national leader in researching this crisis is Renee Hsia, MD, from San Francisco General Hospital. In a landmark study in the Journal of the American Medical Association, she plotted the survival of hospital emergency rooms on Kaplan-Meier curves, identifying the financial characteristics predictive of the mortality of an ED, including for-profit status and safety-net status.5

At the University of California San Francisco (UCSF), my career has focused on strengthening emergency surgical care through the dedicated availability of a surgeon to see patients needing surgery in the ED and hospital. This surgical hospitalist model has been implemented at over 400 hospitals across the country since Hobart Harris, MD; Jessica Gosnell, MD; Jonathon Carter, MD; Robert Wachter, MD; and I introduced the program in 2005.6 However, I was still unable to change the lethal outcome of delays in treatment as my mother received care at a different institution.

Unfortunately, the passage of the Affordable Care Act (ACA)7 may only make stories like my mother’s more common, if lack of access to primary care results in increased numbers of Americans seeking access to an already overwhelmed emergency system. The American College of Emergency Physicians (ACEP) has identified the passage of a law in 1986—Emergency Medical Treatment and Active Labor Act (EMTALA)—recorded as the Code of Federal Regulations 489.24,8 as a key driver of this crisis because it mandates public access to emergency care regardless of one’s ability to pay. ACEP has tirelessly worked to reform this well-intended but underfunded mandate that increases the burden of uncompensated care, forcing some EDs to close, negatively impacting quality of care. Maybe there is some comfort that similar challenges in emergency care are being reported worldwide.

A Journey to American Emergency Departments

The untimely death of my mother inspired me to take almost a year off to work on Capitol Hill with our elected officials, the media, and leading medical organizations to better understand the challenges in emergency care. I was also inspired by Abra- ham Flexner, the champion of medical education reform, to visit over 50 EDs to take inventory and search for new solutions. I rode on planes and trains and drove over 7000 miles last summer to meet with and to hear the personal stories of the people who had written to me after the publication of my article in the New England Journal of Medicine.1 What struck me was the recurring theme of personal loss they too had suffered from an overwhelmed emergency system. Yet we should also not forget the successful outcome for Congresswoman Gabrielle Giffords after the deadly rampage in Arizona in 2011; the story of her amazing recovery catalyzed a positive change in perception in Washington, DC, about the heroism and courage of emergency physicians and trauma surgeons.10 Indeed it is a privilege and an honor to take emergency call, and the need for emergency care reflects the trust that society places in its emergency workforce. Ultimately, identifying ways to support those courageous physicians willing to place themselves on the front lines of clinical care will be key to solving the emergency care crisis.

As I traveled across our amazingly beautiful country, I noted several recurring themes. In some parts, one can drive through deserts for hundreds of miles and not see an ED, whereas in some cities one can walk out of one Level 1 Trauma center right into another one a few blocks away. I was amazed by the billboards advertising how short waiting times to be seen were in certain EDs, suggesting the delivery of ED care is becoming competitive. I noted a wide variability and lack of standardization not only in care, but also in organization. In some hospitals, the ED is part of the Department of Medicine, in others it is part of the Department of Surgery, and in yet others, it is its own stand-alone department, which I believe is superior. As a mystery shopper, I often visited EDs unannounced through the front door, to witness care delivery through the eyes of the patient. In some EDs I was greeted by a valet for parking or by a nurse with a cup of coffee, and at others by ominous and foreboding security personnel seated behind bulletproof glass and metal detectors. I marveled that the most glistening and magnificent parts of hospitals were the cancer centers, and hope one day that towers dedicated to emergency care will also arise. I was pleased to see the emergence of dedicated children’s EDs similar to the new UCSF Benioff Children’s Hospital in Mission Bay, highlighting that children are not simply small adults. One of the most impressive EDs was at UCSF Fresno, which I regard as a premier ED nationally. I would like to thank Greg Hendey, MD, for his enlightening tour of this amazing 70-bed, Level-I Trauma ED, with state-of-the-art trauma resuscitation bays, a burn unit, and precise attention to efficiency and economy in patient flow and movement as it serves an annual ED census of over 110,000 patients.

Three-Part Solution

On the basis of my experiences around the country, I’ve reached the conclusion that the emergency care crisis is entirely solvable, through better distribution and prioritization of resources and incentives, and by standardizing and coordinating care nationally. I believe the solution involves three things: 1) we must inspire young people to work in emergency care; 2) we need to rewrite the laws, the ACA,7 and EMTALA;8 and 3) we must tell powerful stories to attract the attention of the media and of Capitol Hill, as the pathway forward to changing the law.

Inpiring Young Physicians

Regarding inspiring more young physicians to work in emergency care, Thomas C Ricketts, MD, and George F Sheldon, MD, at University of North Carolina Chapel Hill have prepared excellent maps highlighting areas with shortages of surgeons, documenting nearly 1200 counties in America without a general surgeon available.11 A remarkable solution proposed in Washington, DC, is to create a General Surgery National Health Service Corps to deploy board-certified surgeons for 3- to 6-month rotations across rural America. A visionary federal approach could be similarly applied to all specialties, and would require the creation of new maps for Capitol Hill and US Department of Health and Human Services to determine where which specialties are needed most. A starting point could be the current distribution of critical-access hospitals nationally, or alternatively,
Rewriting the Law

Turning to the second proposed solution of rewriting the law, this is at the heart of activity in Washington, DC. Capitol Hill writes the laws, the Supreme Court reviews these laws and determines their constitutionality, and the President (often an attorney) prepares Executive Orders that carry the force of the law. A few months after I first arrived in Washington, a Congressional staffer shared with me the following: “You have a number of excellent ideas, but here is the next challenge for you. On the game show Jeopardy, one must phrase the answer in the form of a question. In Washington, one must phrase the proposed solution in the language of a law that can be presented to Congress for a vote.”

We must recognize that market forces have led to the closure of EDs all across America in the past decade; leaving this problem to the business sector will not be the final answer. A single institution will be unable to solve this crisis on a larger scale, and hospitals will need to work together rather than compete against one another. Accountable care organizations should be charged to solve overcrowding and boarding. Weber et al wrote an excellent paper about the positive long-term results of a new policy in England mandating either patient admission or discharge home within four hours of arrival at an ED. It may take rewriting the ACA and EMTALA to use the “law” to instill “order” in the ED. If this is unsuccessful, reforming Medicare Part A reimbursement to hospitals for boarded patients may become necessary. Reforming patient expectations is also essential. The ED has been described by Kate Heilpern, MD, the Chair of Emergency Medicine at Emory, as a mirror for society’s problems—the overuse of guns, underage of seatbelts, and drinking and driving. Perhaps the time has arrived to consider a 28th Amendment to decide whether access to basic medical care and emergency treatment is a constitutionally guaranteed right? Only after reaching agreement here can our nation then move to the equally important discussion of the responsibilities and expectations inherent in that right.

The Power of Storytelling

In Washington, DC, two of the profound lessons I learned from attending Capitol Hill hearings are the power of the law, and the power of storytelling as the gateway to the media and television to convince Congress and State legislatures to enact new laws. I visited the R Adams Cowley Shock Trauma Center in Maryland and learned of R Adams Cowley, MD, who coined the term “the golden hour,” and pioneered the concepts of advanced trauma life support and regionalized care to dedicated trauma facilities. The tipping point came in 1975, when attorney Dutch Ruppersberger was involved in a near fatal automobile accident and survived after being transported directly to Shock Trauma, bypassing other nontrauma EDs en route. Mr Ruppersberger later ran for public office and championed both Shock Trauma and regionalized care by sharing his personal story. Many of you are likely aware that Parkinson’s disease was one of the highest-funded diseases by Congress for a number of years, as a result of the passionate testimony and eloquence of Michael J Fox on Capitol Hill.

On hearing the words “Once upon a time …” a child instantly recognizes that a story will follow, perhaps the fairy tale of a courageous hero that will capture their imagination and simultaneously enlighten, empower, and inspire hope in the young mind. The art of storytelling to educate continues throughout our lifetimes, as we share stories that reveal the valuable lessons we have learned from our successes and failures to create a deeper bond with others. Regardless of one’s profession, the better a storyteller you are, the greater your chances of succeeding by fully engaging and inspiring your listeners.

In an article in the Journal of Patient Safety in 2010, actor Dennis Quaid highlighted a secret weapon in the national efforts to improve patient safety—one of the potential of “story power as an untapped vehicle to inform, equip, and challenge leaders to drive change that can save lives, save money, and build value in communities.” He defined “story power” as the ability to change or reinforce the behavior of others by telling a story, as a call to action that harnesses the power of full engagement. Quaid highlighted the story of Josie King, an 18-month-old infant who died at one of America’s most famous hospitals as a result of missed orders to start oral fluids, followed by a medication error. A 10-minute videotaped interview with her mother, Sorrel King, recounting the tragic story has now been used in over 2000 hospitals through the Josie King Patient Safety Initiative to transform the delivery of health care worldwide.

The power of storytelling is repeated in recounting the near-death experience of Quaid’s newborn twins Zoe Grace and
Thomas Boone Quaid, who received 1000 times the intended dosage of the blood thinner heparin, leading to a two-day battle between life and death. The larger tragedy for our nation is that the same medication error occurred 11 months earlier elsewhere, killing other children, and has also happened since, because of the look-alike packaging of 2 different concentrations of heparin. Quaid has been inspired to share his story publicly to become a champion for high-quality care.

“A slow cultural shift over the past 20 years, led by television (from St Elsewhere to ER) has been humanizing society’s view of the practice of medicine.” This comment was an accolade to Atul Gawande, MD, MacArthur Genius award recipient and noted author. His writings in the New Yorker have influenced the political debate about health reform. But whereas singular medical voices like his are having an impact, overall the profession of medicine is failing to have an effect in Washington, DC, with elected officials. The impact of the Supreme Court decision in June upholding the ACA has been felt worldwide, and the war on Capitol Hill over health care reform has erupted once again. As physicians, we must now harness the power of storytelling to enlighten Capitol Hill to enact new laws to strengthen EMTALA and the ACA to support emergency health care personnel, who struggle courageously each day to meet the needs of society.

As the debate rages forward again, perhaps patients and physicians across America will succeed in infusing the discussion with the hopes, failures, and triumphs from their personal stories. Harold Goddard once said: “The destiny of the world is determined less by the battles that are lost and won than by the stories it loves and believes in.”

**References**

October 1983

I had just celebrated my 27th birthday, but there was little joy in the celebration. For many months I had dragged myself through my workdays, college courses, housekeeping, and marriage. I thought I must have a dreadful case of the flu, especially when my back began to feel as if the flesh was being slowly torn away from my ribs. When I could no longer breathe, I risked admitting illness. Nothing could have prepared me for the truth.

December 6, 1983

Excerpt from Oncologist’s Hospital Discharge Notes

History of Present Illness: The patient is a 27-year-old woman admitted to Hospital for continuing treatment of her T-cell lymphoma and evaluation and treatment of her post-spinal tap headache.

The patient was admitted [early in October 1983] in pericardial tamponade. On evaluation, the patient was found to have a very large mediastinal mass and, on biopsy, this was a diffuse lymphocytic lymphoma. Immunologic studies revealed the patient to have a T-cell lymphoma, and subsequent evaluation showed involvement of the marrow.

After some discussion with a variety of people and review of the literature, it was elected to treat the patient with a regimen of high dose CHOP chemotherapy for induction of her lymphoma … The patient tolerated the treatment quite well, bad significant myelosupression and required support with platelets, blood and antibiotics for approximately one week until her bone marrow recovered. The patient was also given two doses of intrathecal methotrexate, one on 10-28-83 and the second on 11-12-83. The patient did note a significant post-spinal tap headache from the last spinal tap and this persisted and continues on the day of admission. Except for the post-spinal tap headache, the patient feels extremely well, no respiratory complaints, no shortness of breath, and no new problems.

... The patient had significant nausea and vomiting for one to two days after the chemotherapy but then felt quite well. The patient’s post-spinal tap headache gradually resolved with the use of abdominal binder and increased oral fluids. After one week in the hospital, the patient had no spinal headache whatsoever, and this did not return.

The patient was observed in the hospital: her white [blood cell count] continued to fall and at the time of discharge was 1300 with a platelet count of 115,000. However, as the patient was quite anxious to go home and was absolutely afebrile, it was elected to allow the patient to leave with the understanding that she should return immediately, should there be any symptoms of illness or any fever. The patient is well aware of these restrictions.

I had survived the pericardial-window surgery to relieve the pressure on my heart and could breathe again. I had tolerated the megadoses of chemotherapy, and the mass had all but disappeared. I wrapped my mind around the concept of my perhaps imminent death, and the double-whammy of what the oncologist called “involvement of the marrow,” which translated into “acute lymphocytic leukemia.” In October, I had been told I had a week to live. I was discharged from the hospital on December 6th, walking away from the poisons and the needles and the pain. Christmas was coming. I had things to do.

Yet some nightmares have a way of lingering long after we are awake, and it would be years before this one would end. Initially, no one would lay odds on my winning. Hospitalized again, for more chemotherapy, in January of 1984, a series of fearful visitors came to say goodbye, although none of them used that word. Their red eyes, sobs, and sniffles were daubed and stifled while they were with me, but I could hear them in the hallway outside my room. I thought myself lucky to be so loved that people were that torn up about what we had all been told was likely to be my imminent departure. They didn’t know I was a dark horse. Neither did I.

September 24, 1984

This was my first day at my new job at a major university. I was still on chemotherapy, and an Intensive Care Unit nurse who had become an extraordinarily good friend came to my office to administer the injections because I had grown too fearful of needles to inject myself.

I needed health insurance for the long haul, and this job was the only way to get it. My marriage was in trouble, so I could not count on my husband’s coverage indefinitely. Now virtually uninsurable, I had to leave my career as a private investigator to find a group policy so large that my coverage would be automatic. I had found it and landed a job as a clerk in a computer center. Now all I had to do was learn how to thrive in the new world of computers.

May 12, 2003

Excerpt from Plastic Surgeon’s Notes

Chief Complaint: Right breast cancer.

History of Present Illness: This is a 46-year-old divorced woman who works as a consultant for Information Technology. This patient had abnormalities seen on her...
mammogram. She had right breast calcifications and the stereotactic biopsy was done 03/27/03, which showed ductal carcinoma in situ on the right. She also had an ultrasound of her left breast that did demonstrate a lesion at 6 o’clock in the posterior depth. The patient is nulliparous. She is now approximately a 34B bra cup size and she desires about the same. The patient is now scheduled for bilateral mastectomy and immediate DIEP flap reconstruction.

Past Medical History: Persistent for endocrine, history of Grave’s disease. She is status post-I-125 radiation ablation therapy times two. She is currently hypothyroid and taking Levalbutal. Respiratory: No history of asthma, wheezing, or dyspnea on exertion. Cardiovascular: The patient had some chest pain in 07/09, was ruled out for a myocardial infarction. She had an exercise treadmill test and she also underwent an echocardiogram that showed ventricular size and function to be normal and a mildly thickened mitral valve with a trace to mild mitral regurgitation. She has a trace to mild tricuspid regurgitation. The patient also has a history of T-cell lymphoma and acute lymphocytic leukemia in 1982. She had also some pericarditis and underwent a pericardial window. She is status post radiation treatment to her left thorax and also her brain and she is status post chemotherapy treatment with methotrexate and she is presently in remission. The patient also had a history of transient ischemic attack, a series of four of them in one week in 1986 and has had none since. No history of hepatitis or blood potassium levels. The patient is hypothyroid and is on replacement therapy times two. She is currently hypothyroid and taking no hypothyroid medications. She has a trace to mild tricuspid regurgitation. The patient also has a history of T-cell lymphoma and acute lymphocytic leukemia in 1982. She had also some pericarditis and underwent a pericardial window. She is status post radiation treatment to her left thorax and also her brain and she is status post chemotherapy treatment with methotrexate and she is presently in remission. The patient also had a history of transient ischemic attack, a series of four of them in one week in 1986 and has had none since. No history of hepatitis or blood potassium levels. The patient is hypothyroid and is on replacement therapy times two. She is currently hypothyroid and taking no hypothyroid medications. She has a trace to mild tricuspid regurgitation.

The cardiac episode in 1999 was, on reflection, probably an acute anxiety attack. I had been working a full-time job, a part-time job, and studying for a master’s degree in organizational management. It was a heavy load, and I was under considerable pressure by a number of external forces on both jobs, as well as my own internal desire to succeed academically.

The 20 years between 1983 and 2003 had not been uneventful, but I was still going full gallop when I received news that the mammogram results were abnormal. Everyone had said, “If you have to have breast cancer, ductal carcinoma in situ is the best possible diagnosis.” I wasn’t worried about what they had found in the right breast. I was worried about what the ultrasound had found in the left breast. That’s why I had insisted on bilateral mastectomies, even though I’d been told a less disfiguring partial excision would suffice.

My inner voice was screaming at me to have the breasts off. I did not, at that time, understand that even without breasts, the same breast cancer could occur in other organs. Even though I knew this now, I would not have changed my decision if I had known then. Had I not opted for the bilateral mastectomies, they would not have found the invasion into my sentinel node. By the time they would otherwise have found it, would it even have been found before it was too late?

June 4, 2003

Excerpt from Surgical Pathology

Microscopic Description: The left breast has an invasive carcinoma and lymph node metastasis involving only the sentinel node. An additional 10 nodes are found in the

axillary dissection, thus 1/11 nodes is positive. The right breast has only DS, grade 2, papillary type. No invasion is seen, confirmed with SMMHC immunohistochemistry. Only the sentinel node is sampled on the right.

March 2012

End-stage T-cell lymphoma, acute lymphocytic leukemia, stage 2 breast cancer. Even better than a lucky bet at the racetrack, 29 years later, this dark horse is still racing—and it looks like she’s still winning. The end stage did not end me, the leukemia did not kill me; and this month I celebrated 9 years of life as a breast cancer survivor. So far, so good.

Writing this piece, a sliver of 19th century rural Lithuanian superstition creeps in suggesting that maybe I’m jinxing my survival just by thinking that I’ve won this somatic contest. Ancestral voices? The same that said, “Children are to be seen and not heard?”

I am surprised to still be in the race, and people ask me how that came to be—as if I really know. I don’t know; I can only guess. I’m obstinate, I come from sturdy stock, and I’m ambitious. Even when I was lying on what people had assured me was my deathbed, I was determined to finish crocheting the afghan I’d begun, read the remaining chapters of The Mirror Crack’d, and write the thank-you letters to the many people who had shown me enormous kindness.

Delicacy is a trait that neither my mind nor my body was permitted as a child. One was either strong or broken beyond repair; the choice was subliminal, reflexive. So, apparently, was my body’s biochemical response, which bathed my young brain and body in stress hormones and set me up for a lifetime of hyperstress in even the most banal situations.

To appear strong meant survival, and that is the mode in which my siblings and I were raised on the harsh heels of our immigrant grandparents’ and our first-generation-American parents’ childrearing methods. To actually be as strong as was necessary would have meant somehow having control of those biochemical processes. I didn’t. Not until I was a mature woman did I even have an idea that they exist, and not until decades after that did I learn of their importance and potential for long-term, harmful effects to my autoimmune system.

My biochemistry did not overreact; it was an appropriate response to a chronic state of fight-or-flight while living in households where we were told we were loved, but hands were not always gentle, fists often took flight at people as well as objects, voices were loud, words were meant to hurt, and a child’s sexuality was not her own.

While recently at a routine gynecologic visit, the medical assistant went through her usual routine of weighing me, and asking about smoking, alcohol consumption, and allergies to medications. She added an unexpected question, “In the last six months, have you experienced any domestic violence?” I responded, “Not in the last six months.” Then she took my blood pressure, and it was higher than I’ve ever seen it before. She looked at me wide-eyed. I took a deep breath to ease my angst and explained that the damage of domestic violence does not disappear after six months, six years, or even six decades. I suggested she might want to consider asking questions about domestic violence after taking patients’ blood pressure. It was
Trifecta: Running on Hope

a pleasant conversation; she was just following someone else’s orders to include the question, but timing can be everything. Given a few minutes to recover from the flashback triggered by the question, my BP later measured 116/70, not bad for a middle-aged, postmenopausal woman who had minutes earlier relived an age-five beating that left her incontinent and huddled on the floor of her parents’ living room.

Summer 1962; Chicago, Illinois

Mom died a year ago of a stroke following a high-risk sixth pregnancy. She was only 44. My chain-smoking, alcoholic, PTSD-suffering World War II Veteran dad dove into a bottle and stayed there, intermittently, long enough for us to have been sometimes placed in other homes. He was trying to hold it together, but he couldn’t.

He was, however, still working, and he’d managed to afford to buy me a new pair of shoes, which I had worn to school that day. While playing at recess, the buckle broke. I’d dragged the shoe along with me as I walked home from school that afternoon, in fear of what would happen when dad saw that it was broken. He was so angry all the time, and now that my older brother had run away from home, dad’s rage was bottled up and nearing explosion. I could feel it building in him, capped like a gusher by his silence.

The minute he saw the broken buckle, he went for the barber’s strap, and I knew what was coming. There was nowhere to hide. The beating lasted for less than a minute in real time, but it also lasted for a lifetime. It seemed like forever before I was allowed to return to school, but by then the ringing in my left ear had stopped. Dad never beat me like that again. As soon as he had finished, the look on his face was one of such shame and sorrow that it hurt me even more than the blows from the barber’s strap.

Today

Healing is a miraculous thing. I marvel at those who choose it as a profession. No one looking at me today would ever suspect the ordeal my life has been, which makes me treat everyone I encounter as if they are also as damaged as I am, or worse. One cannot tell by glancing at the exterior. I am astonished by how well my body has cleanly knit the many incisions made by the needles and surgical instruments, but healing the underlying spirit is far less tidy.

They say there are five stages to grief: 1) denial, 2) anger, 3) bargaining, 4) depression, and 5) acceptance. I’ve grieved the loss of my marriage, my birthplace, and the integrity of my body. The denial phase is never long for me—a minute or two at most, since I have seen so much loss that I know when denial is futile. Anger, too, is short-lived, and I’ve never seen the point to playing the “if only I had” game of bargaining. Depression, on the other hand, can be a faithful companion even though I have long since accepted all of the many losses of my life. I live—for the most part—in “intellectual” rather than “emotional” mode, just too stubborn to cave in to the crushing defeat that an emotional meltdown signals to me. Despite my best efforts, they sometimes happen too—though less often now than when I was younger.

There is something even more powerful than obstinacy, heredity, and ambition. During the October 1983 ordeal, one physician made a world of difference by saying aloud what I wanted to believe, “You’re not dying; you’re still living.” Wow! Profound. Life-changing. It was as if he had plucked the words right out of my head. He affirmed my right to hope, that fragile, elusive entity that still remained after all the evils of the world had been loosed upon me from Pandora’s box.

Although I’m still in the race, it would be a mistake to think it’s an easy one. Pandora’s box was opened early in my childhood with abandonment, sexual, emotional, and physical abuse, and neglect, now increasingly recognized as being translated into biochemical responses that damaged my immune system and my ability to handle normal stressors in normal ways, and exacerbated by the myriad of environmental factors that are part of the evils of the modern world.

There are scars—all kinds of scars. Most days I wonder how much longer my luck will hold, but all I can do is keep running. I fill my days with work, with friends and family, with the many small pleasures that give me joy. I try to give my body what it needs to be well, and my mind the peace it needs to work in harmony with the rest of me. I treat others gently because I suspect they have suffered, too. Of course I know I cannot live forever, but—for now—furlong after furlong, each stride is driven by hope.

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Reference

Hope for Tomorrow

Learn from yesterday, live for today, hope for tomorrow. The important thing is not to stop questioning.

— Albert Einstein, 1879-1955, physicist 1921 Nobel Laureate
BOOK REVIEW

ACE Study DVD
produced by David L Corwin, MD

Review by David L Chadwick, PhD

When I was asked to review this DVD about the Adverse Childhood Experiences (ACE) Study, I had some reservations. I had been listening to and accepting the concepts outlined by the ACE Study for about 20 years and I thought there wasn't much that could be said about that research that would be new to me. I was wrong, and this new production contains novel observations and thinking about an internationally recognized Kaiser Permanente (KP)-Centers for Disease Control and Prevention (CDC) research project.

In this four-hour DVD, Vincent Felitti, MD, gives a historical review; then he, Robert Anda, MD, and Frank Putnam, MD, comment on the effect of the Study on the practice of medicine. There are interviews with Felitti, Anda, and David Williamson, PhD, about the history and implications of this major piece of medical research.

Anda points out the good news that State Health Departments across the country are increasingly using the ACE Study to guide program development. The continuing interest and support of the CDC in the ACE Study principles are vital.

Putnam points out that the ACE Study has recently been shown to apply to psychiatric diagnosis. Adverse experiences of childhood affect the incidence of many adult diseases, conditions, and behaviors that are described in the Diagnostic and Statistical Manual. He notes that there is accumulating evidence for the benefits of positive childhood experiences, and he encourages development of early intervention programs for infants and children who are maltreated. Increasingly, health officials and other policymakers are paying attention to the ACE Study. Many psychiatrists have been slow to develop an interest in child maltreatment. Putnam's leadership may accelerate this educational process.

Felitti explains the use of detailed patient questionnaires and brief interviews to gather data from thousands of patients about their unspoken childhood experiences. This process was not just accepted by KP members, but many found it helpful and responded with gratitude and a lowered physician-visit rate that lasted for a year. The process produced striking findings of the high prevalence of ACEs and was simple for the staff.

Felitti argues that it makes a good model for improved medical practice, but acceptance by physicians has been slow. Felitti recognizes the difficulties of change and cites Eric Hoffer who said, “In a time of drastic change it is the learners who inherit the future. The learned usually find themselves equipped to live in a world that no longer exists.”

Felitti dwells on the frequent encounters with patients whose “problems” are really their solutions, showing how this applies to obesity, smoking, and abuse of “illicit” methamphetamine. He points out that this was the first major prescription antidepressant in the US in 1940, then asks if this observation matters.

Felitti summarizes and proposes a new way to change medical practice to recognize the importance of childhood experiences: providing the public a comprehensive medical history questionnaire to be completed and taken to their physicians, understanding that some will resent the burden imposed by unsolicited medical information of a traumatic nature. He also proposes the public health benefit of media portrayals of good and bad parenting.

Anda’s interview describes his personal professional pathway, from epidemiology, to chronic disease epidemiology, to behavioral epidemiology, and to the ACE Study after learning of Felitti’s early experiences with treating obesity. His descriptions of the intense opposition to the ACE Study at both the CDC and at KP San Diego reminded me of the opposition to revelations of child abuse encountered by Freud and (later) by C. Henry Kempe and other early child abuse physicians. He describes the selection of the term “Adverse Childhood Experience.” It was not (as I have sometimes suspected) a deliberate avoidance of the term “child abuse” but rather a decision to cast a wider net than the legally defined term “child abuse” would provide. Thus the ACEs include parental divorce or death, which are not “child abuse” but which may be as likely to have an effect on health as the more obviously damaging events of domestic violence, parental substance abuse, mental illness, and criminal behavior.

Early attempts at publication of the ACE Study findings met with rejection until the 1998 article by Felitti et al in the American Journal of Preventive Medicine broke open that door. At about the same time, Felitti began to be invited to conferences for child abuse professionals where he preached to the choirs.

Anda predicts a powerful social movement growing out of the work on ACEs and leading rather quickly to improving the

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childhood experience. This may be overly optimistic in view of our past experience with societal denial of child abuse.

The Williamson interview emphasizes the importance of continuing surveillance for the occurrence of ACEs and notes that 20 states are now attempting this, using CDC-generated definitions. He firmly states that our society is ethically obliged to improve the childhood experience over and above the practical benefit of reducing the health costs generated by ACEs. He advocates the formation of professional alliances that cross disciplines and professional sectors and cautions that the findings of the ACE Study not be oversold because there are still risk factors for disease other than ACEs.

Dr Corwin’s new production of the ACE Study DVD needs to be shown to all primary care physicians, all health officers, and to policymakers generally. It is much more than a rehash of old material from the ACE Study. It points to new directions for policy and program development. The ACE Study and its spin-offs are among the most important public health advances in our time. This DVD is an important contribution to improving medical practice.

References

The Measure of Our Lives

Sooner or later, we all discover that the important moments in life are not the advertised ones, not the birthdays, the graduations, the weddings, not the great goals achieved. The real milestones are less prepossessing. They come to the door of memory unannounced, stray dogs that amble in, sniff around a bit and simply never leave. Our lives are measured by these.

— Susan B Anthony, 1820-1906, American civil rights leader and suffragette
CME Evaluation Program

Section A.

Article 1. (page 10) A Colorectal “Care Bundle” to Reduce Surgical Site Infections in Colorectal Surgeries: A Single-Center Experience

A man, age 60 years, with a body mass index of 32 and history of hypertension undergoes an elective laparoscopic right hemicolectomy because of a malignant tumor of the cecum. All of the following measures can be considered as adjunctive measures to the Surgical Care Improvement Project core measures to reduce a surgical site infection except:

- a. high inspired oxygen (greater than or equal to 80%) during surgery
- b. double gloving
- c. maintenance of glucose between 80-180 mg/dL
- d. subcutaneous drain
- e. preoperative patient education regarding surgical site infection reduction

All of the following are Surgical Care Improvement Program infection reduction measures in colorectal operations except:

- a. removal of hair with clippers
- b. appropriate prophylactic antibiotics in the appropriate time period
- c. discontinuation of prophylactic antibiotics within 24 hours of surgery
- d. maintenance of postoperative glucose level between 80-180 mg/dL
- e. maintenance of perioperative normothermia

Which of the following statements is incorrect?

- a. herbal supplements
- b. tuina massage
- c. moxibustion
- d. lifestyle and nutritional counseling
- e. spinal manipulation

Which of the following is NOT one of the primary dimensions of patient-centered care:

- a. structural
- b. interpersonal
- c. financial
- d. clinical
- e. quantitative methods can bridge the gap between scientific evidence and clinical practice

On the basis of the information presented in the article, the two fundamental tenets of patient-centered care are:

- a. consistency and trust
- b. clarity and communication
- c. trust and communication
- d. consistency and safety

Objective 1. to inculcate the use of evidence-based medicine as part of the science of medicine
Objective 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
Objective 3. to review appropriate updates on the diagnosis and treatment of clinical conditions
Objective 4. to describe infrastructure and systems improvements that lead to improvements in outcomes and patient care experiences

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

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The article covered the stated objectives.
I learned something new that was important.
I plan to use this information as appropriate.
I plan to seek more information on this topic.
I understood what the author was trying to say.

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
E-mail
Address
Signature
NUID # Date

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