Impact of Central Intake Development and System Change on Per Capita Child and Adolescent Mental Health Discharges from 2002 to 2017: Implications for Optimizing System Design by Shaping Demand

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Introduction: After several Canadian public hospital systems merged, a centralized intake system and associated regional access and intake system were developed and implemented for child and adolescent mental health services in 2002.

Objectives: To describe the catchment area’s per capita service rates (overall and annual discharges) and changes in staff time per unit of intake activity, client wait times, and length of stay.

Methods: Patient data (2002-2017) and census data permitted calculation of annual and overall per capita mental health service episodes of care on the basis of discharge rates. Population-based discharge rates, wait times, length of stay, and staff workload were described, referring service investment and system changes.

Results: From 117,500 referrals (64% admitted and discharged; 53% female) to all regional services, 16,750 unique males and 17,140 unique females were admitted and discharged between April 1, 2002, and March 31, 2017. Per capita annual discharge rates increased over baseline 1.8-fold for both sexes, and investments increased 2.8-fold. Wait times and length of stay decreased in the 90th percentile over time for both scheduled (ambulatory) and urgent/emergent service levels. Staff workload increased.

Conclusion: Per capita system capacity increased but did not change in linear relation to investment, even though wait times and length of stay decreased. Steps focusing on future optimization of system capacity are discussed using a novel concept termed shaping demand, which refers to strategies for orienting/educating families after referral and before admission. Two new education programs focus on community-based primary care physicians and school-based services.

Service Description

The role of the CIS is to function as the intake point for regional Alberta Health Services CAAMHPP, as well as to help professionals and families/navigate the mental health system. This is done in 1 of 2 ways. First, over the telephone, when a call comes in from a professional (eg, referring physician, therapist, school professional) or a parent, or occasionally the youth himself/herself, a telephone intake screening is completed at that time by the mental health clinician. Appropriate recommendations are made for either community mental health support or CAAMHPP services. Second and alternatively, the first contact is a faxed referral received most often from the primary care physician but occasionally from other professionals. Referrals are reviewed for urgency by mental health clinicians. If the

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referral is deemed urgent, a call is placed to the client, or if deemed routine, a letter is sent to the parent or the guardian (including a community education schedule) and the referral source requesting a callback to complete a telephone screening when available.

If a client or his/her family members are referred to a community organization, they are provided with the organization’s contact information and direction on how to access this resource. If a client is referred to a CAAMHPP service, the client is placed on the wait list for that service in the RAIS database. The RAIS is a centralized electronic record and registry available to all CAAMHPP clinics in the region. The intake information developed by the CIS staff is entered in the RAIS database and is immediately accessible to the specific CAAMPPH program to which the client is referred. The destination clinic manages wait lists and follow-up, scheduling contact with the client’s family.

**Prevalence of Childhood and Adolescent Mental Disorders**

The 12-month prevalence of any childhood mental disorder in the US is 13.1%, and the lifetime prevalence of any childhood mental disorder is 21.4%.

This stands in contrast to the Calgary Zone’s 16-year prevalence of 32% for physician-diagnosed childhood mental disorder—a medical epidemic that should be of primary social concern in Canada.

A large unmet need remains in access to publically funded mental health services, amid repeated proposals to reform children’s mental health. Locally, the CIS and the RAIS are at the heart of such reform, being absolute requirements for the empirical study of the effectiveness of system changes and investments designed to optimize service capacity.

**Key Components of Central Intake Service**

Key components of intake and access systems have been previously outlined and are described in detail by the Ontario Centre of Excellence for Child and Youth Mental Health.  

Key components of the CAAMHPP’s CIS include triage and a system of care philosophy. Mental health triage is defined as a clinical process conducted by a mental health clinician to prioritize service type and to determine urgency by assessment of identified risk, need, disability, and/or dysfunction. Effective mental health intake and screening practices require screening to identify mental health and substance use issues. The benefits of implementing standardized screening within assessment processes are as follows:

- improving individualized support planning and treatment
- meeting professional standards, such as screening for suicide risk
- managing resources.

A mental health triage policy should provide a number of recommendations for practice. Ideally, it should include management of care until appropriate placement, being responsible for delivery of care, facilitating access to information, and communicating with the target service to complete the triage process. For example, a CIS with an integrated regional information system that incorporates standardized screening may enhance triage and treatment planning with fair and appropriate placement on the basis of measured urgency, rather than on a first-come, first-serve basis.

Although follow-up with referral sources and provision of options and elective education for families during wait times are presently the standard of care, these processes require updating and innovation.

A brief screening instrument serves the purpose of identifying mental health issues or disorders, making it easier to match clients to appropriate services. Screening and assessment/triage instruments are necessary to the CIS. Screening instruments can generally be divided into 3 categories: Screening and assessment, screening only, or assessment only. Criteria for access to mental health services and prioritization of accepted referrals (depending on urgency) have been described.

The CAAMHPP employs the Western Canada Waitlist Children’s Mental Health Priority Criteria Score (WCWL-CMH-PCS), a 17-item instrument that combines screening and baseline measurement of clinical urgency. The WCWL-CMH-PCS has been primarily employed to prioritize accepted referrals. For example, in clinics, the score is used to position individuals on the clinic wait list depending on urgency, who would otherwise be ordered on the past basis of first-come, first-served. The score can be updated using the most recent clinical information. The WCWL-CMH-PCS also aids matching more urgent or less urgent cases to appropriate settings.

Triage involves the critical step of determining intake outcome and transferring client care, whether accepted and placed on a wait list for CAAMPP services or even if the outcome is referral to a community-based service. According to the Canadian Information and Referral Standards, the following are recommended practices for connecting with mental health services after a client has made contact, typically over the telephone:

- Make initial contact with a service provider to verify client eligibility
- Use 3-way calling technology to contact an agency, introduce the client, and describe the situation
- With permission, listen in on a call or sit in on an interview
- Represent and negotiate on behalf of the client.

Although the CAAMHPP’s intake has the capacities noted in these criteria, they are not necessarily required or offered in the triaging of each referral. Most referrals are processed primarily by telephone contact with families and/or referral sources.

Models of cross-sector coordination of mental health services include coordinated access where referral is the beginning of a case management system. For example, the RAIS identifies and links case navigators with families having children with complex needs who are experiencing difficulties gaining access to services and support. The RAIS flags referrals with involvement of the Ministry of Child and Family Services and identifies each client’s school at the time of referral. Identifying the school attended at the time of referral permits not only tracking the effect of the regional implementation of the national initiative to improve mental health literacy in schools, Teen Mental Health (www.TeenMentalHealth.org), but also permits the identification of schools with high rates of referral, possibly in need of additional support.

An additional critical component of centralized intake within a continuum of assessment and care is a coherent and consistent system of care philosophy, such as the Choice and Partnership Approach. This approach includes being family-centered and
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Discharges from 2002 to 2017. Discharges or separations are an important service indicator, and the Canadian Institute for Health Information maintains a national Discharge Abstract Database.24 Clients not admitted to and discharged from CAAMHPP services were not considered in the rate calculations in the present analysis. The overall and annual rate denominators used in the analysis of the 0- to 18-year-old population (age 24 in the case of two clinics: Transitional Youth and Eating Disorders) were based on age-specific civic census data.25 Additionally, CIS workload statistics were extracted from the RAIS, as were the wait times (days) and lengths of stay (days) for each registration.

Data Analysis

Male and female patients were analyzed separately. The frequency of the reasons for referral was tallied. Age (mean and standard deviation [SD]) and sex were summarized for all unique males and females served from 2002 to 2017 and by year. The annual and the overall per capita discharges from the CAAMHPP were calculated using counts of unique individuals and constituted the numerators of rate calculations. The annual rate, expressed as the total admitted for treatment and discharged per 100 capita, was denominated using related age-specific civic annual census data for those up to age 18 years.6 The overall rate was based on the 16-year average population up to age 18 years. Annual discharge rates were described by sex and average age. Additionally, the changes in CIS staff workload were examined.

The data underpinning CIS workload calculations were also extracted from the RAIS, which contains CIS information related to the type (eg, mode of contact, direct or indirect) and duration of every contact. For mode, contact may be by phone or face-to-face. Direct contact means with the patient or immediate family, and indirect means with a third party such as the referral source, school, or clinical staff. All other CAAMHPP clinics with a network connection to the RAIS have immediate access to the information gathered by the CIS staff. The workload data were constructed on the basis of mean time per activity and for the purpose of comparison were based on 2 periods: 2002 to 2010 and 2011 to 2017. Activity picklists embedded in the RAIS were defined in alignment with the Comprehensive Ambulatory Care Classification System26 and included a list of activities related to mental health (n = 57 from the RAIS), such as screening, assessment, collateral assessment, and family assessment. The mean, median, and 90th percentile wait times and lengths of stay were also calculated for the 2 equal intervals between fiscal years April 2002 and March 2018 (the end of the 2017 fiscal year), representing ambulatory scheduled and urgent/emergent service levels.

RESULTS

The age range of the sample was from less than 1 to 18, and 24 years of age in the case of two clinics. There were 37,455 admissions and discharges for 17,647 unique males, ranging from 1 to 29 admissions per patient, and 42,866 discharges for 18,137 unique females, ranging from 1 to 55 admissions, referred between April 1, 2002, and March 31, 2018. The mean age at referral was 10.1 years (SD = 4.9 years) for males and 12.0 years.
(SD = 4.8 years) for females. The mean age at discharge was 11.6 years (SD = 4.9 years) and for males and 13.2 years (SD = 4.7 years) for females. Table 1 shows the reasons for referral from the most frequent (internalizing and emotional issues) to least frequent (harmful behavior/thoughts to others, addictive and legal issues) for females. For males, the most frequent reason also was internalizing and emotional issues, and the least frequent was eating issues.

Table 2 provides the cross-sectional annual service (discharge) rates of unique 0- to 18-year-old individuals served on the basis of regional annual census data, which have increased from 0.6 to 1.5 per 100 for males and 0.4 to 1.9 per 100 for females. Compared with the baseline budget, the subsequent investments and system amalgamations led to an overall 2.8-fold increase in service rates between 2002 and 2016. During the years after the regional integration, the regional amalgamations of provincial services, and the CAAMHPP-specific investments, the associated per capita service level increased by 1.2 per capita (about 2-fold over baseline) for both sexes by 2017 compared with the 2002 rates. Note that the per capita growth was not linearly proportional in relation to the service integrations, innovations, and investments between 2002 and 2017 (eg, 2.0 vs 2.8). The overall per capita rate, taking the average population as reference, was 14.2 per 100 and 15.2 per 100 for males and females, respectively.

Table 3 shows the total and mean time per intake staff activities, comparing fiscal years 2002 through 2009 and 2010 through 2017. The average time spent on intake activities decreased by 3.4 minutes, whereas the total number of activities increased by about 33%.

The mean, median, and 90th percentile wait times and lengths of stay for urgent/emergent and scheduled services comparing the 2 intervals (before fiscal year 2010 and after fiscal year 2009) are shown in Table 4. All median and 90th percentile values for wait time and length of stay remained stable (median urgent/emergent wait times) or decreased with time.

**DISCUSSION**

**System Changes and Investments**

Although central intake services are thought to be important, there is little research attesting to their utility. Both the CIS and the development of the RAIS in the Calgary Zone of Alberta Health Services have permitted the development of a comprehensive accountability framework for CAAMHPP services. The observed reductions in wait times and length of stay suggest that CAAMHPP successfully implemented an episodic care model that contributed to increased service capacity, albeit within limits.

Between inception and 2004, a slight improvement in the per capita rate of mental health services was observed, suggesting an effect of regional integration to form the CAAMHPP and the CIS preceding the first capacity-building Innovation Fund in 2004, the growth fund in 2006, and the addition of Transitional Youth Services in 2007. The new Alberta Children’s Hospital opened in 2008, to which existing inpatient and emergency services relocated. Regional investments included the provincial 2008-2011 Child Mental Health Plan fund. Additionally, the
Alberta Mental Health Board community clinics and the Alberta Alcohol and Drug Addiction Commission services for children and adolescents were amalgamated into the regional CAAMHP services in 2009 and 2011, respectively. Per capita rate increases were observed with these investments and system changes; however, these increases were marginal in their proportional effect on serving the estimated unmet need in the population.10,11,27,28

### Unmet Need

Development of the CIS and the associated RAIS provided a basis for estimating the per capita rate of CAAMHP service provision to the regional population. The per capita rate of discharge, an indicator of those served, has almost doubled from 2003 to 2017, most likely in relation to system changes, such as amalgamation of community-based and addiction services plus the noted investments, representing nearly a tripling in funding over that at baseline in 2002. Nevertheless, a gap remains in regional unmet need. For example, publicly funded CAAMHP services reach only a small fraction (eg, 10%) of the reported 12-month prevalence of any childhood mental disorder9 and have cumulatively served only about 13% of the population between 2002 and 2016. This capacity stands in stark comparison to the cumulative 32% of children and youth with a physician-diagnosed mental disorder between 1994 and 2009.10

Attention drawn to the unmet need of children and youth with mental problems vis-à-vis national reports14,29 and the development of national commissions, although important, has not led to substantial capacity changes.29,30 Sixteen years is the “lifespan” duration of childhood, and a substantial gap of unmet need remains that has not closed with the traditional forms of investment. Despite the efforts to close the need gaps of this population, gaps remain high at the regional level. However, investment has largely been at the level of adding personnel to existing, new, and specialized programming. Family education, although offered, is ad hoc, being elective or optional, rather than formally required as part of assessment. Some programs are piloting face-to-face family orientation groups before admission, yet implementing orientation groups requires staff time that would otherwise be directed toward treatment. What is called for and planned is a coordinated systemwide approach.

### Current and Future Steps

Recent investments in mental health literacy have led to what might be considered a paradigm shift aligned with the US Surgeon General’s 1999 call for reform14—a call to provide mental health services where children and youth gather, such as in schools.11 Added to this is the recent innovation of training physicians to facilitate assessment, diagnosis, case management, and treatment in primary care settings.8,33 Even though these innovations have measurably improved the quality of referral to tertiary care services and reduced referrals to both scheduled and emergency services, it will take time to measure the effect, if any, on the population-based per capita service, given that less than 10% of the regional physicians have been trained. The present evidence indicates that educating community-based physicians in the management of child and adolescent mental health problems reduces the burden on tertiary care services,8 results that call for wider implementation and reorientation of undergraduate medical and allied professional training. Such reforms should also include education about a recent finding with immediate implications for trauma-focused treatment, such as the lack of association between traditional diagnosis formulation and adverse childhood experiences.33,34

### Shaping Demand

Shaping demand is a novel concept that embodies systemwide orientation and education of families seeking service and community-based professionals seeking service on behalf of

### Table 3. Average central intake staff time per individual served

<table>
<thead>
<tr>
<th>Staff parameter</th>
<th>Fiscal years* 2002-2009</th>
<th>Fiscal years* 2010-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of activities</td>
<td>59,211</td>
<td>83,474</td>
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<tr>
<td>Time, h</td>
<td>13,280.7</td>
<td>13,994.2</td>
</tr>
<tr>
<td>Time, min/activity</td>
<td>13.5</td>
<td>10.1</td>
</tr>
</tbody>
</table>

* From April to March.

### Table 4. Summary of wait times and length of stay

<table>
<thead>
<tr>
<th>Service level</th>
<th>Variable, d</th>
<th>Fiscal year interval</th>
<th>Reduction (-) or increase (+)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before 2010</td>
<td>After 2009</td>
</tr>
<tr>
<td>Scheduled (ambulatory)</td>
<td>Wait time</td>
<td>Mean</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90th Percentile</td>
<td>130</td>
</tr>
<tr>
<td></td>
<td>Length of stay</td>
<td>Mean</td>
<td>189</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90th Percentile</td>
<td>482</td>
</tr>
<tr>
<td>Urgent/emergent</td>
<td>Wait time</td>
<td>Mean</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90th Percentile</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Length of stay</td>
<td>Mean</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Median</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>90th Percentile</td>
<td>43</td>
</tr>
</tbody>
</table>
families and their children. More is required by way of shaping demand to optimize access to CAAMHPP services. The present study’s results indicate that increasing “business as usual” services and investments conducted during 16 consecutive years does not appear to have had a substantial impact on service capacity proportionally to investment or closing the gap of unmet need. A possible step in shaping demand could involve integrating and linking, before referral to tertiary care services, the primary care and school-based mental health literacy projects.\(^6\)\(^,\)\(^3\)\(^5\)\(^6\) Steps are under way to develop and implement these strategies.

Developed in 2004 via the Innovation Fund, community education services continue as an elective option for professionals and families. A shaping demand action might focus on reddefining these community education services to incorporate 2 compulsory functions. First, compulsory online or face-to-face group orientation for parents could assist with navigation and understanding what to expect from mental health services. Second, online structured diagnostic interviews could subsequently provide a focus for parents to seek vetted educational resources before assessment. Such interviews and resources exist\(^1\)\(^6\)\(^-\)\(^3\)\(^8\) and provide evidence for expanded use. For example, computer-based diagnostic interviews have been shown to be more accurate than psychiatrists in making common diagnoses (eg, depression) when compared with independent measures of mental disorder\(^4\) and are therefore appropriate to orient parents to self-help.

Online and face-to-face education groups for parents have been shown to be effective.\(^4\)\(^0\)\(^4\)\(^4\) For example, in controlled studies, community-based, large-group parent training resulted in greater improvements in children’s behavioral problems at home and better maintenance of these gains at 6-month follow-up. A cost analysis showed that community-based, large-group parent training was more than 6 times as cost effective as the standard-of-care programs.\(^4\)\(^0\) Furthermore, parent preferences included, in addition to parenting groups, telephone-coached distance programs, and e-coaching options conducted at a flexible pace.\(^4\)\(^2\) Some portions of parents receiving online or group-based orientation and focused education may not require subsequent regular services. If subsequent referral and enrollment are required, participating parents may arrive at assessment points prepared to expedite access to services, such as being equipped with the language required to better understand and communicate about their child’s problems and engage services. As a result, CAAMHPP service providers would necessarily have to respond to a better-educated public through increasing basic professional competencies. Presently, emergencies aside, many parents and children wait weeks to months for access to the specialized professional knowledge required for assessment and treatment.

Relation of Shaping Demand to Other Child Health and Adult Mental Health Services

Shaping demand necessarily involves the participation of all child health services, given the base rate of mental disorders in the population and the lifespan relationship between physical health status and the emergence of a mental disorder.\(^1\)\(^0\)\(^,\)\(^2\)\(^7\)\(^,\)\(^4\) Children and families have experienced long-lived and needless problems because of the arbitrary design of services based on the formal division of specialized medical disciplines. Service silos are real\(^4\) and a source of potential stigma.\(^4\)\(^4\) For example, consider the precipitous drop in the rate of emergency and inpatient treatment of biomedical and physical disorders among children once they are identified with a mental disorder within tertiary care services.\(^4\)\(^4\)

Even in mental health services, there has yet to be formal systemwide provisions for parents with mental health problems at the point of access to care—an important focus, given that the greatest risk of mental disorder in children is having a parent with a mental disorder.\(^4\) Regionally, 54% of the adult population had a psychiatric diagnosis during a 16-year period,\(^4\)\(^9\) and a substantial number of regional CAAMHPP clients younger than age 18 years report parental mental disorder.\(^1\)\(^4\) A related demand-shaping action would be to engage in a more detailed study of the population to identify the threshold rate of common somatic and biomedical disorders that significantly precede mental disorder.\(^4\)\(^6\)\(^-\)\(^4\)\(^8\) In addition to identifying key threshold disorders, an important starting point would be for each child health clinic to carve out of its existing budget a mental health worker position to engage in preventive and early intervention care with those deemed to be at risk.

**Study Limitations**

The data presented in this article reflect access to regional publicly funded tertiary CAAMHPP services and do not represent the entire affected population, including children not referred who nevertheless have a physician-assigned psychiatric diagnosis\(^4\) or children receiving private services. The level of impairment among other affected children not referred to the CAAMHPP is unknown, although those with physician-diagnosed mental disorders have comparable rates of physical disorders compared with children who do gain access to tertiary care services.\(^4\)\(^4\)

The concepts underpinning reform actions that might lead to the optimization of service provision are theoretical and have not yet been tested on a systemwide basis. Any implementation or expansion must be carefully monitored. A transition should be transparent for families. Not all families will have access to the required online resources or capacity to attend face-to-face orientation groups, and this is likely to be more the case for the most vulnerable families. Hence, all current gateways to services need to remain available in order not to create any additional barriers for families in need of services. Necessarily the existing pathways to treatment would remain open, likely even after there is systemwide evidence for the shaping demand proofs of concept.

Linking systemwide community-level mental health literacy and capacity building programs will prove challenging. The mental health literacy-trained primary care physicians treat school-aged children. Yet, simply providing the CIS staff with a list of these physicians might overwhelm them with referrals and undermine these carefully constructed relationships. A well-thought-out supportive strategy is required to link trained primary care physicians with the existing school-based mental health literacy programming in a way that functions to enhance and sustain these delicate relationships. This opportunity is current, given the little overlap of the referrals made by the school-based and
physician-focused mental health literacy programs. In support of shaping demand, the physician-focused mental health literacy program has resulted in substantially fewer referrals overall, creating service space in the CAAMHPP for those who may need it more, such as those with high Adverse Childhood Experiences survey scores.6 To date, the evidence is promising.6,33

Finally, integrated, systemwide online orientation, education, and online structured interviews have not been implemented, even though computer-based diagnosis has long been considered.49 It is presently unknown what the advantageous or disadvantageous effects might be on the system of care or on families. Adoption of this approach would have to be carefully controlled, studied, and systematically monitored.

CONCLUSION

Innovations based on the concept of shaping demand hold the potential to guide reform and optimize access to limited child and youth mental health resources. Our present system of evaluation is well positioned to measure the effects of such innovations on referral frequency, referral quality, and clinical outcomes.7 The investment-capacity relationship presented points to shaping demand as viable and necessary, in addition to status quo investment in post-triage services. Evidence from the literature supports the proposition that shaping demand can produce efficiencies upstream by providing parents with the lexicon that is required for self-help and orientation to better engage in subsequent treatment. Alignment with the US Surgeon General report and the Kirby report on child mental health services,13,14 demonstrated by the novel mindset underpinning the recent mental health literacy investments,4 indicates that shaping demand may serve to optimize use of the limited tertiary care services by those in the greatest need, while increasing community-based and primary care capacity.  

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