Estimation of Needs for Addiction Services: A Youth Model

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ABSTRACT. Objective: In the field of health care services, resource allocation is increasingly determined based on a population needs model. Although service needs models have been developed for adults with substance use problems, it would seem inappropriate to apply them indiscriminately to young people. Method: The method used proposes six steps: (1) targeting the population, (2) estimating the proportion of the population affected by substance misuse and (3) the proportion of youths who should receive services, (4) identifying categories of services, (5) estimating the proportions of youths who should have access to each category of services, and (6) applying the model to real use of services by youths to recalibrate it. Results: Youths ages 12–17 from the Province of Québec were classified within a tiered model comprising four levels of substance use severity. Youths in need of services varied from 38% (weak response) to 95% (high response) for the highest severity cases. Service categories retained are detoxification/intoxication, outpatient, and residential, with each one being subdivided into four categories. The proportion of youths from each tier who should access categories and subcategories of services varied widely. After a pre-experimentation, the model was adjusted. Conclusions: The model can be applied in different jurisdictions, with the caution of adjusting prevalence to local reality. Further improvement will be based on more accurate information concerning the path of clients through services, better strategies to reach youths in need of services, and increased knowledge of optimal service categories. Models adapted to low- or moderate-income countries, where the health care system has minimal services in the areas of mental health and addiction, should be developed.

RÉSUMÉ. Objectif : Dans le domaine des services de santé, les ressources allouées sont de plus en plus déterminées à partir de modèles basés sur les besoins de la population. Bien que des modèles de besoins de services aient été développés pour les adultes présentant des difficultés d’utilisation de substances, il semble inapproprié de les appliquer sans distinction aux jeunes. Méthode : La méthode utilisée se déroule en six étapes : cibler la population (étape 1), estimer la proportion de la population qui présente des difficultés liées à l’utilisation de substances (étape 2) et la proportion de jeunes qui devraient recevoir des services (étape 3), identifier les catégories de services (étape 4), estimer la proportion de jeunes identifiée à l’étape 3 qui devraient avoir accès à chaque catégorie de service (étape 5) et réajuster le modèle en fonction de l’utilisation réelle des services par les jeunes (étape 6). Résultats : Les jeunes âgés de 12 à 17 ans de la province de Québec ont été classés dans un modèle qui comporte quatre niveaux de sévérité d’usage de substances. Les jeunes ayant besoin de services varient de 38% (réponse faible aux besoins) à 95% (réponse élevée aux besoins) pour les cas les plus sèvères (4e niveau). Les catégories de services retenues sont celles liées à la désintoxication et à l’intoxication, les services en consultation externe et les services résidentiels, chacun étant divisé en quatre sous-catégories. Sur la base de l’opinion d’experts et d’informations provenant de la base de données, la proportion de jeunes qui doivent accéder aux catégories et sous-catégories de services varie considérablement. Après une pré-experimentation, le modèle a été ajusté. Conclusion : Tel qu’ilustré avec les services de la province de Québec, ce modèle peut s’appliquer à différentes réalités territoriales en prenant soin d’ajuster la prévalence aux particularités locales. D’autres améliorations pourraient provenir d’informations plus précises concernant la trajectoire des clients dans les services, de meilleures stratégies pour rejoindre les jeunes ayant besoin de services ainsi que d’une meilleure connaissance des catégories optimales de service. Des modèles adaptés aux pays présentant des revenus faibles à modérés, où les systèmes de soins en addiction et santé mentale sont minimalistes, devraient être développés.

Objetivo: En el campo de los servicios de atención médica, la asignación de recursos se determina cada vez más en función de un modelo de necesidades de la población. Aunque se han desarrollado modelos de necesidades de servicios para adultos afectados por problemas de uso de sustancias, parece inapropiado aplicarlos de manera indiscriminada a los jóvenes. Método: El método utilizado propone seis pasos: Paso 1, dirigido a la población, Paso 2, estimación de la proporción de la población afectada por el abuso de sustancias y la proporción de jóvenes que deberían recibir servicios (Paso 3), identificación de categorías de servicios (Paso 4), estimar la proporciones de jóvenes identificados en el paso 3 que deben tener acceso a cada categoría de servicios (Paso 5) y aplicar el modelo al uso real de los servicios por parte de los jóvenes para recalibrarlo (Paso 6). Resultados: Jóvenes de 12 a 17 años de edad de la provincia de Quebec fueron clasificados dentro de un modelo escalonado compuesto de cuatro niveles de gravedad uso de sustancias. Los jóvenes que necesitan servicios variaron del 38% (respuesta débil a las necesidades) al 95% (alta respuesta a las necesidades) para los casos de mayor gravedad (Nivel 4). Las categorías de servicios retenidas son desintoxicación / intoxicación, ambulatoria y residencial, cada una de las cuales se divide en cuatro categorías. Basado en las opiniones de los expertos y la información de la base de datos, la proporción de jóvenes de cada nivel debería acceder a las categorías y subcategorías de servicios varía ampliamente. Después de una pre-experimentación, se ajustó el modelo. Conclusión: Como se ilustra con los servicios de la provincia de Quebec, este modelo se puede aplicar en diferentes jurisdicciones con la precaución de ajustar la prevalencia a la realidad local. La mejora adicional se basará en información más precisa sobre la trayectoria de los clientes a través de los servicios, mejores estrategias para...
PREVALENCE STUDIES REGULARLY identify significant proportions of youths who struggle with alcohol and drug-related problems. In 2015 in the United States, 1.2 million adolescents ages 12–17 (5%) had a substance use disorder (SUD; abuse or dependence, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition) (Center for Behavioral Health Statistics and Quality [CBHSQ], 2016). Among Canadian youths (ages 15–24), 11.9% report substance abuse or addiction (Statistics Canada, 2014). Furthermore, some provincial results estimate the proportion of youths (ages 12–17) with a severe alcohol or drug-related problem at 5.1% (Laprise et al., 2012), and at 10.2% to 16% for youths with a substance use problem (Boak et al., 2015; Laprise et al., 2012). Despite the availability of diverse effective treatments for substance use and addiction (Samson & Tanner-Smith, 2015; Tanner-Smith et al., 2013), access to services still seems inconsistent with the proportions of youths for whom these services are destined. In fact, only 3.7% to 15% of youths having an alcohol and other drug (AOD) problem reported accessing these services (Boak et al., 2015; Haughwout et al., 2016; Merikangas et al., 2011), and approximately one third of youths with an SUD had accessed specialized services (Costello et al., 2014).

The gap between SUD prevalence and access to services naturally leads to the following question: how many youths should be accessing these services? The first, simplest, and most frequently used answer is obtained by simply equating the needs for services to prevalence (Wang et al., 2007). For example, the Substance Abuse and Mental Health Services Administration (SAMHSA) has historically defined the need for treatment as follows: “People are defined as needing substance use treatment if they had a SUD in the past year or if they received substance use treatment at a specialty facility” (CBHSQ, 2016, p. 27). This assumption of equivalence between diagnosis and the need for treatment has been judged to be inadequate by different researchers for at least two decades (Pincus et al., 1998; Regier et al., 1998) because it does not take into account clinical significance. Indeed, some postulate that for the same diagnosis, more severe cases will have a greater need for treatment (Frances, 1998). Following the same argument, Shepard and colleagues (2005) conducted a Massachusetts survey to estimate the need for addiction-specialized services and operationalized the clinical significance of SUD using an ASAM (American Society of Addiction Medicine) level of care criteria; the need for specialized services was roughly one fifth of the SUD prevalence.

Another observation arguing against using diagnosis as an estimate of the need for services is the significant proportion of cases of youths who will experience remission without any professional help (Sareen et al., 2013). In addition, the significant proportion of in-treatment cases who do not satisfy the last-year-diagnosis criteria, (i.e., nondiagnosed or subthreshold patients) constitutes an argument in favor of a more complex estimation of a service needs model (Bruffaerts et al., 2015; Druss et al., 2007). Finally, the client’s subjective experience must also be considered: The vast majority of youths reporting substance abuse or addiction do not report a need for treatment (Wu & Ringwalt, 2006) and, thus, do not seek help in the related services.

Another strategy is to estimate treatment needs based on the historical allocation of resources, presuming that the previous demand accurately reflects the need for treatment. Many analyses have shown inequities in treatment access among social subgroups or geographical regions, which illustrates how this mode of allocation is not sufficiently sensitive to the needs of subgroups (CBHSQ, 2016). Applying traditional methods of providing and distributing resources ensures that inequities are perpetuated and deters service innovations meant to adapt treatment strategies to population needs (Kamis-Gould & Minsky, 1995).

Another aspect to consider when estimating the need for services is their definition. Very few authors have focused on this aspect; they have estimated the number of cases in need of care without defining which services will be needed and by whom. As proposed by Ritter and colleagues (2019—this issue), the diversity of treatment should be included in the planning model and not presuppose that “one size fits all.” Hence, one strategy to better describe services would be to conduct surveys with key informants (Kamis-Gould & Minsky, 1995). Therapists, youths, families, and stakeholders could all provide detailed information about the adequacy of services and what should be added or modified. Because each person may be too focused on the services that are already familiar to him or her (Kamis-Gould & Minsky, 1995), a diverse range of participants would help to ensure that complementary viewpoints are collected (Lasalvia et al., 2000).

Ritter and colleagues (2019) argue that estimating service needs requires complex models that take into account both prevalence and other variables that drive the demand for services. For example, diagnosis should be only one criterion among several others, such as severity of symptoms, degree of disability, comorbidity, recent stressors, and the need for treatment maintenance after some form of remission (Aoun et al., 2004).

Among these complicating factors in the planning of AOD disorder services for youth, mental health co-morbidity is central, resulting in greater overall problem severity, a need for more services (Grella et al., 2004), and poorer outcome.
(Shane et al., 2003). Externalizing behaviors (e.g., delinquency, opposition, interpersonal aggressive behavior), one of the most frequent co-occurring behavioral problems in this population (Diamond et al., 2006), is also a factor that complicates treatment. Adolescents entering substance abuse treatment can present a picture of multidimensional difficulties, aside from mental health or delinquency/interpersonal aggressiveness problems that are linked to substance abuse and outcome of interventions. These include low school attachment (Li et al., 2011; Rovis et al., 2016), low parental supervision or support (Pettigrew et al., 2017; Serafini et al., 2018), low peer support or even victimization (Richter et al., 1991), and high rates of social and material poverty in the neighborhood (Duncan et al., 2002). These complex cases must be matched to more integrated treatments tagging multiple life dimensions (Godley et al., 2014), this being based on the observation that highly complex cases perform better with more intensive, integrated treatments (Henderson et al., 2010).

Over the past few decades, Rush (1990) elaborated on a service planning model for alcohol use disorders in Canada, initially based on alcohol sales per capita and focused on specialized services. He subsequently improved his model by defining it with five tiers, targeting the whole spectrum of AOD use from at-risk to high severity use. He also provided a complex definition of services as accessed by individuals in each tier in accordance with their specific needs (Rush et al., 2014, 2019–this issue). Addiction services in the Province of Québec have been using Rush’s adult model for a decade to plan the allocation of resources.

This model has helped government authorities to better respond to pressure to invest new funds in specific services and also to estimate fair funding between administrative regions by grounding decisions in a population needs planning model. Based on this success, the public funder for substance use and addiction services requested a model adapted for youth. Indeed, there are many ways in which planning models developed for adults do not apply to youth (Planzer, 2005). These include, for example, a binge use habit, the lack of acquired tolerance, and being less in need of detoxification services and more in need of acute intoxication services. There is also the developmental process (e.g., the degree of autonomy largely varying between 12 and 17 years old), which calls for therapeutic adaptations using, among other things, various combinations of family and individual interventions (Bertrand et al., 2006). This article will describe the method used and the results of this work (i.e., the Needs for Addiction Services Estimation Model for Youths [NASEM-Y]).

Method

The general model used by Rush and colleagues (Rush, 1990; Rush et al., 2014) was adapted for this study and comprised six steps (Step 4 previously included two tasks, which we divided into two distinct steps and to which we added a final step aimed at a pre-experimentation that would allow us to recalibrate the model; cf. Table 1). The targeted population was youths ages 12–17 living in the Province of Québec, Canada (Step 1; i.e., targeting a regional population). Step 2 aimed to estimate the proportion of the youth population affected by substance misuse ranging from an at-risk use to a highly deleterious one. Data were extracted from the 2010–2011 Enquête québécoise sur la santé des jeunes du secondaire (EQSJS), which determined the prevalence for alcohol and drug misuse among youths. The measure used to obtain this information comprised a three-level indicator of severity (low/green light, moderate/yellow light, high/red light) as measured with the Detection of Alcohol and Drug Problems in Adolescents (DEP-ADO; Landry et al., 2004), which has good psychometric properties (Bernard et al., 2005).

The survey also provided multiple, well-validated indicators of mental health problems and indices of psychosocial difficulties in five domains: school, peer relations, delinquency, family, and socioeconomic (cf. Table 2; Institut de la statistique du Québec, 2013). Severity of alcohol and drug use was combined with indices of mental health and psychosocial difficulties to organize the cases into severity tiers and estimate the percentage of these youths in each tier. Step 3 estimated the proportion of youths from each tier (i.e., from Step 2) who should receive services within a 12-month period. These proportions were estimated based on the continuum of the penetration rate in specialized services in the province during one fiscal year.

Step 4 identified categories of services that should be available to respond to the severity continuum of AOD use among youths. Two sources of information were used: (a) a literature review of the services that are offered internationally (and the definitions of these services) and retrieved from orientation documents produced by government agencies from the Organisation for Economic Co-operation and Development (OECD) countries and from a scientific literature database search and (b) experts’ opinions on the adequacy of these categories collected through Delphi consensus group technique (Hasson et al., 2000). Experts were invited to talk about service categories that were not evident in the literature.

In a second round of these Delphi consensus group discussions (Step 5), the same experts voiced their opinions concerning the proportion of youth in need of services at each tier (as identified at Step 3) and who should have access to each of the retained service categories (cf. Step 4). Experts were aware, in their estimation, that large proportions of the young people would probably refuse these services because of a lack of motivation.

To avoid an idealistic estimation of the proportion of youths who would realistically participate in each service
category, a research database comprising information on the actual path of youths in the services (Tremblay et al., 2014) was used to weight the experts’ estimates of the perceived needs for youths. The weighting process was conducted with proportions of youths who, after assessment, were either offered a specific service and refused it (e.g., the professional estimated that the adolescent would need a short-term residential service, but the adolescent refused), or accepted it but never used it. At Step 6, the model was applied in the residential service, but the adolescent refused), or accepted

| Step | Task | Strategies |
|------|------|------------|
| Step 1 | Targeted population | Youths 12–17 years old living in the Province of Québec, Canada |
| Step 2 | Estimation of the proportion of Step 1 affected by substance misuse | Date extracted from EQSJS–2010–2011. Four tiers are extracted. |
| Step 3 | Estimation of youths from each tier (i.e., from Step 2) who should receive services within a 12-month period | National surveys provide a paucity of information on youth consultation rates. Based instead on the continuum of penetration rates in specialized addiction services (corresponding to Tier 3) in the province during a fiscal year. |
| Step 4 | Identification of service categories needed to respond to the severity continuum of AOD use among youths | International literature review of definitions of services provided in OECD countries. Final decision on chosen categories made with the Delphi consensus group technique (n = 83 experts from Canada). |
| Step 5 | Estimation of the proportions of youths from Step 3 who should have access to each service category retained in Step 4 | A second round of the Delphi consensus group with the same experts as in Step 4. Recalibration of experts’ estimations. |
| Step 6 | Pre-experimentation and adjustment of the model | Comparisons between (a) estimations of youths in need of each service category and (b) flow of youths in the province’s addiction services from six administrative regions, so as to identify inconsistencies and adjust the model if needed. |

Notes: AOD = alcohol and other drugs; EQSJS = Enquête québécoise sur la santé des jeunes du secondaire; OECD = Organisation for Economic Co-operation and Development.

Results

Youth classifications drawn from the 2010–2011 EQSJS survey (Pica et al., 2012) and organized into levels of severity provided a four-tier model. Three levels came from the DEP-ADO (Landry et al., 2004), which comprises, as mentioned previously, three levels of substance use risk. Because comorbidity is associated with higher impairment and, thus, higher needs for services, the third and highest level of substance use severity was divided into two tiers, with youths presenting mental health comorbidity and other psychosocial difficulties being in Tier 4 and representing 1% of the youth.
The task of Step 3 was to estimate the proportion of people from each tier who should access services within a fiscal year. National surveys have provided a paucity of information on this question. Indeed, reports concerning the prevalence of service use by youths focused on specialized addiction services and indicated consultation rates varying from 0.4% to 0.9% for the whole population of young people (Australian Institute of Health and Welfare [AIHW], 2014;
Brand et al., 2017; Pirie et al., 2014) and 8.4% to 9.4% among youths reporting an SUD diagnosis (Pearson et al., 2013; Pirie et al., 2014; SAMHSA, 2017).

Tremblay and colleagues (2014) conducted in-depth qualitative and quantitative analyses of specialized addiction services received by youths in six regional health authorities. They identified the best service models (as identified by qualitative analysis), which corresponded to the highest penetration rates of services in the youth population. The penetration rates varied from 14.7% to 33.1%. Discussions with stakeholders and analysis of the services offered in the region with the best performance revealed that their model did not extend to all the schools and juvenile delinquency centers in the region, which means that there was still a possibility to improve them. Expanding their work into these regions would probably result in a penetration rate of close to 50%. These rates were finally retained as markers of low, medium, and high degrees of response to youth needs for specialized addiction services, which generally corresponded to Tier 3.

In their adult model, Rush and colleagues (2014) estimated that the proportion of the population who should access services from Tier 4 or its equivalent (i.e., SUD and mental health comorbidity) was 2.5 times higher than for people from Tier 3. This observation was also reported in youth studies, with the group presenting mental health comorbidity and SUD being two times more inclined to consult than the groups with no dual diagnosis (Cheng & Lo, 2010). They also estimated that people from Tier 2 would be three times less numerous to consult than people from Tier 3. Table 3 shows a synthesis of the proportions of youths who should access addiction services by degree of response to their need for services and by tier (proportions are rounded to zero decimal places).

The identification of service categories (Step 4) was first completed through a literature review of government agencies (e.g., United States, Australia, Europe, France, Canada, Québec, and England) describing youth addiction services that should be implemented in their respective countries. This singled out five categories of services, namely: (a) screening, first contact; (b) detoxification; (c) outpatient; (d) residential; and (e) posttreatment (AIHW, 2014; Chaim et al., 2014; European Monitoring Centre for Drugs and Drug Addiction, 2011; MILDT, 2015; Roberts, 2010; SAMHSA, 2014; Tremblay et al., 2014). These service definitions were presented to experts who had to arrive at a consensus concerning the categories that should be kept or added to obtain a complete and realistic organization of a youth services model. Table 4 presents service categories, titles, and definitions. During the discussions, experts integrated posttreatment services into the outpatient category. They also added acute intoxication to previously identified categories. Experts mentioned the necessity to include family members, as they may also be clients themselves. Internet and mobile-based services were also deemed necessary to contact and inform youths, to provide treatment applications, and even to talk directly with the therapist. Mutual aid groups/peer support were cited as useful. Experts also evoked many system functions that were not specific service categories but that represented large guidelines that should permeate all service categories (e.g., health promotion, prevention, harm reduction, etc.). They also mentioned many conditions that would optimize the implementation, fluidity, and accessibility to services (e.g., outreach, “no wrong door” principle, rapid access to services). These functions and service deployment conditions are integrated into Figure 1 (for a full description, see Tremblay et al., 2016). Proportions to be estimated are indicated by a “p=” symbol (Figure 1).

At Step 5, with the help of Delphi groups with experts, we estimated the proportion of youths identified in Step 3...
The experts provided their estimation of the proportion of youths who should receive a specific service. As mentioned previously, results from the actual path of youths through the services (Tremblay et al., 2014) were used to weight experts’ estimates of their perceived needs. For example, Tremblay and colleagues (2014) report that, among youths who were offered residential services after a specialized assessment, 57.8% accepted and, of these, 60.8% actually accessed the residential setting. This means that of all the youths (100%) who “should” have accessed residential services for their addiction, 35.1% actually did access them ($100 \times 0.578 \times 0.608$). This rate applied to both short- and long-term residential services. They also observed that of all the youths (100%) referred by general services to specialized services, 93.5% went to a first assessment session, and if referred to

from each tier who should receive a given type of general service during a fiscal year. For example, if we mentioned that 33% of Tier 3 youths should access services (cf. Step 3), Step 5 aimed to determine how many of this 33% would need each type of specific service in each general category, allowing for the possibility of more than one specific service per general category. For each service category, the median among the nine groups of experts represented the best consensus, as extreme scores unduly influenced the mean (cf. Table 5).

### Table 4. Table of agreed-upon service categories for youths with difficulties concerning the use of alcohol and other drugs

| Categories | Definitions or aims |
|------------|---------------------|
| Screening  | Identify youths who may have difficulties—AOD use. Very brief screening tools (e.g., CRAFFT). Define or describe the difficulties—AOD use. Medium-length questionnaires (e.g., DEP-ADO). |
| Acute intoxication/withdrawal management ($p_1$) | Symptoms of an episode of heavy use that cannot be safely managed at home and that are typically managed at the hospital <$24$ hours. Overdose management included here. |
| Outpatient ($p_{1.2}$) | Mild withdrawal symptoms treated in many settings (e.g., visiting youths at home or in group sessions). |
| Residential community ($p_{1.3}$) | Moderate withdrawal symptoms. Residential but nonhospital settings. |
| Residential for complexity enhanced ($p_{1.4}$) | Severe withdrawal symptoms. Multiple co-occurring conditions: hospital with high level of medical/psychiatric support. |
| Outpatient services ($p_2$) | Initiating interest in changing: short-term intervention, not always scheduled. |
| General nonspecialized ($p_{2.2}$) | Youths with moderate AOD use (or severe AOD with motivation intervention only in order to guide them to other specialized services). Counselors not specialized in addiction. |
| Specialized ($p_{2.3}$) | Youths with severe AOD use. Counselors specialized in addiction. Harm reduction and case management included. |
| Intensive specialized/complexity enhanced ($p_{2.4}$) | Youths with severe AOD use and a complex situation in other areas. Counselors specialized in addiction. During at least four consecutive weeks, a minimum of (a) three weekly meetings ($\geq 15$ minutes) or (b) one weekly intervention ($\geq 24$ hours). Services can be provided by multiple counselors/organizations, as long as they are coordinated. |
| Residential stabilization ($p_{3.1}$) | 1–7 days of rest and stabilization in a safe setting with low therapeutic goals. |
| Residential short-term (<90 days) ($p_{3.2}$) | Structured program of interventions and activities. Duration is adapted to needs. |
| Residential long-term ($\geq 90$ days) ($p_{3.3}$) | Structured program of interventions and activities. Complexity in many areas necessitates a longer residential program focusing on lifestyle, therapeutic environment, and peer support. Duration is adapted to needs. |
| Complexity enhanced/residential ($p_{3.4}$) | Complexity characterized by high AOD use associated with one or multiple significant problems that cannot be treated at lower levels: mental health disorder (psychiatric hospitalization), delinquency/behavior problems (young offender’s residential facilities), and physical illness (hospitalization). |

Notes: AOD = alcohol and other drugs; CRAFFT = Car, Relax, Alone, Forget, Friends, Trouble; DEP-ADO = Detection of Alcohol and Drug Problems in Adolescents. *p values in parentheses refer to proportions for each service category, as illustrated in Figure 1. *Most of the interventions can be provided in individual, group, and family formats. *All residential services are for youths with severe AOD use.
Figure 1. Needs-based planning model for services and supports for youth 12–17 years old.

Services Deployment Conditions: outreach (being near the youth's location for screening), accept the "no wrong door" principle, rapid access to services; simplicity of procedures; geographic proximity of services; inter-professional proximity; intra/inter-institution communications; continuity/fluency of services (to support during waiting period/to prepare before starting services/to accompany toward different services/to support transition from youth services to adult services, etc.); professionals dedicated to substance use problems; other professionals sensitized to substance use problems; regular training; access to medical services at different steps/services; clinical supervision; flexibility in treatment duration (residential services); integration of the family when and where appropriate; integration of strategies for health promotion and prevention within the services.
Table 5. Estimation of the number of youths who should access each service as a function of level of response to the need for services (Province of Québec)

| Variable                  | General categories of services | Acute intoxication/withdrawal management (p1) | Outpatient services (p2) | Residential services (p3) |
|---------------------------|--------------------------------|-----------------------------------------------|--------------------------|--------------------------|
|                           | Intox./withdrawal | Outpatient | Residential | Acute intox. | Outpatient | Resid. | Resid. complexity++ | Brief intervention | General | Specia- | Intensive specialized | Stabilization | Short term | Long term | Complexity ++ |
|                           |                    |           |             |              |             |       |                   |              |         | lized |                   |             |           |           |               |
| Correction rate           | –                  | –         | –           | –             | –           | –     |                 | –              | –       | –     | –                 | –             | –          | –          | –              |
| Proportion from each tier who should receive each category of services (median from group consensus of nine groups of experts) | –                  | –         | –           | –             | –           | –     |                 | –              | –       | –     | –                 | –             | –          | –          | –              |
| Severity                  |                    |           |             |              |             |       |                   | –              | –       | –     | –                 | –             | –          | –          | –              |
| of AOD use                | Tier 4             | .20       | 1.00        | .70          | .12         | .50   | .30               | .01            | 1.00    | .935 | .85               | .50           | .50        | .30        | .20           |
|                          | Tier 3             | .15       | 1.00        | .25          | .12         | .50   | .30               | .01            | 1.00    | .935 | .85               | .50           | .50        | .30        | .20           |
|                          | Tier 2             | .03       | 1.00        | .01          | 1.00        | .00   | .00               | .00            | 1.00    | .935 | .85               | .50           | .50        | .30        | .20           |

Number of cases that should access services by three levels of response to need for services (Province of Québec)

| Level of response | Low     | Medium | High   |
|-------------------|---------|--------|--------|
|                    | 858     | 1,893  | 2,568  |
|                    | 6,132   | 13,461 | 18,970 |
|                    | 2,072   | 4,537  | 5,819  |
|                    | 98      | 834    | 1,717  |
|                    | 476     | 1,043  | 1,379  |
|                    | 266     | 584    | 779    |
|                    | 8       | 18     | 24     |
|                    | 6,132   | 13,461 | 18,970 |
|                    | 2,442   | 5,365  | 7,734  |
|                    | 3,506   | 7,694  | 10,638 |
|                    | 798     | 1,746  | 2,211  |
|                    | 1,150   | 2,518  | 3,207  |
|                    | 428     | 937    | 1,234  |
|                    | 164     | 358    | 432    |
|                    | 196     | 883    | 2,404  |

Number of cases receiving services in a fiscal year

| –            | –          | 755a   | 18b   | 5,857c  | 507d  | 369e  | 667f  |

Notes: Intox. = intoxicated; resid. = residential; AOD = alcohol and other drugs; SUD = substance use disorder. The dashes in the cells indicate that these numbers were impossible to estimate or obtain. *Number of emergency department admissions for acute intoxication, 2014–2015: 84% are related to alcohol. 1Number of hospitalizations for withdrawal management, 2013. 2Number of youths admitted into an outpatient specialized addiction service, 2012–2013. 3Number of admissions into a short-term residential service, 2012–2013. 4Number of admissions into a long-term residential service, 2012–2013. 5Number of hospitalizations with a primary or secondary diagnosis of SUD, 2013.

A specialized outpatient service, 95.2% accepted; of these, 89.7% accessed the service, meaning that 79.8% (100 × 0.935 × 0.952 × 0.897) of youths who should have accessed outpatient specialized services actually did so.

For general outpatient services, Tremblay and colleagues (2014) did not have an estimate, so the same strategy as the one used for specialized outpatient services was applied (except for the first proportion of referred cases to specialized services), meaning that 85.4% (100 × 0.952 × 0.897) of youths who were offered nonspecialized/general outpatient services actually used them. Tremblay and colleagues (2014) did not give estimates of youths who started intensive specialized outpatient or residential stabilization services when offered to them. The middle score between the residential correction rate and the specialized outpatient service rate was chosen as the potential correction rate based on the idea that it is easier to accept intensive outpatient or brief stabilization residential services than short-/long-term residential services. More difficult to accept than a specialized outpatient service, hospital withdrawal management, hospitalizations for any other difficulty with AOD, and specialized outpatient and residential addiction services. The first observation to be made concerns the appropriateness of estimations regarding hospital withdrawal management, specialized outpatient, and short- and long-term residential services. Levels of response at the provincial level varied from low to moderate. Estimations for emergency services for acute intoxication and residential services for complexity-enhanced cases (hospitalization in psychiatric and medical departments and delinquency centers) largely underestimated youth needs, with numbers being below the actual service offered within the fiscal year.

For these two types of services, distribution of the proportion of cases receiving these services in the 12- to 17-year-old population of each regional health authority was used to readjust the estimations. The lowest performance was used as the criterion for a low response to the need for services, the highest performance was used as the criterion for a high response, and the mean was used as the criterion for a moderate response. For emergency acute intoxication services, the lower bound was 0.02% for the 12- to 17-year-old population, the higher bound was 0.35%, and the mean was 0.17%. Concerning residential services for complexity-enhanced cases, only the number of hospitalizations for a primary or secondary diagnosis of SUD was available. The statistics concerning the number of cases who were in a residential setting because of a combination of delinquency and SUD were not available. For this category, the lower bound...
Discussions

Most planning models for addiction services propose a simple strategy to identify the proportion of cases in need of services with (a) dichotomous diagnosis criteria and (b) an assumption that 100% of cases with a diagnosis will be in need of services. Another weakness is that they do not propose definitions of service types (CBHSQ, 2016). As evoked by Ritter and colleagues (2019), we need to remedy these weaknesses by constructing complex models. The NASEM-Y is a response to this, proposing to alleviate these flaws via four improvements.

First, it is based on a tiered model that combines severity of use of AOD, indicators regarding mental health difficulties, and other domains of social functioning such as school attachment, peer and parental relationships, aggressiveness, delinquency, and poverty. Second, it integrates an estimation of the proportions of youths in need of services for each tier, with the higher tiers having higher needs. These proportions are based on observed penetration rates of specialized services, offering a nuanced three-level response to needs (low, moderate, high), giving stakeholders flexibility and avoiding an idealistic estimation. Third, the model provides a continuum of services for a complex response to youth needs.

Last, tiers are interconnected with services, defining the proportion of youths from each tier in need of each category of services. The model was pre-experimented and proportions readjusted for two types of services (emergency for acute intoxication and residential for complexity enhanced cases).

The NASEM-Y can be used by health authorities to scan the diversity of services offered. Service analysis in the Province of Quebec revealed an absence of intensive specialized outpatient and ambulatory detoxification services, leading authorities to set priorities and to plan for the development of intensive specialized outpatient services in the years to come. Nevertheless, the continuum of services is not understood as a “one size fits all” model. Stakeholders from a specific administrative region could plan and rearrange services to respond to the overall need, without offering each of the services included in the model. For example, in remote areas, offering residential treatment for youths is often a challenge: families want access to services in a nearby setting to facilitate contact with teenagers during the treatment phase. In light of these difficulties, more intensive outpatient services could be offered to youths in need of residential services. For others, lodging arrangements could be arranged as a complementary provision to an intensive outpatient service.

The NASEM-Y also provides the results of a gap analysis regarding the proportion of youths accessing each service compared with the desired level of response. For example, the application of the model to the Province of Quebec shows a moderate response rate to long-term residential services and a rather low response rate to short-term residential and outpatient specialized services. These analyses provide a foundation for service development and rearrangement decisions over the next few years.

The international applicability of the model is based on the assumption that the prevalence in each tier is similar in the targeted area to the prevalence observed in the Province of Quebec. Ideally, users of the model would recalculate the proportion of the youth population in each tier through local surveys and insert it into the model to obtain a more reliable estimate for the population using their services. High quality surveys are crucial to ensure that planning models provide good estimates for service needs. However, the capacity to apply the model to low- or moderate-income countries where health care systems offer a paucity of mental health and addiction services is questionable. Adaptations are needed, and priority must be given to those services most likely to be implemented even with poor resources, encouraging creativity in the way services are conceptualized and delivered.

One of the model’s limitations involves the experts’ participation in the Delphi consensus groups. They might have underestimated or overestimated the proportion of youths from each tier in need of each type of service. Indeed, experts’ knowledge is limited to the services they know, and some services may not be well known by everyone, such as acute intoxication services and residential services for complexity-enhanced cases, which may in turn introduce estimation errors. This limitation was compensated by the large number of experts from different types of services and from across four Canadian provinces. However, users of the services were not interviewed (Boryc et al., 2010), which could have been helpful in identifying their priority needs rather than relying on experts’ opinions about which services they should access (Acosta & Toro, 2000). We know that patients’ and professionals’ opinions about the need for services can be quite different (Lasalvia et al., 2000), given that patients, contrary to professionals, generally do not prioritize mental health and substance abuse services over more basic needs (Acosta & Toro, 2000). Revisions of the model should therefore include service users as experts.

This estimation model is the first version of a process that continues to improve as we collect more accurate information about the path clients follow in services, develop better strategies to reach the youths in need of services, and increase our knowledge of optimal service categories.

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