ABSTRACT

Background: Mental health services for youths in Singapore were challenged by accessibility and resource constraints. A community-based mental health program working with schools and other partners was developed to address the population needs.

Aim: To describe the formation of a community-based mental health program and evaluate the program in terms of its outcome and the satisfaction of the users of this program.

Methods: Based on needs analyses, a community multidisciplinary team was set up in 15 schools to pilot a new model of care for youths. Implemented progressively over five years, networks of teams were divided into four geographic zones. Each zone had clusters of 10 to 15 schools. These teams worked closely with school counselors. Teams were supported by a psychiatrist and a resident. Interventions were focused on empowering school-based personnel to work with students and families, with the support of the teams.

Results: 4,184 students were served of whom 10% were seen by the school counselors and supported by the community team. Only 0.15% required referral to tertiary services. Outcome measured by counselor and teacher ratings showed improvements in the Clinical Global Impression scale and Strengths and Difficulties Questionnaire. These included reductions in conduct problems, emotional problems, hyperactive behaviors and peer problems. Furthermore, prosocial behavior also significantly improved. Preliminary cost effectiveness analyses suggest that community treatments are superior to clinic interventions.

Conclusion: There is evidence that a population-based community mental health program with schools can be implemented through a multisectoral approach with good outcomes that is cost effective.

INTRODUCTION

Singapore is a small island nation with a land area of slightly over 740 square kilometers at the tip of the Malaysian Peninsula. Today, Singapore is one of the wealthiest countries in the world, ranked 36th in per capita GDP (1). The state of physical health in Singapore is good by international standards, ranked by the WHO as 6th in the world in 2000 (2). Singapore also achieved its good physical health standards at a comparatively low cost, ranked by the Economist Intelligence Unit as 2nd among 166 countries in 2014 (2). However, suicides among youth was a major public health issue (3). Mental health disorders contributed to 11% of the Disability Adjusted Life Years (DALYs) in a study in 2004 (4), which is similar to global trends (5), and is expected to rise in the next decade.

MENTAL HEALTH SYSTEMS

In Singapore, private general practitioners predominantly provide primary mental healthcare, while secondary and tertiary mental health care is mainly at the public hospitals (6). The Institute of Mental Health (IMH) is the national specialty center for mental health disorders. Even though there are a variety of treatments available, only 31.8% of people with such disorders seek professional treatment, with a prolonged wait until treatment (7). Disease burden measured by DALYs showed that
The Government of Singapore recognized that a concerted national program was necessary to address the multi-faceted needs of the population. These include the need to maintain good mental health, identify mental health disorders early, and to establish a comprehensive intervention program in primary, secondary and tertiary health care settings. This resulted in the National Mental Health Blueprint in 2007. Singapore’s approach deviated somewhat from the WHO’s Mental Health Gap strategy of arming primary care physicians with skill sets to manage mental health problems in the community. The reason is that only about 1 in 5 persons with mental health conditions approached primary care physicians for help. The initial focus of the Blueprint for children and adolescents was on the school system, as education is compulsory and schools form an obvious basis for preventative as well as early intervention efforts. Singapore has 385 schools clustered in groups of 10 to 15 schools based on geographical regions. Groups of 7 clusters form a school zone and there are four zones in the North, South, East and West. Starting with a prototype concept in 2007 in one school cluster of 15 schools in the North Zone, a pilot team was formed. This consisted of clinicians (nurses, occupational therapists, medical social workers and psychologists) led by a psychiatrist with a small administrative support team. They met with every school’s senior management (which includes the principal and the teacher who oversees counseling services for students) in the pilot cluster and mapped out the school-based needs. A single focal point of contact by schools was established. These single points of contact were in school support teams and are usually school counselors or heads of pastoral care in the schools. The rest of the school support team was made up of learning support staff and teachers. The job of the school support team was to look at potential mental health issues and refer them to the mental health community team for support. Mental health teams worked with schools and were mobile in their support, organizing school or even home-based conferences to help students with issues.

In the pilot program, behavioral and learning disorders were the issues that first surfaced. The teams decided to work on ADHD as they formed the bulk of school identified issues. ADHD was also well understood by schools as a learning related disorder. Specific training for identification and treatment of ADHD was organized. This consisted of lectures, hands on workshops with a multidisciplinary training approach, bringing together mental health team members, school support teams and primary care physicians and community pediatricians. Processes and pathways for managing students with suspected ADHD were created including the development of a clinical practice guideline for ADHD. Using ADHD as the starting point for introducing the approach to diagnostic formulation and treatment planning, school counselors are then introduced to other common mental health disorders.

The pilot program ran for a year with great success and approval was given to scale it across the entire North school zone of almost 100 schools. Success was measured by good outcomes and satisfaction scores of school counselors and partners. The community mental health team called Response, Early Assessment and Intervention in Community Mental Health (REACH), was set up to target the entire school zone. At the same time, relevant non-governmental organizations (NGOs) were recruited to boost support in the community for school and social service linkups. Four NGOs formed the pilot group and additional funding was provided by the National Council of Social Services (an umbrella body that brings together social services and charities for coordination of social care in Singapore). The aim of this paper is to describe and evaluate the program in terms of its outcome (i.e., symptom severity, treatment response and cost effectiveness) and the satisfaction of the users of the program. This can hopefully provide the reader with a blueprint for developing similar community programs.
METHODS

REACH TEAM COMPOSITION
The REACH teams were based in three hospitals selected because they were already running some form of secondary or tertiary mental health services for children and adolescents. The pilot team was part of the psychiatric hospital while the newer teams came from a university-based health system and the national pediatric hospital. The North, South, East and West team respectively employed 1.51, 1.51, 0.5 and 1.3 full-time equivalent (FTE) medical staff; 3, 2, 1 and 1 FTE nurses; 5, 4, 5 and 8.2 FTE psychologists; 2.5, 2, 2 and 0 FTE social workers; 1.5, 3, 1 and 2 FTE occupational therapists; and 2.6, 1, 1 and 1 FTE administrative staff. This composition depended on what the needs were and availability of experienced staff to fill the positions.

REACH INTERVENTIONS
The teams developed a systematic assessment process not dissimilar to a psychiatric evaluation in a clinic involving interviewing the child, parents and teachers in school or at home. A diagnostic formulation follows such an evaluation in which a multidisciplinary treatment plan is devised. Specific targeted interventions may involve either individual treatment of family work using a cognitive behavior framework or provide group therapies for common problems such as anxiety or anger issues. All interventions follow an evidence-based approach and have been described elsewhere (13). For example in ADHD, the teams formulate treatment based on the Clinical Practice Guidelines by the Ministry of Health (15) and offer parent training and school-based educational support as first line interventions. Interventions that require tertiary care such as specialist inputs for medications and intensive multidisciplinary treatment or inpatient care are then referred to the hospitals serving the school region.

SAMPLE
This is a retrospective review of the REACH program from its inception in 2007 until February 2015. A total of 4,184 students (2,801 males and 1,360 females) aged between 7 to 20 years were referred to the REACH program during this period. Outcome ratings were obtained from 3,156 students. A total of 385 schools with 499,295 students were involved in the project. School counselors saw almost 55,000 students annually (16) of whom almost 10% were referred to the REACH teams working with counselors and 955 students were eventually referred to the hospital for specialist care. Annually, an average of 7,500 calls were received by the REACH helpline. The mental health conditions referred to REACH were not dissimilar with IMH's top conditions and include ADHD, anxiety disorders, stress related disorders, depression and autism.

MEASURES
A combination of measures was used to evaluate the program’s outcome and cost effectiveness. These were identified by the clinical teams and tested with the school counselors and community agencies. Outcome ratings were completed by counselors, teachers, primary care physicians as well as the students receiving the service. Satisfaction ratings were also obtained from school counselors, primary care physicians and NGOs involved in the project.

OUTCOME MEASUREMENTS
Clinical Global Impression scale (CGI). The CGI was completed by the school counselor and was a commonly used psychiatric tool consisting of 2-item observer-rated scale that measures illness severity (CGI-Severity) and global improvement (CGI-Improvement). It was deemed a suitable tool due to its simple application. The reliability correlation for the Severity of Illness and Global Improvement subscales were moderate correlation (r ~ –0.47 to –0.66) and had strong concurrent validity, which suggest that the scale had good sensitivity to change over time (17).

Strengths and Difficulties Questionnaire (SDQ). The SDQ was completed by the child’s teacher and has 5 subscales: Hyperactivity, Conduct Problems, Peer Problems, Emotional Problems and Prosocial Behavior. Reliability was generally satisfactory, whether judged by internal consistency (mean Cronbach a: .73), cross-informant correlation (mean: 0.34), or retest stability after 4 to 6 months (mean: 0.62) (18).

Children’s Global Assessment Scale (CGAS). The CGAS was completed by the primary care physician and a measurement of overall severity of disturbance in children and adolescents. The inter-rater reliability correlation was 0.84 (19) and test-retest reliability of 0.83 (20).

Cost effectiveness evaluation. EuroQol-5 Dimensions (EQ-5D). The EQ-5D is a self-reported questionnaire that was used to measure an individual’s health status and was also applicable to a range of health conditions and treatments (21). The EQ-5D was originally designed for the use in adult populations aged 18 and above. Nevertheless, previous research has demonstrated that it is possible to use the adult EQ-5D questionnaire to measure health
related quality of life (HRQOL) in children and adolescent (aged 8 - 11 and 12 - 18, respectively) (22). It should also be noted that the U.K. adult EQ-5D norm was chosen because it has been demonstrated to be both valid and reliable for use in Singapore (23).

**User satisfaction and effectiveness of training.** A questionnaire developed by REACH was used to measure users' satisfaction with the community teams as well as the effectiveness of training provided. These questionnaires covered the two main domains of effectiveness and satisfaction over a 4 point Likert scale of “strongly disagree,” “disagree,” “agree” and “strongly agree” (13). A similar questionnaire was used for primary care physicians and NGO staff working with REACH.

**ANALYSIS**

To monitor health outcomes (symptom severity and treatment response), pre-CGI/SDQ/CGAS scores were obtained during REACH Assessment, and post-CGI/SDQ/CGAS scores were obtained six months after the first assessment, regardless of the intervention. Students were categorized as “improved,” “worsened” and “no change.” Improvements were measured as a ratio of number of students “improved” against the total number of students seen. To determine the mean differences between the pre- and post-CGI/SDQ/CGAS scores, the mean scores for each year were calculated and a paired sample t-test analysis was performed using SPSS version 19 for Windows. To determine if the program was cost effective, EQ-5D utility scores were adjusted using multiple linear regression analyses for baseline socio-demographic variables (i.e., age, gender and ethnicity). The socio-demographic variables were selected based on research that suggests they are important determinants of health related quality of life in Asian populations (23). Descriptive analyses of counselor and REACH partner satisfaction and the effectiveness of training were determined.

**RESULTS**

**CLINICAL OUTCOMES**

Of all the students referred to REACH, 77% of them improved on the CGI while 13.4% had no change and 6.5% had a worsening of symptoms. Paired-samples t-test analysis of the CGI revealed that the initial severity (M = 3.14, SD = 0.11) of the students referred to REACH were significantly lower six months later after REACH intervention (M = 2.42, SD = 0.06), t(7) = 17.88, p < .01.

Out of the total number of students referred to REACH, 63.3% of the students referred improved in SDQ scores whereas 29.9% had poorer SDQ outcomes and 6.9% experienced no change. Paired-samples t-test analysis on each of the five subscales of the SDQ revealed that the students significantly improved on all subscales. Specifically, the post emotional problem scores (M = 2.13, SD = .33) were significantly lower than the pre emotional problem scores (M = 2.76, SD = .33), t(7) = 3.51, p < .01, the post conduct problem scores (M = 2.61, SD = .70) were significantly lower than the pre conduct problem scores (M = 3.17, SD = .56), t(7) = 7.34, p < .01, the post hyperactivity scores (M = 6.01, SD = .41) were significantly lower than the pre hyperactivity scores (M = 6.71, SD = .46), t(7) = 12.18, p < .01, the post peer problem scores (M = 3.45, SD = .31) were significantly lower than the pre peer problem scores (M = 3.93, SD = .22), t(7) = 10.01, p < .01. Prosocial behavior differed from the other problem scores as this
reflected desired behaviors. Students referred to REACH had significantly higher post prosocial behavior scores ($M = 4.47$, $SD = .70$) than initial prosocial behavior scores ($M = 4.05$, $SD = .30$), $t(7) = -2.27$, $p = .05$. Finally, students who received REACH interventions had significantly lower post Total Difficulties Scores ($M = 14.21$, $SD = 1.23$) than initial Total Difficulties Scores ($M = 16.58$, $SD = 1.44$), $t(7) = 11.47$, $p < .01$.

Of all the students referred to REACH, 82.5% of them improved on the CGAS while 17.5% had no change and none had an increase in severity. Paired-samples t-test analysis of the CGAS revealed that the initial severity of disturbance ($M = 60.35$, $SD = 8.80$) of the students referred to REACH were not significantly lower six months later after REACH intervention ($M = 79.30$, $SD = 3.20$), $t(3) = -2.3$, $p = 0.11$.

**COST EFFECTIVENESS EVALUATION**

In a preliminary analysis of 71 youths diagnosed with ADHD who were seen in the REACH program, 53 were referred to a specialist outpatient clinic (classified as hospital-based care) and compared with 18 youths who were supported through the community teams (classified as community-based care) (14). The self-rated EQ5D was used in conjunction with the CGI to measure cost effectiveness. Results showed that community-based care was cost saving compared to hospital-based care at a negative Incremental Cost-Effectiveness Ratio of $S$18,308 per Quality-Adjusted Life Year (QALY) gained and remained cost-effective over the 95% confidence interval of QALY estimates.

**USER SATISFACTION AND EFFECTIVENESS OF TRAINING**

The REACH team has trained 413 school counselors in a myriad of child mental health topics, thus increasing the counselors’ capability in detecting, assessing and managing affected students. The school counselors have provided positive feedback about REACH with 98% rating satisfaction with the REACH support services and more than 95% rating the training provided as being satisfactory and effective.

**DISCUSSION**

There were 4,184 students served of whom 10% were seen by the school counselors and supported by the community team. Only 0.15% required referral to tertiary services. Outcomes measured by counselor and teacher ratings showed improvements in the Clinical Global Impression scale and Strengths and Difficulties Questionnaire. These included reductions in conduct problems, emotional problems, hyperactive behaviors and peer problems. Furthermore, prosocial behavior also significantly improved. Preliminary cost effectiveness analyses suggest that community treatments are superior to clinic interventions.

Prevalence of mental health disorders in Singapore is no different from other countries (24). Clinical services were developed based on high prevalence or high burden disorders. IMH is the largest provider of mental health services in Singapore, treating mainly severe behavioral disorders. This is not dissimilar to specialized child mental health clinics elsewhere (25). The initial implementation has shown that an almost equal number of behavioral and emotional disorders were recognized, suggesting that anxiety and depression were clearly unidentified and under-diagnosed. This potential treatment gap between what was being seen in specialist clinics and what was prevalent in the population suggests a need for some form of screening at school entry, and there is a need for research informing on how health screening may be conducted in an educational setting. Using ADHD as an entry point for schools to be introduced to mental health disorders is important because the principles of diagnostic formulation and treatment planning can be applied more widely to other psychiatric disorders and symptoms, particularly internalizing disorders, which have traditionally been poorly identified and managed in school settings (26).

The importance of using the school as a source of mental health promotion and interventions is well documented in most countries, including middle and low income countries (27). Most programs target specific areas (e.g., smoking or alcohol use) (28, 29) or focus on universal promotion of resilience and general wellbeing (28, 29). Such health promotion efforts use terms such as social emotional wellbeing and life skills training and many have good evidence of their effectiveness (30). Such programs are often delivered by teachers or school-based professionals in a curriculum-based educational process (31). There is a paucity of specific clinical programs that target difficulties and disorders and bring about collaboration between school-based mental health services provided by counselors and specialty mental health services in clinics and hospitals (32). Most of these examples are found in pilot schools, although they have not been scaled (33).

REACH can be said to be a successfully implemented national model with good outcomes. Our evaluation
demonstrates that there were significant improvements for students referred to REACH on a global level and not just symptom improvement. The improvements seen on CGI, SDQ and CGAS were statistically significant although there were no controls in the evaluation. We also did not have outcomes for all students as it was a challenge to obtain the ratings from counselors, teachers and the students themselves. We have also demonstrated that this program has evidence of being cost effective for ADHD treatment (34). Feedback from school counselors also revealed both acceptability of service as well as agreement to participate (13). With training in the form of a set of mental health curricula of almost 100 hours that could be provided over three years the counselors were also able to detect children displaying symptoms of mental disorders and refer them for specialist treatment.

REACH had an easily understood and identifiable brand for the country and schools took to the concept well. The regional deployment helped to phase in the preparation work and also allowed team formation to be ramped up in a manageable way. One of the challenges was developing a balanced team consisting of experienced mental health professionals with the innovative energy to do something that the individual professions were not accustomed to. Typically, a clinical psychologist's training does not involve mental health promotion and multidisciplinary work. The same can be said of nurses, medical social workers and occupational therapists, who are accustomed to working in hospitals and clinics. Team formation was decided by the lead psychiatrist of the teams and team members sourced from existing secondary or tertiary hospital-based systems. The partnership between the Ministry of Health and Ministry of Education was school-centered and progressively involved the 385 mainstream and special schools. This partnership involves sharing of resources so that school counselors are funded by education while community teams are funded by health. Although primary school education is mandatory, secondary school education is not. NGOs were recruited to monitor and reduce school dropout (about 1.5% of the school going population) and these NGOs were also involved in the community engagement of REACH. NGO resources were largely provided in the form of grants from the Ministry of Health and the Ministry of Social and Family Development. The combination of a specialized community team working with school-based counselors, local primary care physicians and social service NGOs in the vicinity of the school form a network of support for students and their families. Over time, parent support groups from schools as well as national disease support groups such as SPARK (Society for the Promotion of ADHD Research and Knowledge) were included in meetings and conferences to help improve understanding and disseminate the work of the community teams and partners.

In summary, we have shown that for a community-based assessment and intervention program to work, it requires several steps: (i) an understanding of the prevalence of problems in the community, (ii) a unified agenda among different providers of care for youths such as education, social services and health, (iii) a calibrated pilot which can be scaled, and (iv) multisectoral and multidisciplinary integration with shared resources. The REACH program showed that a large scale national preventative and early intervention system can be implemented. REACH demonstrates a comprehensive approach to the early detection and treatment of childhood mental disorders in schools. However, as in other areas of the world, there is a pressing need for early identification and prevention programs even before school entry. The empirical base for mental health services is drawn largely from studies in the West, and there is a need for studies examining the determinants of risk and resilience within unique settings throughout the world.

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