

they provide services for those with mental disorders. Such terminology is likely to be confusing to the potential consumer, given the varied meanings attached to the expression “mental wellness”<sup>6</sup>.

The considerable overlap in the age at onset of substance abuse and mental disorders in youth, and the resulting long-term association between the two<sup>7</sup>, creates one more challenge. The new YMH services must be equipped to both assess and treat emerging as well as established substance abuse problems. While heavy use of alcohol and cannabis is transient among many young people, it may also be harbinger of later abuse and dependence. There is indeed an opportunity for effective prevention of substance abuse problems among heavy users through relatively brief, non-invasive, and effective interventions, some of which can be provided online<sup>8</sup>. Including substance use services on an equal footing with those for mental disorders will require a more complex infrastructure, staffing, training and evaluation than what seems to be the case currently. Last, but not least, the epidemic of opioid abuse and the tragically high mortality associated with it remain largely absent from YMH service narratives, with some exceptions<sup>9</sup>. Mental health services for these highly vulnerable youth will need to be connected to other interventions and systems of care currently in place for opioid abuse, so that youth can navigate between different aspects of care for these deadly problems.

There is an implicit agreement that the new YMH services are designed for the age group of 12-25, based on the high incidence of mental health and addiction disorders during this period and the assumption that child psychiatric services are more adequately provided for the 0-12 year period. However, there is little empirical

evidence to support the specific age range for which an entirely new system of care is being built, and issues of continuity with the age groups before and after should be addressed. Among those under 12 years of age, a substantial proportion present with developmental disorders, making them particularly vulnerable to future mental disorders. The new YMH services must be deeply connected with the system of care for developmental disorders and ensure the same unencumbered access for these youth as for those without prior developmental problems. At the other end of the age spectrum, most major disorders are likely to persist beyond 25 years of age and, therefore, need both episodic as well as continuous care of the highest quality. Shifting transition from 18 to 25 may postpone the problem, but not solve it<sup>3</sup>.

In summary, in setting up the new YMH system in multiple jurisdictions, some key issues need to be addressed, including connections with existing services, extending the transformation of service to the age period before and beyond 12-25 years, and providing equally weighted services to those with substance use disorders and pre-existing developmental disorders. The key principles underlying these services must guide an evaluation of a variety of methods of service delivery, as one model is unlikely to fit all circumstances and jurisdictions. Such evaluation will require innovative designs, as traditional randomized controlled studies will be difficult to conduct and we cannot hold back the progress that is already taking place.

It would be prudent, even if not popular, to clearly define the boundaries of mental health and disorders to be able to serve those with the greatest needs. This will require research into different definitions of “caseness”, matched by provision of care

appropriate to the stage and level of an existing or an emerging disorder. It is unlikely that YMH services can address all forms of distress in youth, the origin of and solution to some of which may be outside the field of health. This is likely to be particularly the case for the greatest proportion of youth on the planet who live in low- or middle-income countries, where poverty, political oppression, gross human rights violations, gender discrimination and violence, often resulting from post-colonial legacies, are major sources of distress.

In the context of these environments, the current models of YMH services are not only unlikely to be workable but may be grossly inappropriate. Much of the globe will need to find its own solution to problems of youth, including mental and addiction disorders, using its own unique assets, but still able to incorporate the key principles generated from the current wave of YMH services discussed in this Forum.

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## Implementing 21st century “end-to-end” and technology-enhanced care for young people

The advent of health services specifically designed for young people with emerging anxiety, mood or psychotic disorders is the most appropriate response to the peak age of onset of these disorders, the

evidence favouring early intervention, and the problems with access to clinical care<sup>1</sup>. The primary goal of these services is to provide an attractive “front door” that engages youth at risk of progression to major disor-

ders. The available data suggest that they are largely fulfilling this basic purpose<sup>1</sup>.

While health service innovations alone are unlikely to reduce population-level disease burden, it remains the principal

goal of clinical care to provide high-quality and more personalized interventions. If the more substantive aim is to halt or even reverse illness course and, thereby, prevent premature death or long-term functional impairment, then it is timely to ask: are the new youth services optimally designed to deliver these outcomes?

To date, national health systems have never seriously moved to implement an integrated “supply-chain” of clinical services, operating across the spectrum from indicated prevention to continuing specialist care. By contrast, the traditional response to the ever-increasing demand is to add new stand-alone service “blocks” to the existing disconnected structures.

New service “blocks” are often based on historic concepts of primary, secondary and specialist care. Typically, access to specialist services remains severely restricted, being reserved largely for those who have already progressed to later stages of illness. This traditional hierarchy of care has been viewed as the most equitable way to ensure basic population coverage for very common, persisting or chronic conditions.

However, these pyramidal structures often ignore the reality that early intervention only works when delivered early in the course of illness. While most new services focus on increasing access to primary care, the reality is that enhanced access alone does not deliver improved outcomes. Analyses of longitudinal data from primary-care based youth services indicate both the continued progression of those with early to later stages of mood and psychotic disorders<sup>2</sup>, and that the majority of those who enter with impaired social, educational or occupational function do not make substantive long-term gains<sup>3</sup>.

So, is it time to rethink our assumptions and seriously consider alternative options? Digital health services are rapidly developing in new directions, with a variety of stand-alone or integrated models of clinical care<sup>4,5</sup>. Importantly, as private investments in these more personalized alternatives are also growing substantially, we are likely to see considerable competition and disruption (i.e., “uberization”) of mental health care in both developed and developing economies<sup>5</sup>. Much of this will be dictated by financial considerations

rather than evidence of superior effectiveness.

So, are we really closing in on our main target, namely, “Right Care, First Time, Where You Live”<sup>4</sup>? In reality, this would require the combination of much more innovative clinical models with new technology-enhanced modes of practice<sup>4</sup>. Beyond the concept of supporting an integrated “supply-chain”, a fundamental consideration is the extent to which new digital technologies can support effective implementation of each element of this enhanced care model<sup>4</sup>.

“Right care” means skilled assessment and choice of interventions that are highly personalized. It does require multidimensional assessment, including elements such as lifetime trajectories, clinical stage of illness, pathophysiological mechanisms, comorbidity, recognition of social and cultural setting, and personal choice<sup>4</sup>. Much of this material can be collected efficiently through data entered directly by service users and their families<sup>4</sup>. It is greatly assisted by using new (passive and active) personalized devices that monitor *in vivo* motor activity, sleep, social connections, mood, physiological arousal, cognitive performance, metabolic health, and engagement with education or employment<sup>5</sup>.

“First time” rejects the typical health services mantra of “stepped care” in favour of “staged care”<sup>6</sup>. That is, it promotes immediate specialized care for those presenting with first episodes of major disorders. Technology-enhanced triage systems that bring timely specialized clinical assessment to the start of the service encounter can assist to make this critical task much more efficient. They do this by focusing video-enhanced specialist assessment on those at highest risk of illness progression or suicidal behaviour<sup>7</sup>.

“Where you live” really matters. Socio-economic and geographical disadvantages are real. The disparities in the distribution of services (urban vs. rural, wealthy vs. disadvantaged regions) have major impacts on illness course. The provision of the whole range of services from self-care right through to more specialized interventions, based largely on new technologies, may become possible for those communities that have been most neglected<sup>8</sup>. It will re-

quire new workforces (“digital navigators”) and a much stronger commitment to telecommunication systems as essential “health” infrastructure in the 21st century.

Tied to the notion of “highly personalized” interventions is that of measurement-based care. We need smart, bidirectional and interactive systems that actively engage young people and collect data directly from service users, families, carers, clinicians and personalized devices<sup>4</sup>. Most importantly, these data should then be used quickly to identify those who do not respond, or deteriorate, early in the course of illness<sup>2,3</sup>.

Rather than simply deploying new service “blocks”, it may be better to focus on what a well-coordinated, regionally-organized, technology-enhanced, end-to-end “supply-chain” looks like in the 21st century. New dynamic modelling (at the population level) and discrete event approaches (at the service level) can be employed to bring rigour to national or regional health service planning<sup>9</sup>. It can also inform allocation of limited workforces, alongside financial and technical resources<sup>9</sup>. Modern, real-time data collection systems can also be used to embed clinical research within these new systems<sup>5</sup>.

While the review by McGorry et al<sup>1</sup> does draw attention to the potential of new digital platforms, a less appreciated aspect of digital innovation is the large potential impact of technology-enhanced care coordination. This not only assists to put young people at the centre of the care journey, but focuses on reducing unnecessary delays in providing sophisticated clinical assessment and effective interventions<sup>9</sup>.

In less privileged settings, we are already seeing a willingness to use new technologies that are not limited by traditional geographical barriers<sup>7</sup>. We can no longer simply accept the notion that specialist care is a luxury item reserved for those in developed countries, while the rest will have to make do with “universal primary care”. These digitally enhanced systems have a tremendous capacity to bring more personalized, specialized and coordinated care to those who have long been neglected.

At this time, however, there is still much work to be done to determine whether new clinic-based or technology-enhanced

systems, alone or in combination, can deliver substantive long-term improvements in the lives of young people with emerging mental disorders.

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## Youth mental health: risks and opportunities in the digital world

McGorry et al<sup>1</sup> present a call to action to redesign youth mental health care and conceptualize youth psychiatry as a distinct discipline. Their proposed framework for youth mental health care contains four key elements: a) a focus on prevention and early intervention, with youth mental health services embedded in primary care and community settings; b) services co-designed with young people to be accessible, engaging and destigmatizing; c) blending the benefits of digital technology, to provide accessibility and scale, with human online and face-to-face support to promote youth engagement; d) extending the age boundary of youth mental health provision to cover the period of extended brain maturation in the “new adolescence” and the peak risk period of onset of mental disorders up to age 25.

The urgency of this task is driven by a global youth mental health crisis, and the failure of traditional models of mental health care to meet this demand. In the UK, one in eight young people have a mental health disorder, and one in four young women aged 17 to 19 have significant depression or anxiety, with half of those having self-harmed<sup>2</sup>. Non-suicidal self-harm has nearly tripled over the past 10 years<sup>3</sup>, while suicide rates per 100,000 adolescents have almost doubled<sup>4</sup>. Depression represents the leading cause of disability-adjusted life years lost in young people, resulting in a major societal and economic burden extending across the lifespan.

The peak period for the onset of depression is adolescence and young adulthood, and most adults with recurrent depression will have first experienced it before age 25<sup>5</sup>. However, the growing demand for youth mental health support and inter-

vention far outstrips the capacity of traditional mental health services to respond. In the UK, only 30% of young people with clinically significant depression or anxiety receive any help or professional support, and up to 90% of youth with mental disorders in some low-income countries receive no mental health care<sup>6</sup>.

The youth mental health crisis has coincided with the emergence over the last decade of a new “digital environment”. Digital technology presents major opportunities to scale-up and transform youth mental health services, but also potential risks for youth mental health and well-being, which, if the mechanisms were better understood, could create targets for preventive psychiatry.

In this new digital environment, young people’s communication primarily takes place online or via social media. Most (83%) of UK’s 12 to 15-year-olds own a smartphone, with over two-fifths of girls and one-fifth of boys aged 14 using social media for three or more hours a day<sup>7</sup>. For many young people who are isolated and have mental health problems, social media can be an important source of health information, knowledge and social support. However, social media use has also been linked with depression, suicide and self-harm, particularly in girls and marginalized groups<sup>7</sup>. Potential mechanisms include social isolation, disturbed sleep, attentional distraction, cyberbullying, pressures to conform to idealized lifestyles and body images, and the influence of screen-media activity on brain maturation.

Nevertheless, not all young people are at risk of mental health problems with social media, and currently there is little understanding of what factors make some

youth more vulnerable than others. Policy initiatives and potential preventive interventions are hampered by uncertainty regarding mechanisms and the direction of effects linking use of digital technology to risks for mental health disorder in young people. The COVID-19 pandemic and resulting “lockdown” has been associated with increased mental health problems and greater online activity in young people. While the need of youth to access trusted support online is greater than ever, social media platforms are not designed to meet mental health needs of young people.

Digital technologies have the potential to transform youth mental health services through improved access to evidence-based resources and interventions, and by automating parts of diagnostic, monitoring and treatment pathways. They can connect young people with peers, mentors and therapists, potentially bridging the mental health treatment gap through novel, tailored, flexible and less stigmatizing treatments. However, this potential is still largely unrealized. Few digital interventions are included in routine care, and poor adherence is seen in those that are.

Industry-led innovations often lack a research evidence base and youth co-design (which is crucial to ensure that products fit with needs and lifestyles, and to tackle non-adherence). Numerous mental health and well-being apps exist, but most have no evidence base and some could even be harmful<sup>8</sup>. Meanwhile, academic-led evidence-based digital interventions are available, but few, if any, have shown sustained uptake and engagement in real-world settings. Effective, usable and accessible digital innovations could redress the imbalance of global health inequalities and en-