

Rapid Synthesis

Examining Health Hubs and their Potential to
Inform Ontario Health Teams

30 October 2020



HEALTH FORUM

EVIDENCE >> INSIGHT >> ACTION

Rapid Synthesis:
Examining Health Hubs and their Potential to Inform Ontario Health Teams
60-day response

30 October 2020

Rapid-Improvement Support and Exchange

RISE's mission is to contribute to the Ontario Ministry of Health's 'one window' of implementation supports for Ontario Health Teams by providing timely and responsive access to Ontario-based 'rapid-learning and improvement' assets.

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Timeline

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. This synthesis was prepared over a 60-business-day timeframe. An overview of what can be provided and what cannot be provided in each of the different timelines is provided on McMaster Health Forum's Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

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Conflict of interest

The authors declare that they have no professional or commercial interests relevant to the rapid synthesis. The funder played no role in the identification, selection, assessment, synthesis or presentation of the research evidence profiled in the rapid synthesis.

Merit review

The rapid synthesis was reviewed by a small number of policymakers, stakeholders and researchers in order to ensure its scientific rigour and system relevance.

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KEY MESSAGES

Questions

- What is a health hub and what are some of its core characteristics?
- For what conditions or populations have health hubs been found to be beneficial?
- How have health hubs been configured for use in health systems?
- What barriers or facilitators were identified for the implementation of health hubs?

Why the issue is important

- Ontario Health Teams (OHT) bring together care providers from different organizations and sub-sectors to work as one coordinated team and are now being implemented into the provincial health system.
- A key part of this reform will involve transitioning from responding reactively to the patients seeking care from OHT partner organizations to being proactive in using a population-health management approach to meet the needs of their priority populations (and ultimately full attributed population).
- One mechanism that many OHTs are considering as part of this approach are health hubs, which offer the potential to better serve segments of OHTs' prioritized populations by co-locating select services together.
- This rapid synthesis comes from questions asked by an Ontario Health Team about the evidence base around health 'hubs' and whether they can be designed to support specific 'hot spots' of shared needs within a community.

What we found

- We found 12 systematic reviews and two program evaluations to inform the first, second and fourth questions, while a jurisdictional scan was undertaken to inform the third question.
- Health hubs integrate health and/or broader community services in the same physical space (or enable integration through virtual technologies) so that clients, their families and caregivers can easily access a range of supports from different service providers, and likewise so that providers are better able to interact with one another and coordinate care for their clients.
- Across all the conditions and populations for which we found evidence, few definitive conclusions can be drawn on the effects of hubs on health outcomes for any of the populations, however, many positive effects were reported on patient satisfaction with care, as well as on processes of care (e.g., communication and coordination between providers).
- Systematic reviews found hubs with single-facility integration better considered patients' full array of needs and contributed to the development of appropriate treatment plans, especially patients with three or more co-existing conditions.
- A jurisdictional scan on health hubs found examples of national, regional and local initiatives and, while the hubs differed in the types and number of services they provide, all hubs had a goal to reduce fragmentation and improve the care received by a prioritized population.
- Barriers to the implementation of health hubs included challenges adopting new care processes, high turnover rates of health providers, and difficulties accessing resources to invest in needed digital-health supports, while facilitators included buy-in of health providers, prioritizing the right patients who can benefit from the services, and management support for the initiative.
- Based on the 12 systematic reviews and two program evaluations that informed the previous four questions, we have constructed a template logic model for OHT-led hubs, though the specifics of this logic model will need to be tailored to the local context, partners, and proposed activities.

QUESTIONS

- 1) What is a health hub and what are some of its core characteristics?
- 2) For what conditions or populations have health hubs been found to be beneficial?
- 3) How have health hubs been configured for use in health systems?
- 4) What barriers or facilitators were identified for the implementation of health hubs?

WHY THE ISSUE IS IMPORTANT

Ontario Health Teams were first introduced in February 2019 to provide a new way of organizing and delivering care that is more connected to patients in their local communities. Ontario Health Teams bring together care providers from different organizations to work as one coordinated team. After more than a year of establishing partnerships, the first cohort of 29 Ontario Health Teams (24 initial teams plus an additional five announced in July 2020) is in the midst of implementing their reforms.(1)

One of the first tasks OHTs have is demonstrating their ability to adopt and apply a population-health management approach to their self-identified year 1 priority populations.(2) A key part of this will involve transitioning from responding reactively to the patients seeking care from OHT partner organizations to proactively meeting the needs of their chosen year 1 population (and ultimately attributed population).(2)

Adopting a population-health management approach involves four steps:

- 1) segmenting the priority population into groups with shared needs and access barriers;
- 2) co-designing care pathways and in-reach and out-reach services for each group;
- 3) implementing pathways and services in a way that reaches and is appropriate to each group; and
- 4) monitoring implementation and evaluating impact.(2)

This rapid synthesis relates to the first and second steps – segmenting the priority population into groups with shared needs and access barriers, and co-designing care pathways and in-reach and out-reach services for each group. The rapid synthesis was requested from an Ontario Health Team that was asking questions about the evidence base around co-location of care or ‘health hubs’, and how they can be deployed within the community to support particular ‘hot spots’ within a community where needs are greater than the rest of the population. The idea behind this question was to discern the value of co-locating select services where there are concentrations of individuals from a year 1 priority population.

Box 1: Background to the rapid synthesis

This rapid synthesis mobilizes both global and local research evidence about a question submitted to the McMaster Health Forum’s Rapid Response program. Whenever possible, the rapid synthesis summarizes research evidence drawn from systematic reviews of the research literature and occasionally from single research studies. A systematic review is a summary of studies addressing a clearly formulated question that uses systematic and explicit methods to identify, select and appraise research studies, and to synthesize data from the included studies. The rapid synthesis does not contain recommendations, which would have required the authors to make judgments based on their personal values and preferences.

Rapid syntheses can be requested in a three-, 10-, 30-, 60- or 90-business-day timeframe. An overview of what can be provided and what cannot be provided in each of these timelines is provided on the McMaster Health Forum’s Rapid Response program webpage (www.mcmasterforum.org/find-evidence/rapid-response).

This rapid synthesis was prepared over a 60-business-day timeframe and involved four steps:

- 1) submission of a question from a policymaker or stakeholder (in this case, an Ontario Health Team);
- 2) identifying, selecting, appraising and synthesizing relevant research evidence about the question;
- 3) drafting the rapid synthesis in such a way as to present concisely and in accessible language the research evidence; and
- 4) finalizing the rapid synthesis based on the input of at least two merit reviewers.

The potential implementation of hubs by OHTs is not intended to replace the OHT itself – as is suggested by some U.S.-based literature on hospital-led “hubs”(3) - but rather it refers to a community option for concentrating services to meet the needs of the prioritized population in a given geography.

WHAT WE FOUND

We found 12 systematic reviews and two program evaluations that contain evidence summaries to inform three of the four questions (1, 2 and 4). In addition, we conducted a jurisdictional scan of websites for local, provincial and international health and social-care hubs to examine how they have been configured in different health systems.

Question 1: What is a health hub and what are some of its core characteristics?

Health hubs integrate health and/or social-care services in the same physical space (or enable integration through virtual technologies) so clients, their families and caregivers can easily access a range of supports from different service providers.(4) In addition, they allow providers to better interact with one another and coordinate care for their clients. The theoretical basis for hubs stems from the literature on vertical integration of services.(5) Vertical integration typically refers to the provision of services that cross multiple levels in the health system (i.e., move from primary to secondary to tertiary), while horizontal integration tends to refer to the addition of services at the same level. Despite the origins of the literature, most hubs now include a range of vertical and horizontal integration.

Health hubs often spring up organically to meet the recognized needs of community members. They are typically created for a particular population or condition (e.g., older frail adults; those with mental health and addictions challenges) for whom the orientation of existing services is sub-optimal. However, in Ontario we have also seen them develop to contend with a unique geography (e.g., northern and rural communities).(6) This model takes advantage of the proximity of providers to improve communication, collaboration, and coordinate care for their clients. The centralization of services and collaboration between professionals can minimize transportation costs and supports continuity of care between providers.

Given the bottom-up development of many of these hubs, they are each unique in the services they provide, as well as in their respective governance and financial arrangements. Each hub has its own specific organizational characteristics, patient-care responsibilities, coordination mechanisms between team members, and their own data and systems policies. However, a few common features for hubs include:

- presence of multiple health and social-service providers (often specialized based on the needs of a specific population or condition);
- use of care coordination through case conferences;

Box 2: Identification, selection and synthesis of research evidence

We identified research evidence (systematic reviews and primary studies) by searching (in February 2020) Health Systems Evidence (www.healthsystemsevidence.org) using the following search: ((co-location) OR (colocation)) AND ((services) OR (service delivery)) AND (health*). We also searched PubMed using the following three search strategies: 1) ((hub) OR (co-location) OR (colocation) OR (central point)) AND ((services) OR (service delivery) OR (coordination)); 2) ((quality of care) OR (cost savings) OR (cost effectiveness) OR (patient experience) OR (clinical experience)) AND ((hub) OR (co-location) OR (centraliz*) OR (centralis*) OR (colocation)); and 3) ((collaborative) OR (integrated) OR (central)) AND (service delivery) AND (model) AND ((quality of care) OR (cost savings) OR (cost effectiveness) OR (patient experience)).

The results from the searches were assessed by one reviewer for inclusion. A document was included if it fit within the scope of the questions posed for the rapid synthesis.

For each systematic review we included in the synthesis, we documented the focus of the review, key findings, last year the literature was searched (as an indicator of how recently it was conducted), methodological quality using the AMSTAR quality appraisal tool (see the Appendix for more detail), and the proportion of the included studies that were conducted in Canada. For primary research (if included), we documented the focus of the study, methods used, a description of the sample, the jurisdiction(s) studied, key features of the intervention, and key findings. We then used this extracted information to develop a synthesis of the key findings from the included reviews and primary studies.

- presence of internal referral protocols;
- multiple providers attending appointments;
- shared technology platforms (or digital solutions) that allow for the flow of information between providers; and
- longer appointment times and walk-in offerings. (7-12)

Examples of these types of hubs have been rooted in the leadership of both health and social systems, depending on the needs of the local population. In Ontario, significant work on establishing community-based hubs was spearheaded by the then Ministry of Community and Social Services, despite health services being central to their programming.(7) As a result of the different contexts from which they emerge, hubs can take shape in a variety of different infrastructure including primary-care clinics, community centres, public schools, or in some cases public spaces.(7)

Question 2: For what conditions or populations have health hubs been found to be beneficial?

Despite the assumption that improvements in coordination and communication across providers would improve care, the evidence for health hubs has found varied effects depending on the service partners being co-located and the population for whom it aims to provide care. A high-level summary of the findings from 12 systematic reviews and two program evaluations is provided below. Detailed findings from each of the reviews and program evaluations can be found in Appendix 1.

All systematic reviews related to health-based hubs, however, the reviews varied in the extent and number of different services that were integrated into the hubs. The two program evaluations included a broader array of community services. The highest quantity of literature was found for hubs that focused on those with mental health and addictions challenges.

Across all the conditions and populations, few definitive conclusions can be drawn on the effects of hubs on health outcomes for any of the populations. This may be due in part to the heterogeneity of the models. However, many positive effects were reported on patient satisfaction with care, as well as on processes of care, for example, communication and coordination between providers. One recent high-quality review found hubs with single-facility integration better ensured that patients' full array of needs were considered and appropriate treatment plans were developed.(8) This was particularly true for patients with three or more co-occurring conditions.(8) The review also noted that the integration reduced logistic barriers for clients and improved confidentiality and stigma concerns for those receiving care for mental health concerns.(8) However, two high-quality systematic reviews found conflicting findings with respect to confidentiality and stigma with integrated HIV treatment services.(8; 9)

With respect to which services should be part of hubs, one recent high-quality systematic review found that co-locating practitioners from specialties that have well-developed care management guidelines or that rely on highly refined diagnostic clinical exams such as cardiology or neurology, may enhance point-of-care delivery in collaboration with primary-care providers.(8) In contrast, specialties that can provide expertise through image interpretation may provide some benefits without requiring co-location through the use of telemedicine modalities.(10)

Additional condition- and population-specific findings are summarized in Table 1 below. The table also includes notes where there is a match between the findings from the literature and the year 1 priority populations that have been prioritized by cohort 1 OHTs.

Table 1: Key findings from systematic reviews on community health hubs

Condition or population	Key findings
Hubs for those with a particular condition	
Diabetes (aligns with older adults and/or people with chronic conditions as a year 1 priority population)	<ul style="list-style-type: none"> One recent high-quality review found co-location of primary care and specialty diabetes services resulted in reduced blood pressure and total cholesterol, but had no effect on hemoglobin A1C or triglyceride levels (10)
Heart failure (aligns with older adults and/or people with chronic conditions as a year 1 priority population)	<ul style="list-style-type: none"> One recent medium-quality review included four studies that focused on the use of vertically integrated heart-failure clinics and found an improvement in outcomes including reduction in hospital readmission rates, mortality rates, and cost of care (15)
HIV/AIDS	<ul style="list-style-type: none"> One older high-quality review on the integration of HIV services with other reproductive health services, tuberculosis care, and primary care was found to be cost-effective compared to the provision of siloed services (9) <ul style="list-style-type: none"> The review found that integrated Computerized Tomography services improved technical efficiency (9) Contrary to other reviews, the review found some concerns with respect to stigma and confidentiality with integrated services(9)
Mental health and addictions (aligns with mental health and addictions as a year 1 priority population)	<ul style="list-style-type: none"> One recent high-quality review found mixed effects on clinical outcomes and extent of hospital readmission from co-locating behavioural and primary health services (10) <ul style="list-style-type: none"> However, the same review found co-location of behavioural health services was associated with higher levels of patient satisfaction (10) One older medium-quality review examined co-located psychiatrists and primary-care providers and found no evidence with respect to medical or psychiatric symptoms. However, it did find evidence that length of stay, readmissions, and rates of long-term care may be reduced by vertically integrated models (13) Two recent high-quality reviews examined co-location of primary care, mental health and addictions services, and infectious-disease services (HIV testing and treatment) and was found to remove logistic barriers and reduce concerns about confidentiality and stigma when seeking care (8; 14) <ul style="list-style-type: none"> One review reported improvements in social functioning, patient engagement in care, and improvements in physical HIV-related symptom (8)
Conditions that would lead an individual to benefit from a palliative approach to care (aligns with those who could benefit from a palliative approach to care as a year 1 priority population)	<ul style="list-style-type: none"> One older high-quality review examined the vertical integration of palliative care and emergency-department services and found mixed evidence about its effectiveness compared to traditional referrals (11)
Hubs for populations defined by other characteristics	
Maternal health and family-planning services	<ul style="list-style-type: none"> One older high-quality review examined the integration of maternal health, neonatal care, family planning, nutrition and HIV/AIDS services and found that these models showed promise towards improving care (17) <ul style="list-style-type: none"> The review reported increased uptake of anti-retroviral therapy among eligible pregnant women as well as an increase in family-planning use, however one study included in the review found that the integrated-services model led to higher staff workload than compared to separate service delivery (17)
Northern communities	<ul style="list-style-type: none"> An evaluation of Rural Health Hubs in Ontario has found an improvement in the majority of outcomes related to process-related indicators, including strengthened relationships and trust between providers and enhanced understanding of the community that hubs were meant to serve, however few, if any, changes were made to health outcomes.
Older adults (aligns with older adults and/or people	<ul style="list-style-type: none"> One recent high-quality review found co-location of primary care and geriatricians resulted in an increase in the frequency of visits (10)

with chronic conditions as a year 1 priority population)	
Refugee and new immigrants	<ul style="list-style-type: none"> • An independent program evaluation found that hubs were reaching the intended families and were highly responsive to their needs (12) <ul style="list-style-type: none"> ○ The evaluation found that immigrant and refugee families are more confident about being involved with their community and schools, including greater cultural and linguistic diversity among school parent councils (12)
Worksite integrated primary care clinics (U.S. based)	<ul style="list-style-type: none"> • One older low-quality review found that the introduction of worksite clinics, which provide access to primary-care providers, allied health workers and on-site pharmacies, were associated with a reduction in healthcare costs, worker’s compensation, employee turnover and absenteeism (16)

Question 3: How have health hubs been configured for use in health systems?

To complement the findings from the literature, we undertook a jurisdictional scan on health hubs to examine how these have been used in health systems. In general, we found that there are many examples of local initiatives that have grown from the “ground up”. Some of the examples such as the Rural Hubs or Youth Wellness Hubs in Ontario are part of broader provincial initiatives that, while similar in structure, take on unique characteristics based on the local population and geography they aim to serve. The hubs differed in the types and number of services they provide, as well as whether they were based in the health or social system. For example, in Ontario, rural health hubs were an initiative of the Ministry of Health whereas the community hubs were an initiative from the then Ministry of Community and Social Services. The commonality that all hubs had was the desire to reduce fragmentation and improve the care received by the priority population. The intent of Table 2 below is to provide insights into the diversity of models and approaches to hubs that can exist. However, very few evaluations of the hubs model were found to be in the public domain, limiting the extent to which we could determine whether the objectives of the model were met. Findings included in Table 2 are organized into three sub-sections from Ontario (local to regional implementation) to other provinces and finally to other countries.

Table 2: Jurisdictional scan of health hubs

Model (jurisdiction)	Level of implementation	Condition or population	Sectors involved	Goal of the hub model
Ontario				
Gay Men’s Health Hub (Ontario) (19)	Local	Men who have sex with men	<ul style="list-style-type: none"> • Primary care • Sexual and reproductive health • Mental health and addictions 	To create a model of comprehensive non-judgmental care providing integrated services to meet the physical, mental and emotional health needs of gay men
Integrated Health Hub (Ontario) (20)	Local	Mental health and addictions	<ul style="list-style-type: none"> • Primary care • Mental health and addictions 	To create a comprehensive whole-health approach which uses community outreach, primary-care services, case management, supportive housing, specialized psychiatric care, and community wellness services to meet the needs of the Durham region

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Le Centre de Sante Communautaire du Grand Sudbury (Ontario) (21)	Local	Francophone population	<ul style="list-style-type: none"> • Education • Employment • Health (primary care; dietitian; sexual and reproductive health services) • Recreational services • Social work • Services for LGBTQ+ 	To develop community-centred healthcare services to meet the needs and expectations of the francophone community in Sudbury
Rural Health Hubs (Ontario) (6)	Regional	Rural and northern populations	<ul style="list-style-type: none"> • Home and community care • Primary care • Acute care • Mental health and addictions • Public health • Social workers • Municipal recreation • Education 	To enable local health and social-service providers to collaboratively meet their communities' needs using a flexible model based on local need rather than provincial rules
Youth Wellness Hubs (Ontario) (18)	Regional	Youth with access challenges to mental health and addictions services	<ul style="list-style-type: none"> • Primary care • Mental health and addictions • Education • Employment services • Housing services 	To address gaps in the system related to mental health and addictions services, primary care, and other community and social services as a one-stop-shop model
Other provinces				
Continuing Care Hubs (British Columbia) (24)	Regional (proposed – not yet implemented)	Older adults	<ul style="list-style-type: none"> • Home and community care • Primary care • Rehabilitation • Public health • Mental health and addictions 	To address health issues for seniors in the most appropriate settings using a network of individual care homes sharing services, specializing in care or providing services for a geographic area
Complex care hub (Alberta) (22)	Local	Older frail adults	<ul style="list-style-type: none"> • Home and community care • Primary care • Acute care • Emergency services (paramedicine) • Recreational services 	To create a bridge between acute care sites and the community by creating a virtual inpatient unit that allows patients to receive the same kind of care and treatment that they would in a hospital, but in their own home, connecting patients with services outside the hospital. and supporting a safe transition back to the community

Comprehensive Home Options of Integrated Care for the Elderly (Alberta) (23)	Local	Older adults with complexity	<ul style="list-style-type: none"> • Home and community care • Primary care • Acute care • Emergency services (paramedicine) 	To provide services for older adults who have complex health issues but remain at home, by personalizing supports such as medication administration and meal assistance with primary care and psychological supports
Other countries				
Community Hubs Model (Australia) (12)	National	Immigrant and refugees	<ul style="list-style-type: none"> • Maternal health services • Immigration • Employment • Language and literacy • Childcare • Allied healthcare 	To improve social inclusion and social cohesion of migrant families through place-based integration of national, state and local immigration services alongside community organizations that provide allied healthcare, maternal and child health nurse-visits, employment supports, language and literacy training, childcare and children's programming
NHS health and social care hubs (U.K.) (25)	National (but designed and implemented locally)	Geographically-based communities	<ul style="list-style-type: none"> • Primary care • Housing services • Voluntary sector 	To decrease fragmented care and relieve pressure being placed on primary-care providers by addressing some of the underlying determinants of health, including housing

Question 4: What barriers or facilitators were identified for the implementation of health hubs?

The 12 systematic reviews and two program evaluations reported significant findings related to barriers and facilitators for the implementation of a hubs model. Barriers related to different components of the intervention, with chief amongst these related to partnerships amongst service providers and organizations, resourcing the initiative, and adopting new processes of care. One medium-quality systematic review identified challenges shifting to different methods of communicating between providers that were different than those that professionals had previously been used to.(28) The same review also mentioned the high turnover rate of professionals in the hub was a barrier to establishing trust and consistent processes.(28) Resourcing the initiative was frequently mentioned both in terms of money made available to hubs as well as difficulty finding a physical space that would meet the needs of the community. A particular resourcing concern in one systematic review was the provision of information technology for the hub that would allow for the exchange of records and information between partners.(8; 28) Finally, one program evaluation mentioned the significant learning curve was that needed to understand the complexities of the population, many of which were beyond the initial expertise of those implementing the program (e.g., understanding details of the immigration system).(12)

With respect to facilitators, the first key theme is the importance of buy-in and engagement amongst all providers.(28) Elements that supported this buy-in include discussions to clarify the principles behind the hub, championing of the initiative by select providers, and making the benefits of the approach visible to participating providers.(28) Ensuring the right patients receive the intervention and having flexibility to adapt interventions to patient needs were also seen as facilitating implementation.(29) Clear direction and supports for the initiative from management was further perceived to enable success.(29)

In addition to observing and reporting on what works, it is necessary to also understand how and why a given health-hub intervention is intended to work. To address this, we undertook a supplementary piece of work and developed a logic model for hubs that can be adapted by OHTs implementing this approach. Logic models are useful visual tools that present the justification behind a given program or model of care.(26) They are diagrams which convey relationships between contextual factors, inputs, processes, program activities and intended outcomes of an initiative. Their development benefits not only those developing the program as a guide, but also helps to build a common understanding of expectations for resources, consumers reached and results, as well as supporting critical evaluation and identification of goal attainment.(27) Based on the 12 systematic reviews and two program evaluations that informed the previous three questions, we have constructed a template logic model for OHT-led hubs (figure 1). However, given the heterogeneity of findings across the literature, we were unable to definitively state the connection between particular inputs, activities and outcomes. What is featured is our best hypothesis of the relationship between inputs, activities and outcomes, as well as the role of enablers that support the hubs model to be successful.

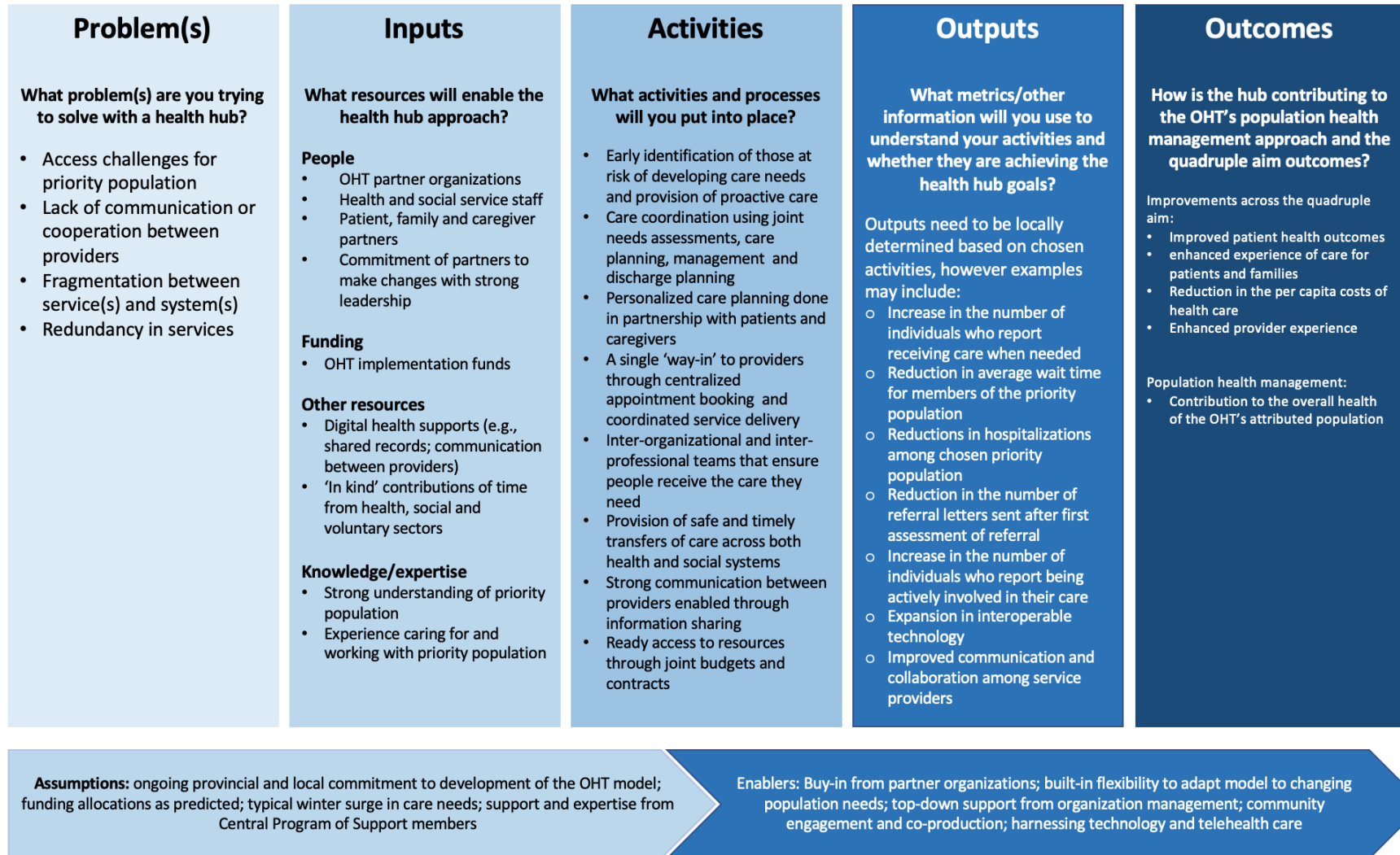
As mentioned, the specifics of this logic model will need to be tailored to the local context, partners and activities proposed in the reform, but this template can provide a first step towards the implementation of a new model.

Supplementary insights

Despite the heterogeneity in the literature and the challenges encountered using it to construct a logic model, it does appear that health hubs or vertically integrated models of care have the potential to improve the care being delivered to patients, notably for specific population groups such as OHTs' year 1 priority populations. To use the information provided in this brief, OHTs may wish to consider:

- 1) co-constructing a logic model (based either on the template below or using the Health System Performance Network's [OHT logic model development guide](#)) with partners, including patient, families and caregivers;
- 2) determining a set of a meaningful indicators that can be monitored throughout the implementation process;
- 3) prioritizing changes to care that can be considered 'quick wins';
- 4) using a rapid-learning approach to monitor these changes and assess whether this has 'moved the needle' on quadruple-aim metrics before moving on to more complex changes; and
- 5) layering on additional activities from the logic model, and continuing to monitor and make incremental adjustments towards the desired outcomes.

Figure 1. Logic model template for OHT-led hubs



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APPENDICES

The following tables provide detailed information about the systematic reviews and primary studies identified in the rapid synthesis. The ensuing information was extracted from systematic reviews - the focus of the review, key findings, last year the literature was searched, and the proportion of studies conducted in Canada.

For the appendix table providing details about the systematic reviews, the fourth column presents a rating of the overall quality of each review. The quality of each review has been assessed using AMSTAR (A MeaSurement Tool to Assess Reviews), which rates overall quality on a scale of 0 to 11, where 11/11 represents a review of the highest quality. It is important to note that the AMSTAR tool was developed to assess reviews focused on clinical interventions, so not all criteria apply to systematic reviews pertaining to delivery, financial or governance arrangements within health systems. Where the denominator is not 11, an aspect of the tool was considered not relevant by the raters. In comparing ratings, it is therefore important to keep both parts of the score (i.e., the numerator and denominator) in mind. For example, a review that scores 8/8 is generally of comparable quality to a review scoring 11/11; both ratings are considered “high scores.” A high score signals that readers of the review can have a high level of confidence in its findings. A low score, on the other hand, does not mean that the review should be discarded, merely that less confidence can be placed in its findings and that the review needs to be examined closely to identify its limitations. (Lewin S, Oxman AD, Lavis JN, Fretheim A. SUPPORT Tools for evidence-informed health Policymaking (STP): 8. Deciding how much confidence to place in a systematic review. *Health Research Policy and Systems* 2009; 7 (Suppl1):S8).

All of the information provided in the appendix tables was taken into account by the authors in describing the findings in the rapid synthesis.

Appendix 1: Summary of findings from systematic reviews about the role of health hubs in achieving the quadruple aim

Type of review	Focus of systematic review	Key findings	Year of last search/ publication date	AMSTAR (quality) rating	Proportion of studies that were conducted in Canada
Systematic review of effects	To review the evidence on co-locating speciality services in primary-care settings (10)	<p>This review included 22 studies, most of which came from the United States. Most of the co-located specialty services focused on behavioural care; others included diabetes care, cardiology, geriatrics, nephrology, and infectious-disease care.</p> <p>Four studies evaluated the impact of co-located speciality care on patient satisfaction. Meta-analysis of these studies found co-location to be associated with higher levels of patient satisfaction. All four of these studies involved behaviour healthcare.</p> <p>Two studies found co-located specialty services to be associated with higher levels of provider satisfaction.</p> <p>With respect to healthcare access and utilization, five studies examined the number of outpatient primary-care and specialty visits. Meta-analysis of these studies showed an increased frequency of primary-care and speciality outpatient visits for co-location specialty care. The included services included behavioural health, infectious disease and geriatric care. However, the study on geriatric care showed a significant increase in frequency of visits, while the study on infectious disease HIV care showed no significant effect.</p> <p>Five studies found no significant impact of co-located speciality care on the frequency of specialty outpatient visits.</p> <p>Three studies examined the impact on appointment wait times. All three studies (and meta-analysis) showed co-located specialty care to be associated with a significant reduction in wait times.</p>	2015	8/11 (AMSTAR rating from McMaster Health Forum)	1/22

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		<p>One study found that co-located behavioural healthcare was associated with a lower referral rate to specialty mental health care. However, three studies (of nephrology, geriatrics and behavioural healthcare) showed co-located specialty care had no significant impact on hospital admission rates.</p> <p>Thirteen studies reported on clinical outcomes. The outcomes were heterogenous and results mixed. For example, co-located behavioural healthcare was found to be associated with higher quality of life in three studies, but had no impact on depression severity in five pooled studies. Furthermore, studies reporting on outcomes of physical and social functioning found no effect. For diabetes care, co-location was found to be associated with reduced blood pressure and total cholesterol, but had no effect on hemoglobin A1C or triglyceride levels.</p> <p>Three studies examining costs found co-location specialty care to be associated with lower costs for patients and per-member per-month for a health management organization.</p> <p>This review is limited by the fact that most studies come from the United States and the high risk of bias and heterogeneity in the included studies.</p>			
<p>Systematic review addressing other questions</p>	<p>To review qualitative evidence regarding implementing collaborative care or anxiety and depression care (28)</p>	<p>This review included 17 studies, mostly from the United States. All but one of the included studies examined interventions focused on depression (either exclusively or in combination with other mental or physical healthcare needs). Interviews were a predominant form of data collection.</p> <p>This review was framed around the normalization process theory which has four theoretical dimensions that reflect implementation processes: coherence, cognitive participation, collective action, and reflexive monitoring.</p> <p>With respect to coherence (which reflects how actors view an intervention), many studies reported a lack of clear understanding of the collaborative-care model among providers, even though they were taking part in it. Noted facilitators included education to clarify principle, and tools</p>	<p>2015</p>	<p>6/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>1/17</p>

		<p>and clear allocations of responsibility between primary and secondary care.</p> <p>With respect to cognitive participation (which reflects how people participate in implementation), buy-in and engagement amongst providers was an important theme. Time pressures, competing priorities, not seeing the value added of the intervention, and issues with reimbursement were noted as barriers. Facilitators to engagement included being able to see the benefits for patients and the championing of the intervention by opinion leaders. Furthermore, ensuring costs did not become a problem for primary-care providers was seen as a facilitator.</p> <p>With respect to collective action (which reflects how people’s abilities and the resources at their disposal influence the implementation of interventions in normal practice) co-locating a care manager and primary-care physicians was noted as an enabler to implementing collaborative care in numerous studies, due to facilitated formal and informal interactions. Similarly, regular communication and interactions were cited as enablers as well. A lack of space for co-location and high turnover rates of professionals were cited as barriers. A lack of integration and access to information technology systems was further highlighted as barriers. Finally, time constraints were cited as a barrier in some studies, but some studies demonstrated conditions where collaborative care was not a time burden (such as when there is experience working in interprofessional environments and the ability for collaborative care to reduce workloads).</p> <p>With respect to reflexive monitoring (which reflects formal and informal assessments of interventions), assessments that patients were benefitting from collaborative care helped improve provider motivation and reduce reservations. Furthermore, providers appreciated systematic, objective monitoring and feedback on patients’ conditions to be able to justify continuing with the collaborative-care model.</p>			
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<p>Systematic review addressing other questions</p>	<p>To review patient and professional perspectives on integrated care for older people with fragility (29)</p>	<p>This review included a total of 18 studies that describe patient, caregiver and health professionals’ perspectives on integrated care for older people with fragility, and the barriers and facilitators to implementing integrated care.</p> <p>With respect to people’s perspectives on integrated care, the coordination/continuity of care was highlighted by patients and providers in numerous studies, particularly the important role that case managers and/or care coordinators can play. This role was cited as being important in managing transitions from hospital to community, ensuring personalized care, providing information, helping patients navigate systems, and ensuring health and social-care needs are met. However, failings in achieving integrated and continuous care were also noted to arise when there is insufficient/inconsistent carer involvement during transitions, staffing issues, and poor design of integrated services.</p> <p>Several stakeholders were also noted to express their support for multidisciplinary teams and their ability to reduce primary-care practitioner workloads and better serve patients’ health and social-care needs.</p> <p>Several studies report patients and service users experience improved outcomes and more involvement in their care as a result of integrated care. A greater sense of receiving coordinated and personalized care was also reported.</p> <p>Providers reported that integrated care can improve multidisciplinary collaboration, follow-up, patient navigation of systems, and the provision of holistic care.</p> <p>With respect to barriers and facilitators to integrated care, providers noted that a lack of clarity regarding interventions and the complexity of interventions can act as barriers to implementing integrated care. Conversely, ensuring the right patients receive the intervention, delivering vertically integrated healthcare, and having flexibility to adapt interventions to patient needs were seen as facilitators.</p>	<p>2017</p>	<p>6/9 (AMSTAR rating from McMaster Health Forum)</p>	<p>5/18</p>
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		<p>Several organizational factors were also noted as barriers and facilitators. Lack of effective communication (which can sometimes lead to unnecessary repeated assessments) and a lack of understanding regarding roles were noted as barriers. Strategies to improve interprofessional collaboration (especially among professionals working in different settings) were seen as facilitators to integrated care. Furthermore, strong commitment to integrated care from higher levels or healthcare management was seen as an important directive and facilitator. Finally, the relationship between primary-care providers and case managers was noted as a potentially important determinant of success.</p> <p>At the system level, information technology access, and the ability to share information in multidisciplinary teams, were noted as facilitators to integrated care. Furthermore, remuneration mechanisms were noted to restrict integrated care if they are inflexible and force providers to use standard packages of care.</p>			
Systematic review of effects	To review evidence on the components and effectiveness of integrated HIV and mental health care (8)	<p>This review included 45 studies, mostly from high-income countries. Twenty of the included studies examined models of single-facility integration.</p> <p>Single-facility integration (or ‘one-stop shopping’) was described in various ways including: solely HIV and mental health care integration; larger integration of primary healthcare; integrated mental health, substance use and HIV care; and integration in a residential facility. Integration of care was carried out through case conferences of multidisciplinary teams, shared notes and communication, an internal referral team, and joint consultations. Most often, single-facility integration took place in primary-care clinics or HIV clinics. In three studies, integration was centred around a specific treatment program such as cognitive-behavioural therapy or contingency management.</p> <p>Providers noted that single-facility integration can improve communication and coordination among providers, ensuring that patients’ various needs are considered and appropriate treatment plans are developed.</p>	2015	8/10 (AMSTAR rating from McMaster Health Forum)	1/45

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		<p>Patients noted that single-facility integration can reduce logistical barriers to continuous care and improve confidentiality/stigma associated with attending HIV or mental health clinics.</p> <p>With respect to barriers, one study noted that in rural areas and areas with fewer resources adequate integration of services may not be feasible. Furthermore, if patients' needs are complex, it may not be practical or cost-effective to manage all their needs in one central location.</p> <p>Nine studies of single-facility integration measured some form of patient outcome. In general, these studies reported improvements in outcomes such as social functioning, patient engagement in care, and HIV-related physical symptoms. However, these studies were noted to suffer from a high risk of bias.</p>			
Systematic review addressing other questions	To review the evidence regarding the role of hospitals in coordinating care for patients with chronic illnesses (15)	<p>This review included 32 studies focused on the role of hospitals in transitional care and the coordination of care.</p> <p>Three of the included studies examined a heart-failure clinic. These clinics combine multiple specialties, hospital discharge planning, and continuing follow-up care. These clinics were found to improve many outcomes, such as hospital readmission rates, mortality rates, and costs of care.</p> <p>Furthermore, numerous studies of integrated care programs that focus on the role of the hospital (but take on many different forms) show that these programs generally improve clinical and resource-use outcomes. However, difficulties in implementing these programs was noted – particularly the challenge associated with managing transitions of care.</p> <p>The challenge of managing transitions was approached in several ways in the included studies, including the use of care managers and patient care teams. These efforts demonstrated the importance of process-oriented teams that can break boundaries between departments and health professionals.</p>	2016	7/10 (AMSTAR rating from McMaster Health Forum)	2/32
Systematic review	Examining the integration of HIV and substance use services (8; 14)	A systematic review of 51 studies examined the service integration of services for substance use and HIV. The	2015	6/10 (AMSTAR	2/51

<p>addressing other questions</p>		<p>included studies explored various approaches to integrated HIV and substance-use services based on patient entry points and patient perspectives.</p> <p>The extent of integration varied from micro (integrated care delivered to individuals) to macro (system-level integrations), and degree of integration from least (screening and counselling only) to most (care for HIV, substance use and/or other illnesses at the same facility). It was found that greater integration offered greater benefits in both patient and service outcomes. As listed in increasing order of integration, three integration model types were found: Type 1 integration: facilities combining screening and counselling without further shared service provision; Type 2 integration: incorporates some treatment aspect in substance-use facilities or substance-use treatment in HIV facilities; and Type 3 intergration: combines substance use and HIV treatment with other healthcare provision or social services.</p> <p>The review identified innovative approaches for people-centred integration models including implementation in mobile, community and residential settings.</p> <p>Each model offered its own advantages and disadvantages. Across all models, there was potential to increase HIV and substance-use detection and treatment adherences, structure, accountability and support. Facilitated communication across providers were also found. There was some evidence that when managing HIV and substance use together, acute episodes were reduced, and thus reduced costs for patients. In addition, studies describing integration models reported positive patient perceptions whereas studies examining systems without integrated services identified family-, social- and system-level barriers to care.</p> <p>Some studies identified barriers to integration. Implementation barriers included higher costs, appropriate financing, workforce training, and challenges in combining differing clinical practices. There was some evidence that staff were hesitant to perform HIV testing and</p>		<p>rating from McMaster Health Forum)</p>	
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		<p>communicating positive tests to patients. It was found that integration required strong referral links to primary care and mental health and social services.</p> <p>Overall, the review found benefits for delivering integrated treatments for HIV and substance use at all facility types, including ease of referral to other mental health and social services. However, the high risk of bias identified in the majority of studies calls for a need for further research to be conducted.</p>			
Systematic review addressing other questions	Examining the evaluation of implementing integrated mental health care (30)	<p>A systematic review of 148 studies examined the implementation of integrated mental health-care models in primary-care settings to guide the development of quality measures.</p> <p>It was found that a strong emphasis on clinical effectiveness and client centredness were found for the evaluation of the implementation of integrated care programs. No measures of patient safety and few measures of equitability or accessibility, or timeliness of care, were found. Several measures reflected the provider experience and culture of healthcare delivery.</p> <p>The review proposed a visualization and database to help inform researchers of theory development regarding integrated care. Measures were categorized by structure, process and outcome. Key components of implementation for integrated-care functioning included scaling up and sustainability in real-world settings. It was found that the components of communication, collaboration and coordination, in addition to local contextual factors, that were crucial to integration were often under-recognized and under-reported. The review cautions against focusing on the domains of effectiveness and efficiency at the expense of other domains.</p> <p>It was found that consultation with experts and key stakeholders, and the exploration of client perspectives were critical. The review recommends incorporating domains of quality that are presently unaddressed: microprocesses of care that influence effectiveness; sustainability and</p>	2014	8/9 (AMSTAR rating from McMaster Health Forum)	25/148

Examining Health Hubs and their Potential to Inform Ontario Health Teams

		transferability of models of care; and client and healthcare-provider perspectives.			
Systematic review of effects	Examining the effectiveness of emergency department-based palliative care for adults with advanced disease (11)	<p>A systematic review of five studies examined the effectiveness of emergency department-based palliative care for adults with advanced disease. Three case series and two cohort studies were included.</p> <p>The review examined interventions including a screening tool, traditional emergency-department palliative care, and integrated emergency-department palliative care. In one study, there was no statistically significant difference in 90-day readmission rates between the time integrated palliative care was initiated (at the emergency department versus after hospital admission). One study found a high admission rate in patients who initiated palliative care after admission, but lacked the inclusion of a comparison group. One study identified a reduction in length-of-stay in the emergency department-initiated palliative care compared to postadmission. Conflicting findings were identified regarding survival.</p> <p>Overall, the review found little evidence that emergency department-based palliative care affected patient outcomes.</p>	2014	9/10 (AMSTAR rating from McMaster Health Forum)	0/5
Systematic review addressing other questions	Examining worksite primary-care clinics (16)	<p>The systematic review examined comprehensive health-delivery platforms, such as integrated worksite primary-care clinics, for their potential to cost-effectively address pressing health issues in the U.S. (e.g., growing primary-care physician shortages, poor access to routine care, lack of coordinated treatment models, etc).</p> <p>The worksite-clinic paradigm was characterized with broad office hours, low wait time, long appointment time, personalized and skilled nursing care, and on-site pharmacy. The paradigm is a relatively new development. The review found that the use of primary-care models is able to influence broader practice with a broader occupational emphasis that can have substantial clinical benefits and cost savings. The recent expansion of worksite clinics has been associated with reported benefits including: reductions in both direct and indirect healthcare costs, with reductions in</p>	2013	3/9 (AMSTAR rating from McMaster Health Forum)	Not reported

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		<p>workers' compensation, disability, and life insurance claims; employee turnover; absenteeism; and presenteeism. However, the peer-reviewed cost-benefit evidence supporting this claim remains limited. Some studies have reported financial returns ranging from 10% to 30% savings off total healthcare expenditures, an estimated \$7-to\$20 billion in savings.</p> <p>The review found that the worksite primary-care clinic is a platform with potential to directly offset the growing U.S. primary-care physician shortage, lack of patient-centred care and current technology-heavy treatment models. Generally, the consensus is that worksite clinics may provide a comprehensive patient-centred 'medical home' that is able to provide accessible team-based, prevention-focused primary care. It is proposed that the model can reduce socio-economic health inequalities and offset physician shortages in the community.</p>			
Systematic review of effects	Examining integrated models of care for medical inpatients with psychiatric disorders (13)	<p>A systematic review of four studies examined integrated models of care for medical inpatients with psychiatric disorders.</p> <p>The review found limited literature. The review defined integrated models of care as ones where psychiatrists and general medical physicians are jointly responsible for care and integrated within a single health team to provide care to an inpatient population.</p> <p>Overall, the studies found that integrated models of care were associated with improvements in psychiatric symptoms when compared to usual care. The effect on medical symptoms were not clear. There was some evidence that length of stay, readmissions, and rates of long-term care may be reduced by integrated models.</p> <p>The most common model of care recognized was the psychiatric consultation or consultation-liaison model. The former involves a referral by the general medical service while the latter involves a more proactive psychiatric service in the identification of patients with psychiatric morbidity within a general medical setting. In comparison with usual</p>	2012	7/10 (AMSTAR rating from McMaster Health Forum)	0/4

		<p>general care, consultation-liaison models were associated with an increase in accurate diagnoses, reduction in mortality and reductions in length of stay and health service utilization. Barriers to such a model included limited remuneration for the services, and that general medical physicians may be less amenable to providing psychiatric care.</p> <p>The review found preliminary evidence that integrated models of care may improve outcomes for medical inpatients with psychiatric disorders, including reductions in length of stay and improvement in functional outcomes.</p>			
Systematic review of effects	Examining the integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family-planning services (17)	<p>A systematic review of 20 studies examined the integration of HIV/AIDS services with maternal, neonatal and child health, nutrition, and family-planning services. Nineteen interventions met inclusion criteria.</p> <p>The observational studies in the review reported that integrated HIV/AIDS services were feasible and showed promise towards improving health and behavioural outcomes. This was true across a variety of integration models, settings and target populations. All of the studies that measured change in health behaviour found an increase in contraceptive use and other measured health behaviours pertaining to HIV/AIDS. Only three studies measured actual changes in health status, but all health outcomes for women and children improved with integrated services.</p> <p>Five studies reported uptake and coverage of health services. Generally, improvements were found with integrated service models. Two studies reported that integrated services consistently increased the uptake of anti-retroviral therapy among eligible pregnant women. Four studies reported an overall increase in family-planning use (both condom and non-condom methods) when HIV care was integrated with family-planning services. Only one negative outcome was identified. One study found that integrated services could lead to higher staff workload than compared to non-integrated services.</p>	2010	10/10 (AMSTAR rating from McMaster Health Forum)	0/20

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		<p>The success of an integrated program was dependent on factors including stakeholder and staff support, support of the local community, adequate investment in staff training and supervision, and addition of simple and inexpensive interventions. Additional factors include onsite provision of family planning, flexibility of clinic in rescheduling appointments, male partner involvement, rapport between health providers and clients, and integrated electronic patient record systems.</p> <p>Factors inhibiting the success of an integrated program include additional referral waiting times, user-cost fees, lack of knowledge, staff turnover, and cost and logistics of commodity procurement and supply.</p> <p>A number of interventions were not included nor studied, including the integration of HIV services with infant and child-health services, nutrition services, post-abortion services, and postnatal/postpartum services. In addition, the lack of individual randomized controlled trials included in the review suggest further research is needed.</p>			
Systematic review of effects	Examining the costs and efficiency of integrating HIV/AIDS services with other health services (9)	<p>A systematic review of 46 studies examined the costs and efficiency of integrating HIV/AIDS services with other health services.</p> <p>A range of integrated HIV services, including HIV services integrated into sexual and reproductive health services, integrated tuberculosis/HIV services, and HIV services integrated into primary healthcare, were found to be cost-effective compared with 'do nothing' alternatives. Specifically, the review assessed offering HIV counselling and testing in antenatal care services as part of the provision of prevention of mother-to-child transmission of HIV, providing tuberculosis services to HIV-positive clients and HIV services to those with tuberculosis, and making family-planning services available to HIV-positive clients.</p> <p>The integration of both counselling and treatment and HIV care into general health services was found to be feasible. Additionally, it was found that integrated CT services</p>	Not reported	9/10 (AMSTAR rating from McMaster Health Forum)	0/46

		<p>improved technical efficiency. Countries that integrated family planning into services for HIV care have overall found it economically beneficial. The review found that integrated services often were lower in cost compared to that of stand-alone counselling and testing provision.</p> <p>No studies compared the relative efficiency of different models of delivery (e.g., one-stop versus structured referrals). No studies examined whether integrated services would reduce the unit costs of services. None of the studies found used traditional econometric methods to estimate economies of scale or scope.</p> <p>There were noted concerns regarding stigma and confidentiality with integrated services. Little evidence was established regarding the most efficient model. Limited empirical evidence supports further scale-up as most of the studies focused on models at the pilot level.</p>			
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