Evidence Brief Appendices

Planning Now for the Future of Technology-enabled Healthcare Work in Ontario

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McMaster University | HEALTH FORUM

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APPENDICES

Appendix tables 1-4 provide detailed information about the most relevant evidence syntheses identified in searches related to the four approach elements described in the evidence brief (see Box 5). Each row in the appendix tables corresponds to a particular evidence synthesis and the reviews are organized by sub-element component. In the first column of the table we list the sub-element, hyperlink to the search strategy used to find potential syntheses within the sub-element, and the total count of syntheses identified for each sub-element component. In the second column, we list the hyperlinked titles of the most relevant identified syntheses, and columns 3-6 list data related to the criteria that can be used to determine 'best' for a single category (i.e., living status, quality, last year literature searched and availability of a GRADE profile, which provides insights about the strength of the evidence included in a particular synthesis). In columns 7 and 8 we provide additional details that can be helpful in determining relevance to the issue such as whether any particular equity groups are the focus of the syntheses (column 7) and the type(s) of question addressed by the synthesis (column 8).

As noted above, the fifth column presents a rating of the overall quality of the 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 evidence syntheses 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.

Appendix 1: Evidence syntheses relevant to element 1 – Defining the government's role in enabling compassionate, technology-enabled healthcare

Sub-element	Most relevant evidence syntheses to inform decision-making about the sub-elements	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by PROGRESS PLUS categories)	Type of policy question addressed
Clarifying the legal and regulatory approaches needed (Search 1, Search 2, Search 3) *Total syntheses: Three (of which two are medium quality and one is low quality)*	Effective national digital health stewardship requires attention to four areas: strategic direction, policies and procedures, roles and responsibilities, and health service delivery (29)	No	4/9	2017	No	None	• Identifying implementation considerations
	The conditions for mHealth prescribability include the adaptation of international regulation by the different states, the state provision of marketing support, and the evaluation of mHealth applications (30)	No	3/9	2021	No	None	• Identifying implementation considerations
	There is very little evidence on how macro-level policies and regulation affect access to digital technology and the innovative behaviour of private firms (31)	No	5/9	2016	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
Clarifying government's role in financing, funding and remuneration for technology-enabled healthcare, and the approach for integrating it into public and private insurance plans (Search 1) *Total syntheses: Two (of which one is medium quality and one is low quality)*	Innovations tend to increase challenges associated to human resources by affecting the nature and scope of practice, and call for accountable governance of their dissemination, use and reimbursement (22)	No	3/9	2016	No	• Place of residence	• Identifying implementation considerations
	Financial incentives by governments and other external stakeholders may facilitate adoption of eHealth (e.g., funds to cover upfront costs, financial sponsorship, reimbursements for adoption, and pay-for-performance initiatives) (32)	No	4/9	2014	No	None	• Identifying implementation considerations

Clarifying the government's role in supporting the development of technological innovations that are 'fit for purpose' (Search 1) *Total syntheses: Two (of which one is high quality and one medium quality)*	Stakeholder analyses are critical to properly organize health innovation planning processes (33)	No	5/9	2017	No	• None	• Identifying implementation considerations
	Evidence use in decision-making about introducing innovations is influenced by multi-level processes (professional, organizational, local systems) and interactions across these levels (34)	No	8/9	2016	No	• None	• Identifying implementation considerations
Clarifying the necessary investments in infrastructure and the approaches to workforce planning needed (Search 1) *Total syntheses: Three (of which two are medium quality and one is a protocol, so quality ratings are not yet possible)*	'Digital-first primary care' raises concerns among policymakers about the possible impact of new technologies on workload and workforce, inequalities, local implementation and integration with existing services (23)	No	6/9	2018	No	• Socio-economic status • Personal characteristics associated with discrimination (e.g., age, disability)	• Identifying implementation considerations
	The scientific literature focuses largely on documenting different models of workforce planning, with a focus on supplementing traditional stock-flow estimates with a demand component based on population health needs (35)	No	4/9	2019	No	• None	• Identifying implementation considerations
	This review will examine the effectiveness of human resource information systems (HRISs) to improve workforce planning (protocol) (36)	No	Not applicable to a protocol	Not applicable to a protocol	Not applicable to a protocol	• None	• Selecting an option for addressing the problem
Clarifying the assets in place, and gaps that need to be addressed, to support ongoing rapid learning and improvement (Search 1) *Total syntheses: Two (of which one is medium quality and one is low quality)*	The Nose to Tail tool can help stakeholders identify the stage of maturity of innovations, and help facilitate deliberative discussions on the key considerations for each major stakeholder group and the major contextual barriers that the innovations face (37)	No	2/9	Not available	No	• None	• Selecting an option for addressing the problem • Identifying implementation considerations
	To support the creation of rapid-learning health systems, we need to identify the assets that can be leveraged,	No	5/9	2018	No	• None	• Identifying implementation considerations

	and the gaps that can be addressed, along seven dimensions: 1) engaged patients; 2) digital capture, linkage and timely sharing of relevant data; 3) timely production of research evidence; 4) appropriate decision supports; 5) aligned governance, financial and delivery arrangements; 6) culture of rapid learning and improvement; and 7) competencies for rapid learning and improvement (38)					

Appendix 2: Evidence syntheses relevant to element 2 – Planning for a future health system where clinical encounters in all sectors and settings are less constrained by the geographical location of providers and patients

Sub-element	Most relevant evidence syntheses to inform decision-making about the sub-elements	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by PROGRESS PLUS categories)	Type of policy question addressed
Care models (e.g., 'brick and mortar' providers, digital health-only companies) (Search 1, Search 2, Search 3, Search 4) *Total syntheses: Eight (of which six are medium quality and two are low quality)*	Digital health in primary care has both potential positive and negative impacts on quality of care, but must overall strengthen its response capacity and expand the use of information and communication technologies (39)	No	5/9	2021	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	The use of telehealth services for women includes maternal healthcare, veteran needs, family planning, intimate partner violence, homelessness, pain management, and high-risk breast cancer assessment; however, further research is needed to understand the impact on provider- and system-level outcomes (40)	No	4/9	2018	No	• Gender/sex	• Selecting an option for addressing the problem
	Telehealth is useful for health promotion among rural older adults compared to face-to-face, but the review found mixed findings on savings (e.g., reduced travel) and increased costs (e.g., insurance) (28)	No	5/9	2021	No	• Place of residence	• Selecting an option for addressing the problem
	Reimbursement policies, educational services, technological infrastructure, and culturally competent care are required implementation considerations for the use of telehealth in Indigenous communities in the United States (24)	No	4/9	2015	No	• Race/ethnicity/ culture/language	• Identifying implementation considerations
	Remote-care technology can improve health outcomes, but requires further understanding of its use in clinical practice (41)	No	2/9	Not reported	No	None	• Selecting an option for addressing the problem

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Sub-element	Most relevant evidence syntheses to inform decision-making about the sub-elements	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by PROGRESS PLUS categories)	Type of policy question addressed
	Most reported non-invasive digital technologies were multicomponent interventions focusing on older adults, but require further research to determine healthcare benefits and feasibility of large-scale implementation (42)	No	4/9	2004	No	None	• Selecting an option for addressing the problem
	A digital healthcare model appears to be less costly compared to the traditional healthcare model in Sweden (43)	No	1/9	2019	No	None	• Monitoring and evaluating the impacts
	There is limited high-quality evidence to inform the NHS 'digital-first primary care' policy, but found possible impact of new technologies on workload and workforce, inequities, implementation, and integration of current services (23)	No	6/9	2018	No	None	• Selecting an option for addressing the problem
System-level arrangements • Establishing an appropriate payment model • Developing an approach for defining the payment amount • Establishing an approach for defining appropriate referral networks and for ensuring continuity of care	Digital health-enhanced referral coordination and mobile clinical decision support systems have the potential to improve the quality and continuity of care, but require standardization and expanded scope of practice for health workers (44)	No	3/9	2018	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	The authors developed guidance for the implementation of multi-level eHealth technologies based on the contextual factors that have an impact on healthcare systems (32)	No	4/9	2014	No	None	• Identifying implementation considerations
	EMRs, computerized physician order entry, ePrescribing, and computerized decision support systems have the potential to increase accuracy, completeness of information, improve turnaround times, improve adherence	No	8/10	2015	No	None	• Selecting an option for addressing the problem

Sub-element	Most relevant evidence syntheses to inform decision-making about the sub-elements	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by **PROGRESS PLUS** categories)	Type of policy question addressed
• Establishing an approach to ensuring the quality of care (Search 1, Search 2) *Total syntheses: Three (of which one is high quality, one is medium quality and one is low quality)*	to guidelines, and optimize medication use; however, the effects on health outcomes are limited (45)						

Appendix 3: Evidence syntheses relevant to element 3 – Planning for a future health system with more digitally supported care

Sub-element	Most relevant evidence syntheses to inform decision-making about the sub-elements	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by PROGRESS PLUS categories)	Type of policy question addressed
Clarifying digital-support models • Online self-monitoring, self-management, and support for patients • Clinical-decision support and clinical-prediction tools for healthcare workers • Predictive analytics for system leaders (Search 1, Search 2, Search 3) *Total syntheses: 18 (of which three are high quality, nine are medium quality, and six are low quality*	Increased efforts to provide mechanisms to host internet-delivered 'interventions that work' and to assist the public in locating these sites are necessary (46)	No	2/9	2016	No	None	• Identifying implementation considerations
	While remote patient-monitoring interventions are complex, if they are designed with patients, providers and the implementation setting in mind and incorporate the key variables identified within this review, it is more likely that they will be effective at reducing acute hospital events (47)	No	3/9	2020	No	None	• Identifying implementation considerations
	This review examines policy-relevant studies about target demographics, facilitating uptake and governing mechanisms for e-mental health care in Australia (25)	No	7/9	2015	No	• Race/ethnicity/ culture/language • Gender/sex • Socio-economic status	• Selecting an option for addressing the problem • Identifying implementation considerations
	Web-based tools for text-based patient-provider communication are most often used to facilitate self-management, and have potential to support interdisciplinary team-based care (48)	No	4/9	2016	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	A Digital Health Engagement Model can help guide patient- and public-engagement strategies that are necessary considerations to ensure enrolment in digital-health interventions (26)	No	6/9	2015	No	• Race/ethnicity/ culture/language • Gender/sex • Socio-economic status	• Identifying implementation considerations

	Telecare innovations such as personal emergency-response systems must account for the complexity of practice as well as unforeseen consequences and possible improvements to user experience (49)	No	3/9	2015	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	Health status, perceived utility and value, motivation, convenience and accessibility, and usability shape engagement with remote measurement technology for managing health and should be considered when developing person-focused devices (50)	No	5/10	2017	No	• Disability	• Identifying implementation considerations
	Common problems with health information technology include user errors and poor user interfaces, clinical errors involving medications, and issues with system functionality and access, which can lead to patient harm and death (51)	No	6/10	2015	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	Literacy, interoperability, access to health information, and secure messaging should be considered to address barriers for personal health record use, but a better understanding of interactions between work systems and the role of organization and external environment is still needed (27)	No	4/10	2013	No	• Race/ethnicity/ culture/language • Gender/sex	• Identifying implementation considerations
	This review explores the benefits and challenges of sensor-based mHealth authentication for real-time remote healthcare monitoring systems (52)	No	2/9	2017	No	• Gender/sex	• Identifying implementation considerations
	Digital health interventions for service delivery, such as digital health-enhanced referral coordination and mobile clinical decision support systems, demonstrate considerable potential to improve the quality and comprehensiveness of care received by patients, but require greater standardization and engagement of health	No	3/9	2018	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations

	workers at different levels of the health system for effective scale up (44)					
	It is imperative to align healthcare capabilities with technologies to ensure the practice of person-centred digital healthcare (44)	No	4/9	2019	No	None	• Identifying implementation considerations
	Decision-support tools via mobile devices to improve quality of care in primary healthcare settings (53)	No	11/11	2020	No	None	• Selecting an option for addressing the problem
	Mobile technologies probably slightly decrease the time to deliver healthcare, as well as the number of face-to-face appointments, when compared with usual care, and probably increase the number of people receiving clinical examinations for some conditions (54)	No	10/11	2019	Yes	None	• Selecting an option for addressing the problem
	Healthcare organizations should both pay attention to the social environment of a workplace and create a positive atmosphere if they want to improve the response to digitalization (55)	No	6/10	2017	No	None	• Identifying implementation considerations
	Speech-to-text conversion technology offers opportunities to improve the documentation process of medical records, reduce cost and time of recording information, enhance the quality of documentation, improve the quality of services provided to patients, and support healthcare providers in legal matters (56)	No	3/9	2014	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	This review provides recommendations for developers of guideline-based clinical-design support systems (57)	No	6/9	2015	No	None	• Identifying implementation considerations

		No	9/10	2015	No	None	
	Multifaceted information and communication technology interventions demonstrated significant improvements in beliefs about capabilities, perceived usefulness, and intention to use clinical practice guidelines, but variable findings for improvements in skills (58)	No	9/10	2015	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
System-level arrangements • Clarifying the roles of, and accountability attributed to, private companies who provide required technology services • Ensuring equitable access to the technologies • Investing in the required information and communication technology infrastructure that enables healthcare workers to make use of clinical decision-support and clinical-prediction tools (Search 1, Search 2) *Total syntheses: Four (of which two are low quality, one is medium quality and one is high quality)*	E-health technologies in hospital settings appear to improve efficiency and appropriateness of care, prescribing safety and disease control (45)	No	8/10	2015	Yes	None	• Selecting an option for addressing the problem
	Patient attitudes, institutional buy-in, interface optimization, information technology support, and aggressive tailored marketing are important facilitators of patient portal and personal health record adoption and usage (59)	No	3/9	2017	No	None	• Identifying implementation considerations
	eHealth technologies have the potential to positively affect clinical and financial outcomes, but hospitals and decision-makers must identify and act on drivers of successful implementation (60)	No	5/10	2015	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	Particular focus and attention should be placed on data mining capabilities, integrating the electronic health record across all aspects of care, using the electronic health record to improve quality at the point of care, and developing interoperable and usable health information technology (61)	No	2/10	N/A	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations

Appendix 4: Evidence syntheses relevant to element 4 – Engaging in HHR planning processes that align the workforce to health-system needs

Sub-element	Most relevant evidence syntheses to inform decision-making about the components	Living status	Quality (AMSTAR)	Last year literature searched	Availability of GRADE profile	Equity considerations (organized by PROGRESS PLUS categories)	Type of policy question addressed
Clarifying altered levels of demand (i.e., fewer of some types of healthcare workers, more of other types such as digital-health support workers)	None identified	N/A	N/A	N/A	N/A	N/A	N/A
System-level arrangements • Shifting from 'stock-flow' to population needs-based workforce planning models as well as new types of healthcare workers required for care delivery • Supporting self-regulation for new types of healthcare workers, and adjusting scopes of practice among others as their role in care delivery evolves (Search 1, Search 2) *Total syntheses: Two (of which one is medium quality and one is low quality)*	To strengthen the delivery of health services using digital devices to mitigate health human resource restraints, areas of focus should include enhancing digital-referral coordination and mobile clinical support systems, and ways to standardize digital care and engage health workers across the health system (44)	No	3/9	2018	No	None	• Selecting an option for addressing the problem • Identifying implementation considerations
	Health workforce planning models in Canada have shifted focus to supplement traditional stock-flow estimates with a population health needs-based component that considers variables such as epidemiology and demography of the population, level of service, and productivity (35)	No	4/9	2019	No	None	• Identifying implementation considerations