

The Australian Digital Health in Cancer Care Roadmap

A Strategic Framework for Implementation of Digital
Health in Cancer Care in Australia

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ABOUT THIS ROADMAP

STATEMENT OF PURPOSE

Digital technologies promise to overcome some of the major challenges of cancer care today, including enabling continuity of care in a complex and high-risk setting, rapid information access and analysis, and facilitation of patient's self-management. With digital technologies increasingly adopted across all aspects of cancer care, there is a need for a systematic approach to their development and application, in order to maximise benefits to individuals and society and ensure equity of access. The Australian Digital Health in Cancer Care Roadmap (the Roadmap) is intended to identify priorities for the development, implementation and use of digital health technologies in cancer care in Australia, such that health systems can respond to priority needs identified that reflect best evidence and consumer and other stakeholder input.

This Roadmap is intended to support best practice in development, adoption, and evaluation of digital technology in cancer in Australia. As such it may assist health care professionals, consumers, researchers, policy makers and technology developers in decisions relevant to cancer care. The Roadmap is not intended to be a static document, nor a fixed plan but rather serve as a prompt for engagement and across jurisdictions, craft and stakeholder groups. If you have any feedback on its content and you wish to add to the discussion please contact the Roadmap Lead Investigator – Prof Bogda Koczwara on Bogda.koczwara@flinders.edu.au

PROJECT TEAM

This Roadmap was developed by a multi-disciplinary project team consisting of the following people:

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ENDORSING ORGANISATIONS

This Roadmap has been reviewed and endorsed by the following organisations:

Australian Clinical Trials Alliance

CanTeen

Cancer Council Australia

Cancer Voices South Australia

Clinical Oncology Society of Australia

Psycho-oncology Co-operative Research Group

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EXECUTIVE SUMMARY

The Australian Digital Health in Cancer Care Roadmap presents unique considerations for implementation of digital health in cancer care as informed by a comprehensive review of the literature and stakeholder consultation. Importantly, the final ranking of the importance of priorities reported in the Roadmap was obtained through consultation with stakeholders in digital health in cancer care in the Australian context, including consumers (people with a history of cancer or cancer caregiving) and health care professionals (who are also consumers of digital health applications, including digital health records and reporting systems).

Highly ranked stakeholder priorities reflected a consumer focus, emphasising consumer involvement, needs, and benefit. This included high ranking of priorities for end users to be involved in the design process: for usability and acceptability testing, for increasing the quality and usability of digital health applications, for providing end-users easy access to existing resources and to review and accreditation outcomes, for providing a means of communication between patients and health care professionals, for personalising treatments and resources according to individual characteristics, supporting care coordination, and for ensuring research reflects consumer priorities. The Roadmap therefore indicates consumer focus and involvement is a high and continuing priority for digital health in cancer care; concordant with the National Framework for Consumer Involvement in Cancer Control, consumer involvement needs to be considered across all aspects of development, research and implementation.

Consistent with a consumer focus, safety and security considerations ranked highly, particularly in priorities for *adoption and integration* which emphasised the need to explicitly address data ownership/security, privacy/confidentiality, and potential risks of digital health applications. Data management and security issues also ranked highly in priorities for action for *design and development*. Coordination and collaboration in the development and implementation of digital health in cancer care also ranked highly, particularly in priorities for action for *governance and evaluation and research gaps*.

Stakeholders agreed with the review literature in considering evidence base as important to implementing digital health in cancer care, emphasising the need for evidence of efficacy and effectiveness, theoretical and scientific basis, and evidence-based regulatory standards for digital health applications, as being among their top priorities for action. However, an important contrast between the stakeholder-identified priorities presented in the Roadmap and conclusions identified by review literature concerns the priority given to traditional forms of research evidence. While review literature conclusions tend towards recommendations for further testing of digital health applications in large, high-quality studies, stakeholders ranked testing of digital health applications in high-quality, large-scale clinical trials among the lowest priorities for *design and development*, and use of formal implementation research design as a mid-level priority for *adoption and integration*.

Review literature identifies specific gaps in development, implementation and research on digital technology for specific user groups, including underrepresented and underserved groups. However, priorities pertaining to development and implementation of digital health according to needs of specific user groups, including user groups with greatest need (under-resourced groups), underserved groups, and groups experiencing disparities in digital access and/or cancer outcomes (including groups with limited digital and general health literacy), were ranked by stakeholders as mid- to low-level priorities. Top priorities identified in the Roadmap provide a clear framework of principles for action which highlight issues of consumer focus, safety, security, and coordination: strategic 'firsts' to underpin evidence-based development and implementation of digital health in cancer care. These priorities can then be applied to the development and implementation of digital health in cancer care in multiple populations.

READING THE AUSTRALIAN DIGITAL HEALTH IN CANCER CARE ROADMAP

The Australian Digital Health in Cancer Care Roadmap is based on stakeholder responses to the final round of a Delphi consensus process. The order of priorities for action presented here reflects stakeholders' final rankings of **relative** importance, based on the mean rank of each item within five categories:

-
1. Design and development
 2. Adoption and integration
 3. Governance and evaluation
 4. Specific digital interventions
 5. Research gaps
-

The 'Top 5' priorities for action according to stakeholder rankings in each of these categories are presented 'at a glance' on the following page. ***For a more extensive report of background, methodology and stakeholder ranking of all priorities within each category, please read further in this document.***

All items were based on priorities identified as important in consultation and/or within review literature. Several respondents commented that the ranking exercise was challenging due to the high perceived importance (and in some cases, interdependence) of all priorities.

Therefore, a lower ranking within any of the five categories ***does not indicate low absolute importance***, but simply indicates lower importance than the other, more highly ranked priorities in that category.

Along with order of priorities for action based on mean rank, the Roadmap shows the percentage of respondents who considered that each priority should be achieved within a ***short-term (up to two years)***, ***medium-term (3 to 5 years)***, or ***long-term (6 or more years)*** timeframe.

For the purposes of the Roadmap, ***consensus was defined as 70% of respondents or more*** ranking or rating the priority in the same way (e.g. ranking the priority in the 'Top 5', or assigning a priority the same timeframe).

ROADMAP AT A GLANCE

DESIGN AND DEVELOPMENT

1. End users are involved in the design process^{*^}
2. Digital technology is based on sound evidence of efficacy and effectiveness^{*}
3. Digital technology development includes usability and acceptability testing with end users^{*^}
4. Digital technology development is based on sound theoretical and scientific basis
5. Digital technology development includes plans for evaluation of efficacy and effectiveness

ADOPTION AND INTEGRATION

1. Increasing the quality of available digital health technologies in cancer care^{*^}
2. Increase the usability of existing digital technologies in cancer care^{*^}
3. Data ownership, security, and confidentiality/privacy are explicitly addressed[^]
4. Only digital technology supported by sound scientific evidence is adopted^{*}
5. Potential risks of interventions are explicitly described and addressed[^]

GOVERNANCE AND EVALUATION

1. Monitoring access, engagement and use of digital technology in cancer care, to inform future implementation^{*}
2. Establishing evidence-based regulatory standards for digital technology approaches in cancer care^{*}
3. Providing end-users easy access to review and accreditation outcomes for digital technology approaches (e.g., online database)^{*}
4. Helping users to find existing digital resources through better promotion/dissemination, or centralisation (e.g. through a central website/portal)
5. Increasing and facilitating collaboration between states, health departments, health bodies, health providers/sites, industry/business, and researchers in development, uptake and governance of digital technology

SPECIFIC DIGITAL INTERVENTIONS

1. Two-way communication between patients and health care professionals via use of digital health technology^{*^}
2. Using digital technology to customise and tailor treatment pathways and resource provision to individual characteristics^{*^}
3. Using digital technology to enable better care coordination across health professionals and health providers[^]
4. Using digital technology to improve health professional access to patient records and to resources
5. Using digital technology specifically to aid in more effective care planning[^]

RESEARCH GAPS

1. Developing a research strategy that identifies and addresses research gaps^{*^}
2. Ensuring research reflects priorities identified by consumers^{*^}
3. Coordinating and collaborating to avoid research redundancy/achieve maximum impact^{*}
4. Investing in digital health technology research at all levels from government and non-government organisations to individual health sites and consumer/patient groups^{*}
5. Conducting more research on access to and uptake of digital health technologies in cancer care

NOTES:

^a All Top 5 priorities were most commonly considered short-term priorities, except for Governance and Evaluation, Priority 4, which was most commonly considered a short-term and medium-term priority by equal numbers of respondents.

^{*} 70% or more of stakeholder respondents rated this priority within the Top 5 priorities in that category.

[^] 70% or more of respondents agreed on displayed timeframe as the most appropriate timeframe for achieving this priority



"Ask people with cancer what would best meet their needs and how can this best be structured for accuracy, ease of use and timeliness."

(Geraldine, Cancer Survivor)

BACKGROUND

WHAT IS DIGITAL HEALTH?

Digital health can be defined as: “the use of information and communications technologies to improve human health, healthcare services, and wellness for individuals and across populations” (Kostkova, 2015).

Digital health is understood to encompass multiple digital technology systems and modalities, including **mobile health or ‘mHealth’** (medicine and care delivery practice supported by mobile phone and other wireless technology use); **health information technology** (information technology applied to health and health care settings); **wearables** (clothing and accessories that integrate advanced electronic technologies); and **telehealth** (a broad spectrum of technologies and systems for remote data exchange between patient and clinician) (Digital Health and Care Institute, 2018).

The Roadmap defines digital health technologies as including:

- *Electronic education or intervention platforms (web-based or mobile-based platforms, including mobile apps)*
- *Electronic decision support*
- *Electronic medical records*
- *Wearable devices*
- *Telehealth (e.g. remote consultation)*

THE PROMISE OF DIGITAL HEALTH

Digital health approaches offer a promise of innovative, accessible, and tailored person-centred care (Wyatt & Sullivan, 2005).

Potential benefits may be achieved through:

- *Integration of data across many services*
- *Provision of electronic decision support*
- *Provision of resources and interventions*
- *Use of digital technology to monitor and facilitate positive changes in behaviour*
- *Improved communication between consumers and providers (Wyatt & Sullivan, 2005), and*
- *Empowering people to track and manage their health, thereby facilitating greater independence for consumers (Digital Health and Care Institute, 2018).*

The Australian Digital Health Agency considers benefits of digital health to include better care coordination for people with chronic and complex health conditions, and improved access to healthcare including through telehealth and online consultations (Australian Digital Health Agency, 2018b). These benefits position digital health to help **deliver safer, better quality healthcare**, and to **save and improve lives** (Australian Digital Health Agency, 2018b).

WHY A SPECIFIC FRAMEWORK FOR CANCER CARE?

DIGITAL HEALTH IN AUSTRALIA

The National Digital Health Strategy produced by the Australian Digital Health Agency promotes the vision of:

“Better health for all Australians enabled by seamless, safe, secure digital health services and technologies that provide a range of innovative, easy to use tools for both patients and providers” (Australian Digital Health Agency, 2018b).

To achieve this vision, the National Digital Health Strategy proposes seven strategic priorities to be achieved by 2022, namely:

- 1. Health information that is available wherever and whenever it is needed*
 - 2. Health information that can be exchanged securely*
 - 3. High-quality data with a commonly understood meaning that can be used with confidence*
 - 4. Better availability and access to prescriptions and medicines information*
 - 5. Digitally enabled models of care that drive improved accessibility, quality, safety and efficiency*
 - 6. A workforce confidently using digital health technologies to deliver health and care.*
 - 7. A thriving digital health industry delivering world-class innovation.*
-

The Australian Roadmap for Digital Health in Cancer Care aligns with and builds on the National Digital Health Strategy, acknowledging that strategic priorities outlined in this Strategy are an important basis for implementation of digital health in cancer care. The Roadmap outlines a cancer-specific approach, informed by cancer-specific research and stakeholder consultation, to identify and respond to priorities for digital health as it applies to cancer care.

UNIQUE ASPECTS OF CANCER CARE

Latest estimates indicate there will be 145,000 new cases of cancer diagnosed in 2019, with the risk of being diagnosed with cancer by 85 years of age estimated as 1 in 2 for both males and females (Australian Institute of Health and Welfare, 2019). The growing number of Australian *cancer survivors* (people alive who have had, or are living with, cancer) is approximately 1.2 million (Australian Institute of Health and Welfare, 2019). These figures reinforce the need for cancer prevention and control, including quality long-term care, and quality follow-up and survivorship care after acute treatment.

Cancer control presents many challenges to the health care system that are potentially overcome by digital health approaches, including

- Coordination of high-risk and complex care (Australian Digital health Agency, 2018a)*
 - Addressing survivors’ complex and long-term health care needs, which over time result in changes in providers, information, and needs (Cooley et al., 2017)*
 - Supporting self-management strategies to navigate long-term changes in care needs (Cooley et al., 2017)*
 - Promoting health behaviour modification in primary and secondary prevention approaches (Haberlin et al., 2018)*
 - Ensuring care is informed by real-life data, including monitoring of patient reported outcomes (Girgis, Durcinoska, Arnold, & Delaney, 2019)*
 - Post-cancer care that addresses chronic healthcare needs, including major chronic diseases which are more common in cancer survivors (Koczwara, 2016).*
-

Research shows that cancer patients are overburdened by the high level of information they access, and need decision support, with the majority viewing digital health approaches as one way of addressing this need (Cooley et al., 2017).

LIMITED EVIDENCE FOR QUALITY DIGITAL HEALTH IN CANCER

Despite the promising role of digital health in addressing the noted needs in cancer care, and the enthusiasm with which digital health applications are sometimes adopted, the *quality of evidence* for digital health applications in cancer care is generally poor (e.g. (Bártolo et al., 2019; Hanlon et al., 2017), and current literature frequently indicates poor evidence in *quality of applications* (e.g., (Bender, Yue, To, Deacken, & Jadad, 2013; Davis & Oakley-Girvan, 2015; Han, Lee, & Demiris, 2018; Hanlon et al., 2017; McAlpine et al., 2015; McCaughan, Parahoo, Hueter, Northouse, & Bradbury, 2017; Prochaska, Coughlin, & Lyons, 2017). Concerning findings include a lack of healthcare and medical professional involvement and lack of scientific evidence base (Collado-Borrell et al., 2016; Giunti, Giunta, Guisado-Fernandez, Bender, & Fernández-Luque, 2018; Mobasheri et al., 2014; Pandey, Hasan, Dubey, & Sarangi, 2013), lack of standardised quality measures (Giunti et al., 2018), and low to absent regulation (Böhme, von Osthoff, Frey, & Hübner, 2018; Brouard et al., 2016). Given the life-changing nature of a cancer diagnosis and the overwhelming level of information (Cooley et al., 2017) and number of applications available (e.g. (Böhme et al., 2018; Davis & Oakley-Girvan, 2015), people living with cancer or as cancer survivors can be vulnerable to non-evidence based promotion of digital health applications (e.g., non-healthcare organisations, celebrity endorsement). Not all applications have sufficient evidence of quality and safety (Collado-Borrell et al., 2016; Davis & Oakley-Girvan, 2015; Mobasheri et al., 2014), nor are available applications necessarily the best individual fit for circumstances of a given consumer (Bouma et al., 2015). Moreover, when emerging applications are of high quality, interventions and platforms are often not interoperable, complicating cross-platform communication (Mohammadzadeh, Safdari, & Rahimi, 2013). Strategic planning of appropriate, evidence-based implementation of digital health in cancer care is therefore critical.

ADDRESSING DIGITAL EXCLUSION

The greatest needs for high-quality coordinated cancer care exist for those whose outcomes in cancer tend to be poorest, including people living with socioeconomic disadvantage, living in rural and remote locations, and Aboriginal and Torres Strait Islanders peoples (Australian Institute of Health and Welfare, 2019). Digital health has been identified as one possible means of addressing disparities in cancer-related outcomes (e.g. Gonzalez, 2018). However, population groups that experience poorer cancer outcomes tend also to be at highest risk for digital exclusion due to lacking technological resources, lower digital literacy or access opportunity (Thomas et al., 2018). To mitigate this, strategic implementation of digital health in cancer care that identifies and addresses access barriers for these groups is crucial. Without such an approach, digital health in cancer care may not only fail to address the disparities in care, but may widen the existing gap by alienating, rather than assisting, communities who most need quality accessible cancer care (Latulippe, Hamel, & Giroux, 2017).

THE NEED FOR A CONSUMER-DRIVEN FRAMEWORK

While there is strong consumer advocacy in cancer in general, little is known about consumer preferences regarding use of digital health applications in cancer care. The National Framework for Consumer Involvement in Cancer Control (Cancer Australia and Cancer Voices Australia, 2011) calls for greater consumer involvement in strategic planning for all aspects of cancer care and control, particularly considering the following factors:

- 1. Engaging consumers in all aspects of cancer control (from prevention and treatment through to research, including policy development) adds a depth of complementary knowledge of the reality of the consumer experience*
- 2. Increasingly complex health care requires engagement with beneficiaries of care; moving away from 'acting upon' consumers, toward 'acting with' consumers.*
- 3. Every aspect of the cancer journey can benefit from consumer involvement, from the individual level, through service, local and organisational levels, to regional, state, national and international levels.*
- 4. There is robust evidence that consumer involvement leads to improved outcomes.*

While Australia's National Digital Health Strategy was informed by consultation with key stakeholders, including consumers, it remains imperative for a cancer-specific framework such as the Roadmap also to be informed by and reflect cancer consumer priorities. This is particularly important given the high degree of self-management that is increasingly required of people living with a history of cancer (Cooley et al., 2017).

DEVELOPING THE ROADMAP

The Australian Digital Health in Cancer Care Roadmap was developed using a Delphi consensus process, consisting of:

- a) Identification of priorities for implementation (item generation) via (i) systematic meta-review and (ii) stakeholder consultation, followed by
- b) Stakeholder consensus process, consisting of two rounds of Delphi consensus survey.

SYSTEMATIC META-REVIEW

A systematic meta-review of the international literature was conducted to identify priorities for the implementation of digital health in cancer care reported in published reviews. Database searches and screening identified 93 reviews of digital health in cancer care published January 2013-July 2018. Data were extracted on barriers, enablers, needs and opportunities for implementation of digital health in cancer care, then thematically analysed.

STAKEHOLDER CONSULTATION

Consultations were held with 51 stakeholders to identify priorities for implementation of digital health in cancer care within the Australian context. Perspectives were sought from a range of stakeholders, with an emphasis on consumers, including people with a history of cancer/cancer caregiving and individual health care professionals who might use digital health. The final pool of stakeholders included people with a history of cancer/cancer caregiving ($n=14$), health care professionals ($n=9$), research professionals ($n=6$), digital health application developers ($n=6$), non-government cancer care organisation representatives ($n=6$), and representatives working in government/policy roles in health, digital health, and quality and safety ($n=10$). Consultation involved either focus groups or interviews, and was designed to identify barriers, enablers, needs and opportunities in the implementation of digital health in cancer care in Australia. Recorded consultation data were thematically analysed.

STAKEHOLDER CONSENSUS PROCESS

By examining the barriers, enablers, needs and opportunities identified through literature review and stakeholder consultation, specific priorities for implementation of digital health in cancer care were developed across five categories:

-
1. Design and development
 2. Adoption and integration
 3. Governance and evaluation
 4. Specific digital interventions
 5. Research gaps
-

Consensus process priorities were developed using the themes identified in the literature review and stakeholder consultation, with specific action items informed by barriers, enablers, needs and opportunities. These items were reviewed by a panel including experts in cancer care and research, experts in digital health implementation, non-government cancer organisation representatives, and consumers.

Stakeholders responded to two rounds of a Delphi consensus survey in which they indicated:

- (a) **Importance of each priority** relative to other items in the same category, using a ranking process, and;
- (b) The timeframe they judged appropriate for achieving each priority, either **short-term (up to 2 years)**, **medium-term (3 to 5 years)**, or **long-term (6 years or more)**.

Consensus was defined as 70% of respondents or more ranking or rating the priority in the same manner (e.g. ranked the priority in the 'Top 5', assigned the same timeframe).

In Round 1, stakeholders were asked to indicate whether any priorities listed in the survey should be excluded from the Roadmap, and were not a priority at all. Additionally, stakeholders suggested further priorities that they considered important, that were not yet included. In total, 29 stakeholders responded to Round 1. Mean rank scores, percentage of respondents ranking within the Top 5 for each category, and percentage of respondents selecting each timeframe were calculated for each priority. No items were rated by >70% participants as not being a priority at all. Stakeholders identified 11 additional priorities across the five categories.

In Round 2, stakeholders received a summary of their individual Round 1 responses relative to group responses. As consensus was not reached on any Round 1 items being rated as 'not a priority at all', none of the original priorities were excluded in Round 2. Additional priorities suggested by stakeholders in Round 1 were included as items in the Round 2 survey. A total of 26 stakeholders indicated the final relative importance and appropriate timeframe for each priority. Mean rank scores, percentage of respondents ranking each item in the Top 5, and percentage of respondents selecting each timeframe were calculated for each priority.

ROADMAP PRIORITIES IN DETAIL

DESIGN AND DEVELOPMENT

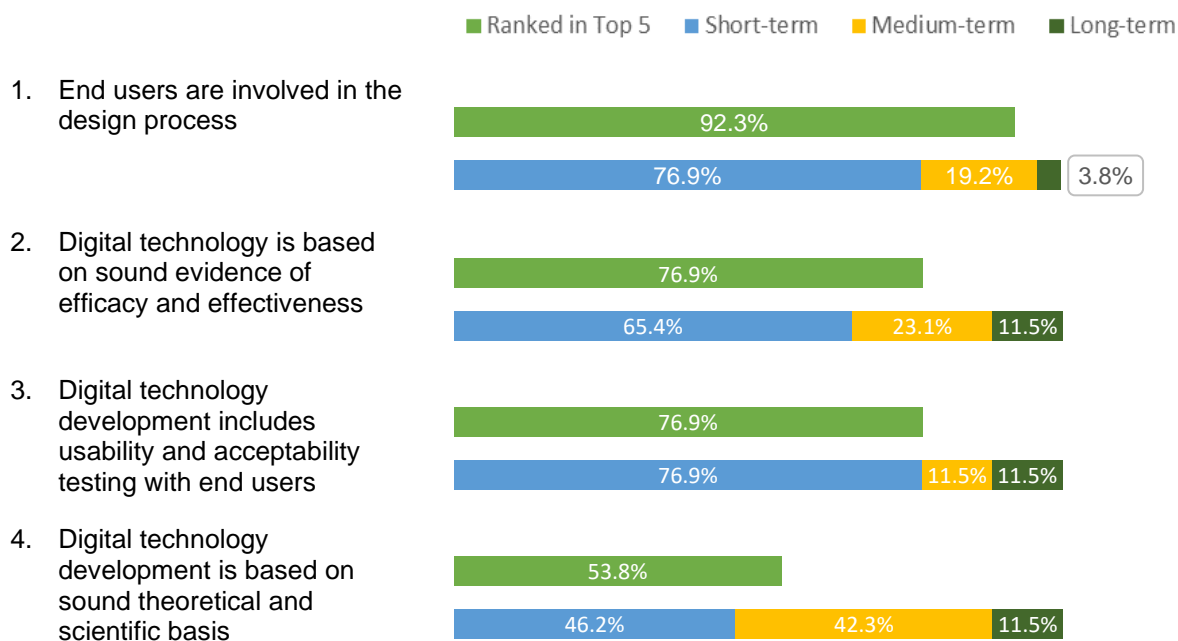
OVERVIEW

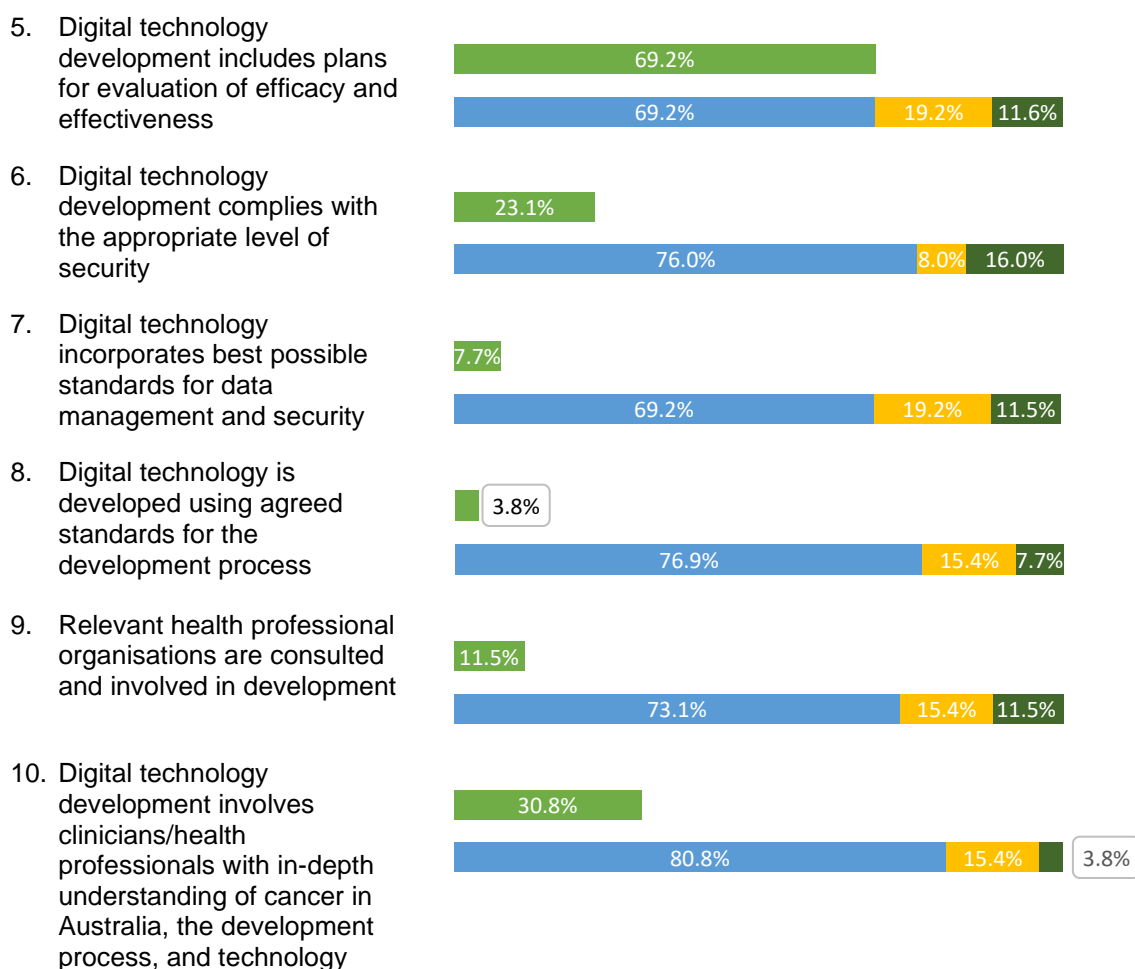
In the category of *design and development*, 19 priorities for action were ranked. The Top 5 priorities reflected needs for end-user involvement in design and in usability and acceptability testing, needs for evidence of efficacy and effectiveness (including plans to evaluate for these), and the requirement of strong theoretical and scientific basis for design and development of digital health in cancer care. The next most highly-ranked priorities for action pertained to security and data management, standards for the development process; and involvement of relevant health professionals, particularly those with in-depth understanding of cancer, the development process and technology. After this, rankings reflected priorities to develop and tailor implementation for groups with greatest need, and for end user needs, then to evaluate cost-effectiveness and long-term- effectiveness. Priorities receiving lower rankings included those relating to integration with existing applications and workflows, and rapid development to reflect the pace of technology change. Application testing via large-scale clinical trials was ranked as least important compared with other priorities for design and development.

Overall, three priorities for action achieved consensus ($\geq 70\%$) as being ranked within the 'Top 5' priorities for *design and development*. Seven of the 19 priorities achieved consensus ($\geq 70\%$) on the most commonly assigned appropriate timeframe.

Most priorities for action for *design and development* were most commonly considered short-term priorities, with the exceptions of priorities pertaining to; evaluation of cost-effectiveness (most commonly considered a medium-term priority); evaluation of long-term effectiveness (most commonly considered a long-term priority), and testing using high quality large-scale clinical trials (most commonly considered a medium-term and long-term priority, by equal numbers of respondents).

PRIORITIES FOR ACTION





PRIORITIES FOR ACTION	% Respondents			
	Top 5	Short term	Medium term	Long term
11. Digital technology is developed for populations and user groups with demonstrated greatest need	11.5	56.0	36.0	8.0
12. Digital technology has provisions for tailoring to end-user needs	11.5	57.7	34.6	7.7
13. Digital technology development includes evaluation of cost effectiveness	0.0	26.9	50.0	23.1
14. Digital technology development includes design and user experience professionals as part of the development team	15.4	88.5	11.5	0.0
15. Digital technology is evaluated for long-term effectiveness (long-term outcome data are collected)	0.0	0.0	30.8	69.2
16. Ability to integrate with other applications and data used in health care settings (e.g. electronic medical record) is considered at all levels of design and development	7.7	61.5	30.8	7.7

PRIORITIES FOR ACTION	% Respondents			
	Top 5	Short term	Medium term	Long term
17. Digital technology development is rapid to reflect the fast pace of technology change	3.8	60.0	32.0	8.0
18. Digital technology for use in Australian settings is developed to inherently support typical Australian workflows and does not require end-users to modify their practice to suit the workflows 'enforced' by the application	3.8	46.2	38.5	15.4
19. Digital technology is tested using high-quality, large-scale clinical trials	0.0	7.7	46.2	46.2

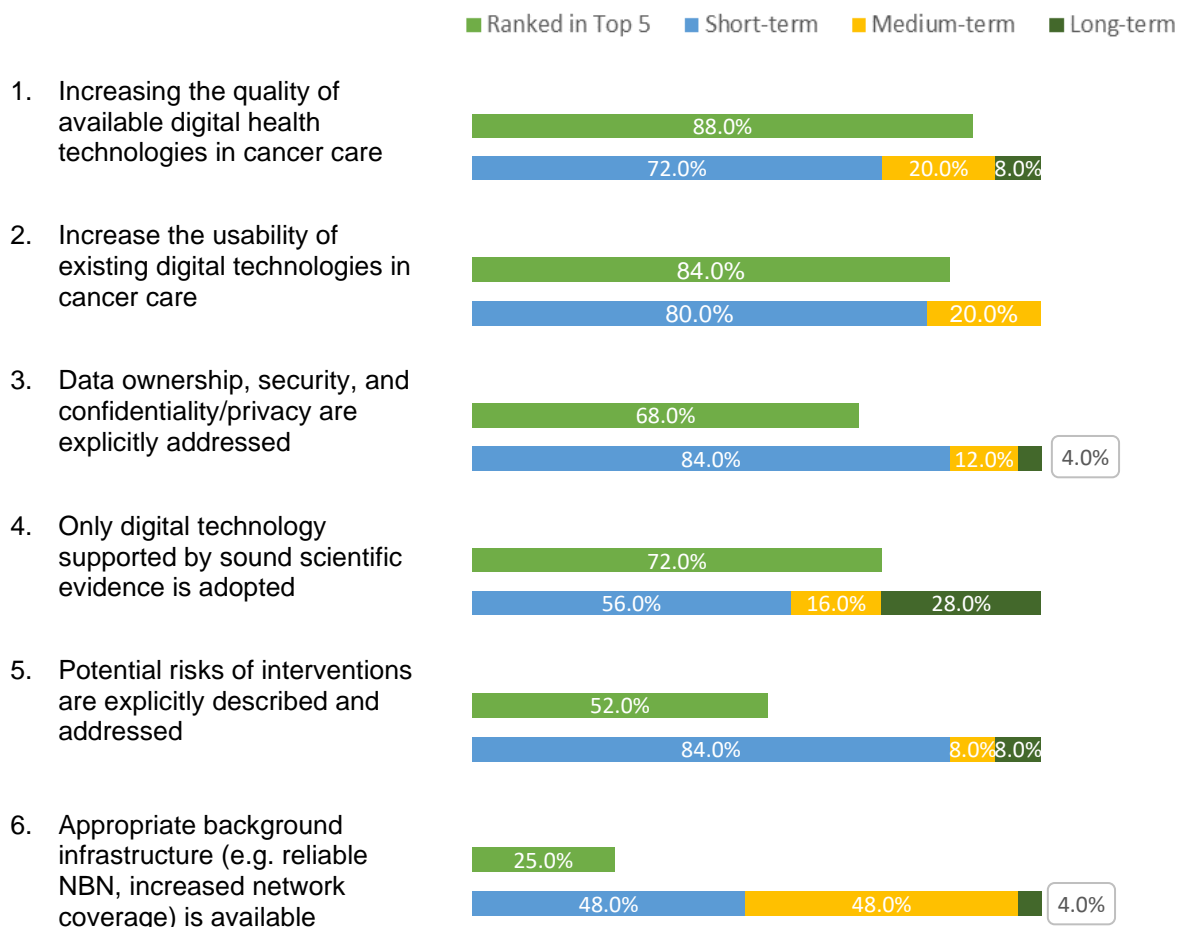
ADOPTION AND INTEGRATION

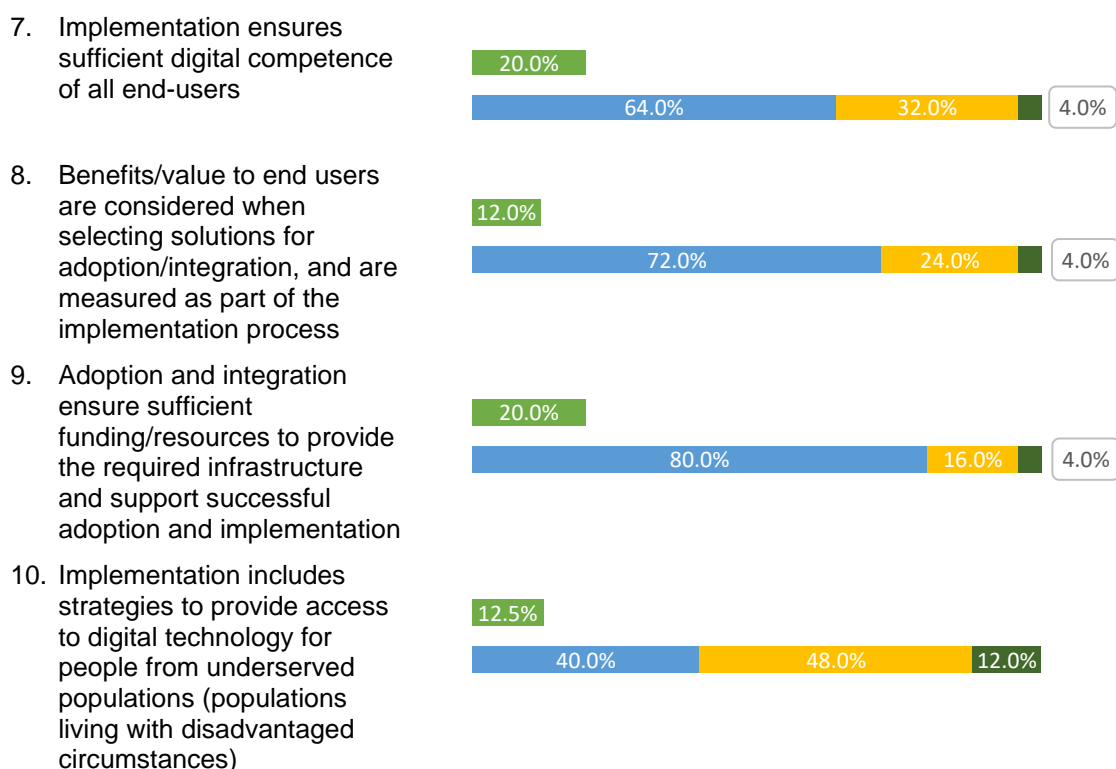
OVERVIEW

In the category of *adoption and integration*, 17 priorities for action were ranked. The Top 5 priorities reflected needs for increased quality and usability, for explicitly addressing data ownership, security, privacy, and potential risks, and for technology to be supported by scientific evidence. The next most highly ranked priorities related to infrastructure provision, including ensuring sufficient funding and resource availability, ensuring digital competence and access, including for those living in disadvantaged circumstances, and considering and measuring end user benefits. Next, rankings reflected priorities for integrating with existing workflows, using implementation research design, and adapting and implementing in novel and targeted populations. Lowest ranked priorities pertained to standardising technology to be portable/transferable across settings, and supporting software vendors to integrate their products with existing systems, along with increasing the range of existing applications.

Three priorities for action achieved consensus ($\geq 70\%$) as being ranked within the 'Top 5'. Six priorities achieved consensus ($\geq 70\%$) on the most commonly assigned appropriate timeframe. Most of the highly ranked priorities were considered short-term priorities. However, availability of appropriate background infrastructure and implementation strategies for providing digital technology for populations with limited digital and health literacy were each considered to be short-term and medium-term priorities by equal numbers of respondents. Lower-ranked priorities were largely considered to be of medium-term concern.

PRIORITIES FOR ACTION





PRIORITIES FOR ACTION	% Respondents			
	Top 5	Short term	Medium term	Long term
11. Integration of digital health applications/systems with existing workflow and workplace needs in health care settings	12.0	64.0	28.0	8.0
12. Digital technology is implemented using formal implementation research design	8.0	40.0	56.0	4.0
13. Existing digital technology is adapted into new populations/user groups	0.0	40.0	56.0	4.0
14. Implementation includes strategies for provision of digital technology for populations with limited digital and general health literacy	12.0	44.0	44.0	12.0
15. Standardising digital technology to be portable and transferable across settings (i.e. sites, sectors, jurisdictions)	4.0	32.0	60.0	8.0
16. Increasing the number of available digital technologies in cancer care	8.0	24.0	44.0	32.0
17. Software vendors are supported to promote/welcome integration of their products with those of other vendors (to support the continuum of care)	4.0	48.0	44.0	8.0

GOVERNANCE AND EVALUATION

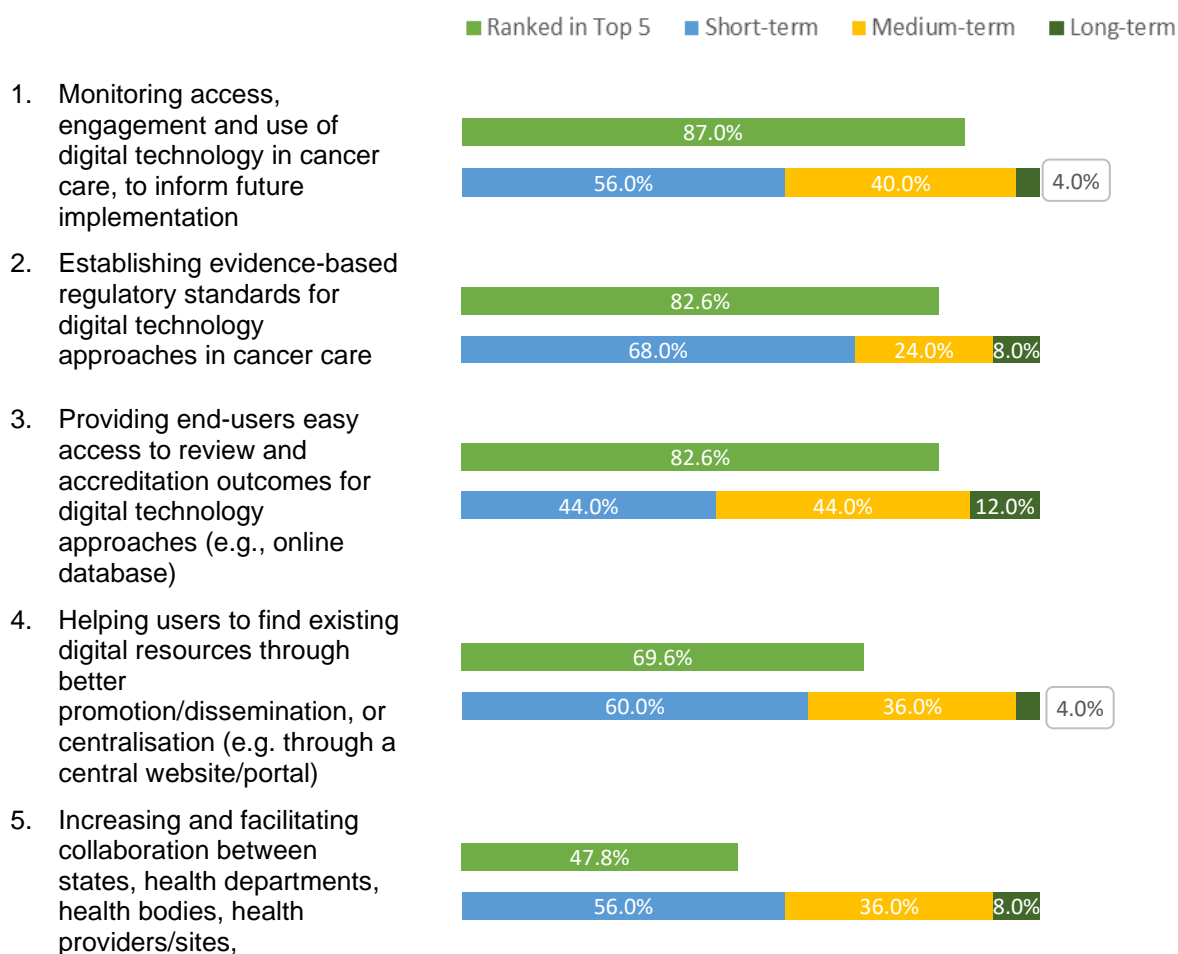
OVERVIEW

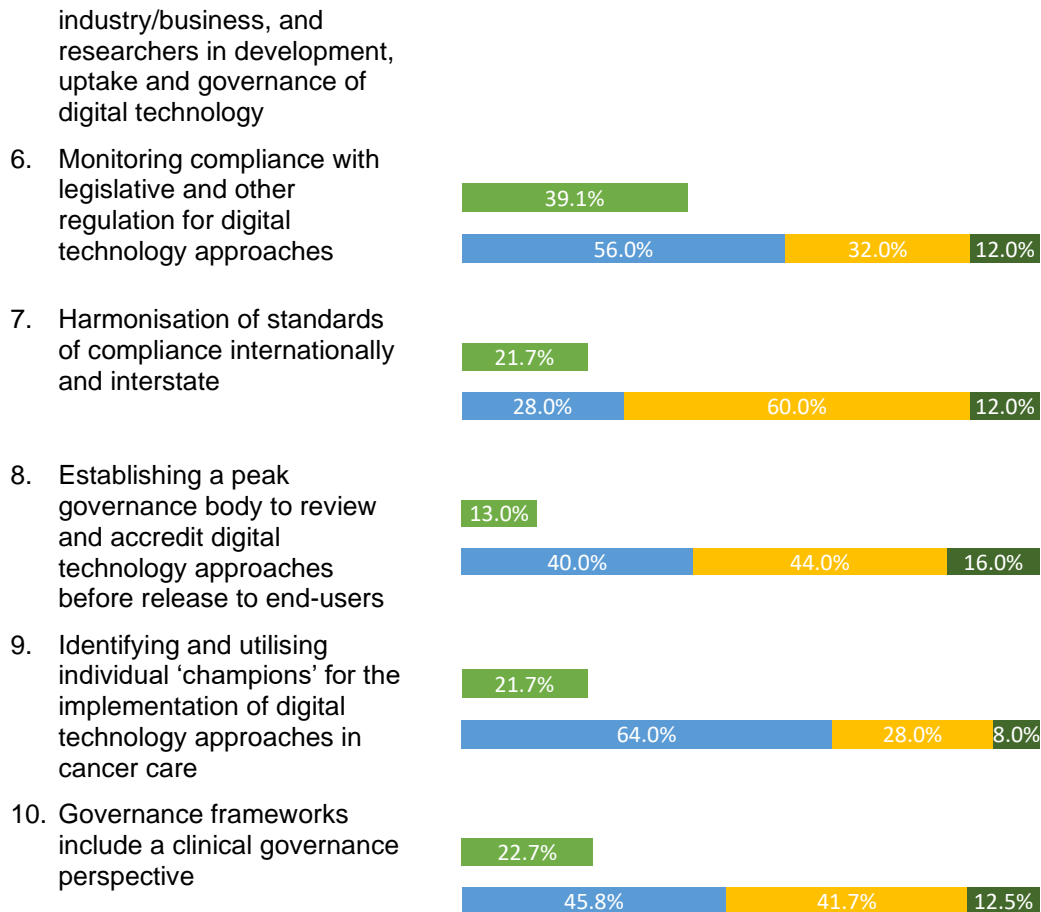
In the category of *governance and evaluation*, 12 priorities for action were ranked. Top 5 priorities related to monitoring of access and engagement and establishing regulatory standards, providing end users with easier, centralised access to accreditation outcomes and to digital technologies themselves, and to facilitating increased collaboration through governance and evaluation efforts. The next most highly ranked priorities related to regulatory standards and monitoring compliance, harmonising compliance standards, establishing a peak governance body that includes clinical governance perspectives, and identifying ‘champions’ for implementation of digital health approaches. Lowest ranked priorities included transparent affiliation and conflict reporting and establishing incentives for health professionals using digital health applications in cancer care (e.g., payment).

Three priorities for action achieved consensus ($\geq 70\%$) as being ranked within the ‘Top 5’. None of the priorities achieved consensus ($\geq 70\%$) on the most commonly assigned appropriate timeframe.

Most priorities for action were most commonly considered of short-term concern. However, providing end-users easy access to review and accreditation outcomes was considered a short-term and medium-term priority by equal numbers of respondents. Harmonisation of compliance standards and establishing a peak governance body to review and accredit digital technologies were both most commonly considered to be medium-term priorities, and developing incentives for health professionals to use digital technology approaches was most commonly rated as a long-term priority.

PRIORITIES FOR ACTION





PRIORITIES FOR ACTION	% Respondents			
	Top 5	Short term	Medium term	Long term
11. Clear reporting of authorship, affiliation, funding sources, and potential conflict in digital technology approaches	8.7	60.0	32.0	8.0
12. Developing incentives/payment of health professionals for using digital technology approaches	0.0	12.5	29.2	58.3

SPECIFIC DIGITAL INTERVENTIONS

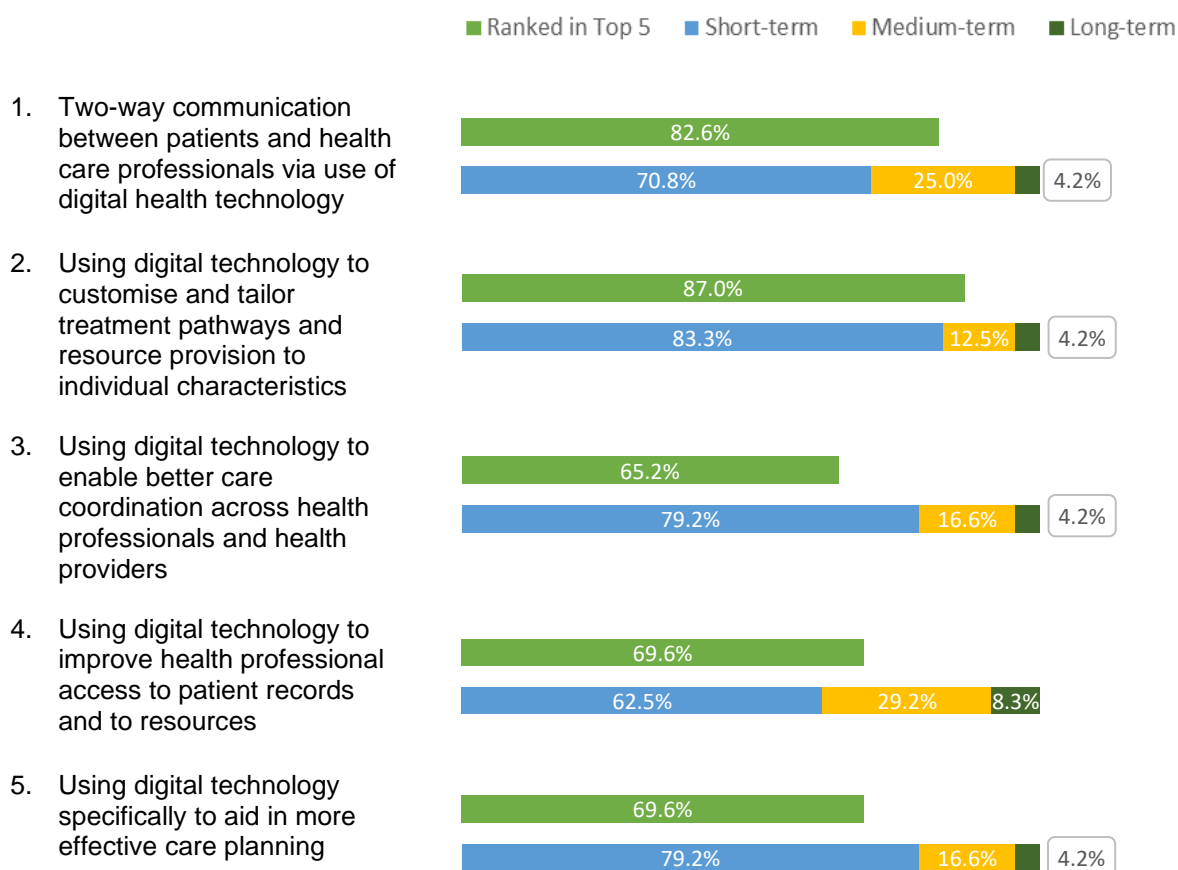
OVERVIEW

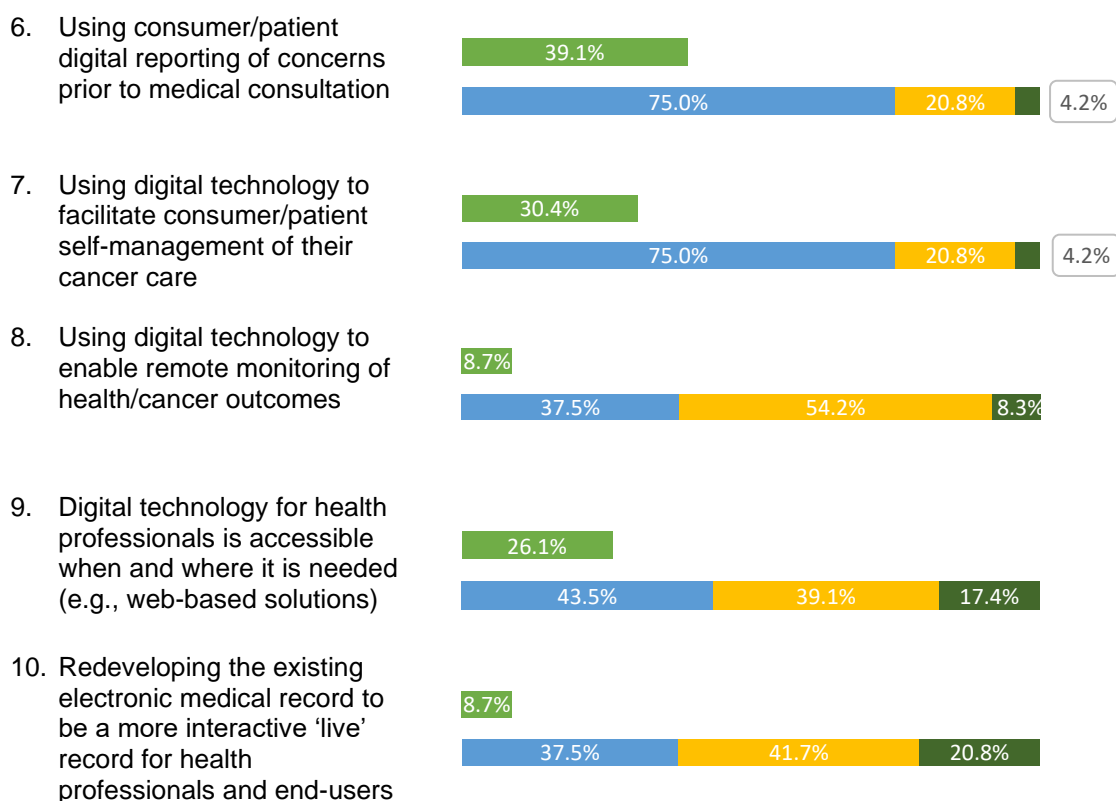
In the category of *specific digital interventions*, 14 priorities for action were ranked. The Top 5 priorities for action reflected needs for coordination and consumer focus, including through interventions to improve two-way communication between patients and health care professionals, tailoring of treatment pathways/resource provision, and care coordination and care planning, along with health professional access to records and resources. The next ranked priorities also reflected ways to improve self-management and remote management, including through remote reporting of concerns and remote monitoring of outcomes, along with needs for accessible and adaptive technologies, including health records, for health professionals and consumers. Following this, priorities related to providing peer support and education to consumers. Lowest ranked priorities related to remote cancer screening/detection and analysis of large datasets.

Two priorities for action achieved consensus ($\geq 70\%$) as being ranked within the 'Top 5'. Six priorities achieved consensus ($\geq 70\%$) on the most commonly assigned appropriate timeframe.

Most priorities for action for *specific digital interventions* were most commonly considered short-term priorities; the two exceptions to this were *redeveloping the existing electronic medical record to be a more interactive 'live' record* and *peer support via digital technology*. Both of these priorities were most commonly rated as medium-term priorities.

PRIORITIES FOR ACTION





PRIORITIES FOR ACTION	% Respondents			
	Top 5	Short term	Medium term	Long term
11. Peer support via digital technology resources	4.3	29.2	58.3	12.5
12. Using digital technology to provide consumer/patient education outside of medical consultation times	4.3	58.3	29.2	12.5
13. Using digital technology to enable remote screening/detection of cancer	0.0	45.8	33.3	20.9
14. Collecting and analysing large data sets in order to improve treatment outcomes	4.3	43.5	39.1	17.4

RESEARCH GAPS

OVERVIEW

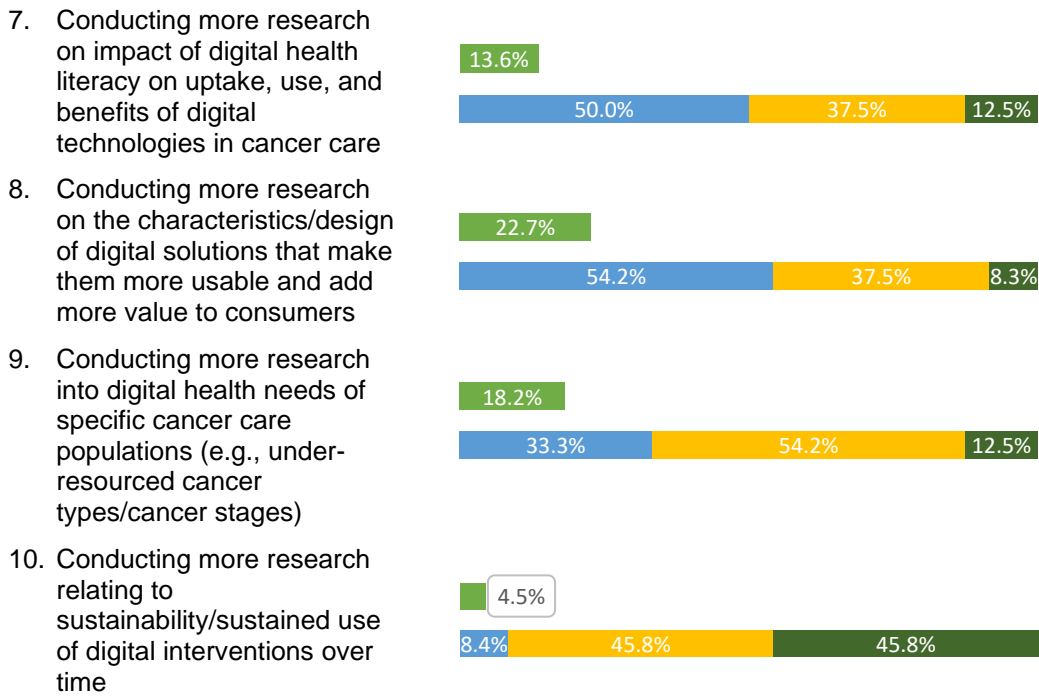
In the category of *research gaps*, 12 priorities for action were ranked. The Top 5 ranked priorities in this category related to establishing a research strategy, reflecting consumer priorities, coordinating, collaborating and investing in digital technology research, and conducting research on access and uptake. The next most highly ranked priorities related to reporting and researching user and application characteristics affecting uptake, engagement and benefit. Lowest ranked priorities pertained to conducting research on sustainability/sustained use of interventions, and in specific user groups and contexts.

Four priorities for action achieved consensus ($\geq 70\%$) as being ranked within the 'top 5'. Two priorities achieved consensus ($\geq 70\%$) on the most commonly assigned appropriate timeframe.

The eight most highly ranked priorities were most commonly considered to be short-term priorities, while the remainder were largely considered medium-term priorities. *Conducting more research relating to sustainability/sustained use of digital interventions*, however, was considered a medium-term and long-term priority by equal numbers of respondents.

PRIORITIES FOR ACTION





PRIORITIES FOR ACTION

	% Respondents			
	Top 5	Short term	Medium term	Long term
11. Investing in research focused on use and implementation of digital health in groups experiencing disparities in digital access and/or disparities in cancer outcomes	13.6	29.2	62.5	8.3
12. Investing in research on implementation of digital health technologies in different contexts and with different user groups	9.1	16.7	66.6	16.7

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