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Clever Health: A Study on the Adoption and Impact of an eHealth Initiative in Rural Australia

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ABSTRACT

This chapter reports on the evaluation of Clever Health, an Australian e-health project. The evaluation took place from mid 2007 through 2010 and consisted of both qualitative and quantitative approaches to capture awareness, expectations and use of Clever Health components – which included video-conferencing for patient care, professional development and peer support – and to compare initial perceptions and expectations to perceived changes in awareness and uptake of Clever Health components. The study found that while use of components increased at a satisfactory pace, health services and professionals struggled with change management issues, which, in turn, impacted on changing work practices. Findings suggest that it is imperative to address and integrate the human factors of e-health delivery in the rollout of future e-health programs. The study proposes a robust evaluation framework for future telemedicine projects that uses a patient-centred unit of analysis and examines the costs and benefits that accrue for different stakeholders.

INTRODUCTION

One of the more significant developments over the past two decades has been the emergence and widespread adoption and diffusion of information and communication technologies (ICT). During the past two decades, society has been witnessing an ICT and knowledge revolution as the result of the rapid development of ICT. The arrival of digitised telephone networks and the computer modem in the 1980s facilitated the electronic retrieval, transmission and exchange of data, thereby transforming computers into veritable gateways to information. Soon thereafter, globally connected computer networks formation of the Internet and the world wide web, commonly referred to as “the web”, started linking and exchanging information via the Internet, allowing millions of people around the world to access, contribute and retrieve information as well as interact with one another online (Negroponte, 1995).

ICT has captured the attention of health care providers as well as health policy makers, who are encouraging the use of ICT to address issues such as inequality of access to health care, the need to reduce health care delivery costs, and the potential of ICT-enabled healthcare to improve standards of health care (Obstfelder et al, 2007). As well as from capital investments, the Australian Government is investing in electronic health records and new technology that will allow primary health care practitioners to deliver better and safer services. Given Australia's dispersed geography, improvements in technology are expected to enable more services to be

provided within patients' homes, allowing for greater convenience to people in regional, rural and remote locations. This could, for example, enable a patient with heart disease who usually needs to travel to see their cardiologist, use local videoconference facilities instead (Commonwealth of Australia, 2011).

A particular strength of **e-health** – interchangeably referred to in this chapter as **telemedicine**, encompassing the use of ICT and web-based technologies to remotely manage, deliver, access or enhance health services – is the capacity to increase and/or provide access to healthcare services previously unavailable in rural and remote locations. However, a recent national study (Moffatt & Eley, 2011) on the perceived use and usefulness of telemedicine from the perspective of users and providers identified a number of barriers that hinder the uptake of e-health as the preferred mode of service delivery. The latter authors raise issues in the domains of policy priority, education and training, lack of funding, lack of time in terms of workload implications, poor infrastructure in terms of internet access in rural Australia, and lack of access to equipment and skills as the most significant barriers.

Although Moffatt & Eley (2011) conclude that telemedicine is not a rational response to the current climate with a reported preference for conventional service delivery, e-health initiatives continue to lead and traverse new ground in the areas of electronic service delivery and patient care. As it is important to widely share the lessons learned from such initiatives, this chapter reports on the evaluation of Clever Health, an e-health project funded by the Federal Government of Australia and administered by the Grampians Rural Health Alliance Network from mid 2007 through 2010. The evaluation took place over a two-year period and consisted of both qualitative and quantitative approaches to capture awareness, expectations and projected use of Clever Health components – which included video-conferencing, eLearning, patient care, and peer support – and to compare initial perceptions and expectations to perceived changes in awareness, uptake and impact of Clever Health components.

BACKGROUND

In late 2006, the Grampians Rural Health Alliance (GRHA) led a consortium of agencies in applying for a A\$3.385 million grant under the Clever Networks program managed by the Australian Government to use technologies such as video-conferencing (VC) to provide more effective patient treatment, better peer support for health professionals in the GRHA network and the continued development of high quality health services in the region.

The Grampians region of Victoria stretches from the urban fringe of Melbourne to the South Australian border, including major regional centres such as Ballarat as well as some of the most sparsely populated areas of Victoria. The GRHA network in the Grampians region encompasses 12 public Health Services – almost all of which are multi-campus and three of which are major hospitals – two stand-alone community health agencies and five bush nursing centres. There are approximately 2500 healthcare workers in connected health services, providing a comprehensive range of public health services ranging from acute and emergency services to mental health, aged and home care.

The GRHA network (formerly known as GRHAnet) was established with an earlier National Communications Fund (NCF) grant, whereby a model was adopted that involved working with a national telecommunications and power company as well as a regional cable and data management company for the development and continued maintenance and monitoring of the network. A combination of GWIP, BDSL and ADSL was set up for connectivity to sites, according to the location and needs of individual sites. The ability for GRHA to provide services according to the needs of the individual organisation was a key feature of this model. Another key initiative of GRHA was the establishment of a shared services facility in a major telecommunications centre in Melbourne. Through this centre GRHA is able to provide state-of-art IP based integrated data, voice and video services, essentially creating a single phone, video conferencing and data communications system across the whole region. The centre is also a common gateway to the public telephone network, Internet, various commercial application service providers and most importantly to all other regional and metropolitan health networks. A regional data centre supporting deployment of common computer applications was also established. The establishment of these services through GRHA's investment with the telecommunications carriers resulted in community benefit in terms of regional towns in the region being able to access broadband. The additional economic benefit of the network flowed to businesses being able to connect to broadband as a result of the work undertaken by GRHA. With these services and underlying infrastructure capability in place, but relatively slow uptake of usage of the network for clinical purposes -- due to a number of factors, including limitations in the availability of appropriate equipment and resources for training and change management activities -- the Clever Health project aimed to accelerate the usage of the GRHA network for clinical purposes through the delivery of a coordinated program underpinned by **video-conferencing technology** (VC).

Videoconferencing technology dates back to the early 1980s when clinicians used interactive video systems based on analogue television to broadcast live telemedicine demonstrations to remote lecture theatres (Cannavina et al, 2004). The use of VC increased exponentially with the rapid development of digital technology, making it more readily available and more affordable for education and health care delivery. The capability of VC to facilitate live interaction further fuelled interest in the technology, in particular for the development of learning communities made up for geographically dispersed health professionals, who would normally have to travel considerable distances for professional development (Sackett et al, 2004).

Apart from professional development, rural and remote healthcare professionals are also faced with challenges of professional isolation and a lack of interaction with peers. Moreover, Australia has an ageing workforce and attraction of younger health professionals to regional and rural areas can be problematic (Rural and Regional Health and Aged Care Services, 2005). By providing effective peer support and up-to-date professional development, video conferencing can make a positive impact on attracting and retaining health professionals. Research suggests that the drivers for the utilisation of technologies such as VC are particularly strong in rural/regional settings and reflect some of the challenges facing the public health system including workforce, resources, demand from an ageing population and equity of access (PriceWaterhouseCoopers, 2007). On the other side of the VC coin, common limitations to the technology cited in the literature pertain to technical problems and difficulty in achieving a full interactive environments and while generally recording positive results, still tend to fall short of delivering successful learning and knowledge construction experiences (Newman et al, 2009).

At the time of the GHRA funding application, the use of telemedicine applications was low and it was commonly suggested that there was insufficient evidence of its efficacy, both in terms of clinical and organisational impacts on service delivery (Newman et al, 2009). Evaluations of e-health projects often did not correlate positive outcomes to routine use and without such evidence, telemedicine did not have a bright policy future, yet the future of health in Australia's regions was dependent on reducing risk and workforce shortages. There was potential for a wide range of new technology initiatives such as Clever Health to increase both the evidence base on what is needed to make telemedicine applications work (Harrison, McFarlan & Wallace, 2003) and create a network of health professionals willing to embrace telemedicine to improve healthcare delivery. In performing a coordinating role for the development and implementation of clinical and non-clinical information and blended learning programs, the GHRA project sought to improve both the quality of health care and professional development in the region as well as augment the retention and attraction of health professionals to the region.

CLEVER HEALTH EVALUATION

Project Objectives

An important project goal was the engagement of health practitioners in changing work practices, since the aim of the Clever Health project was to introduce and develop standardised and transferable work practice models that could be made available to other health alliances and agencies as a template for similar activities. As such, the objectives of Clever Health were to (1) deliver innovative delivery of Primary Health Care (PHC) services to the region and ways of providing peer support and advice mechanisms, decision making pathways and development of evidence based practice and case analysis; (2) increase skills for health professionals in the region by working with providers to develop and deliver blended learning professional development programs via the network; and (3) trial innovation using wireless technologies in the delivery of better patient care.

In pursuing the objectives outlined above, the Clever Health project installed high quality wireless technology, fixed and mobile videoconference units with relevant specialist attachments in all 12 health services; rolled out web-based professional development modules; established high quality video facilities in a new operating theatre in the public hospital in Ballarat and technology links with metropolitan hospitals, the University, and other training institutions in the region. The author was approached to undertake the external evaluation component of the project. A total of five evaluation reports were produced at six-monthly intervals over two and half years.

Methodology

The Clever Health evaluation took a formative and summative approach to measure uptake and impact of the Clever Health project components. Both formative and summative program evaluation focused on the extent to which the project achieved its specific goals and objectives, in particular the extent to which project goals were realised (awareness, effectiveness), and at what perceived cost (outcomes, impact, efficiency). Formative evaluation included regular stakeholder feedback during the course of the project to ensure that the project remained on track.

While technologies and equipment were still being rolled out during the first year of the project, the evaluation adopted a qualitative interview approach to capture key stakeholders' perceptions and awareness of Clever Health, anticipated future use of components and projected benefits of the project. A structured interview schedule was designed to elicit perceptions about each of the components of the Clever Health project. The interview schedule also included questions to gather data on stakeholder demographics, organisational roles and general characteristics of the organisations they represented. Open ended questions were included that allowed for stakeholder perceptions to be freely expressed on key areas of interest. Such perceptions were deemed highly relevant as they had the potential to reveal factors that might influence uptake and speed of adoption in stakeholders' respective organisations. A total of 20 individuals were interviewed for the first two reports. The same interview schedule was applied throughout the evaluation, but once a quantitative evaluation component was added for the third report, capturing responses from a wide group of stakeholders, interview numbers were paired down to include only key stakeholders in the project. All interviews were transcribed, collated and analysed for recurring themes.

In reviewing the options to capture quantitative data, and in particular usage data on each component of the Clever Health project, it quickly became apparent that it would be difficult, or in some instances inappropriate, to capture hard usage data. Hence it was decided to design an online survey based on the principles of the Theory of Planned Behaviour (Ajzan, 2002). This theory comprises two elements: self-efficacy (dealing largely with the ease or difficulty of performing a behaviour) and controllability (the extent to which performance is up to the actor). This approach facilitated the measurement of attitudes, perceptions and seized opportunities (perceptual scales) vis-à-vis awareness, expectations and use of Clever Health components. Measuring perceptions of change, actual change, and impact of change over time facilitated the longitudinal measurement of perceived changes to work practices, peer support and learning practices.

The final report reflected the last three rounds of quantitative survey data and summative interview data on awareness, expectations and current use of Clever Health components and, where applicable, compared findings to baseline data. This chapter comprises salient data resulting from summative evaluation.

Quantitative Findings

Below tables reflect quantitative data gathered over three reporting periods. Findings included in this section pertain to health services' use of fixed and mobile videoconference units, professional development through eLearning and peer support. Any significant changes accrued over time are marked by an asterisk (*). Technology-based findings pertaining to wireless infrastructure, high quality video facilities in the operating theatre and regional network tests and linkages established during the course of the project are not included in these findings. Qualitative findings are incorporated into the next section which discusses salient themes.

Insert Table 1

As may be noted from Table 1, the ratio between female (86%) and male (14%) of respondents did not alter much across surveys and is generally reflective of the health industry workforce make-up.

Survey results indicate that general awareness of the Clever Health project across survey respondents was very high and increased in comparison over time but not statistically significant. This may be ascribed to the fact that throughout the project a Clever Health Project Officer liaised extensively with stakeholders across the region to raise awareness of the Clever Health project and provide training in the use video-conferencing (VC) equipment. Over time, the level of awareness pertaining to the various components of the Clever Health project increased, with awareness of eLearning increasing most significantly. Conversely, awareness of the Ballarat Health Services (BHS) Operating Room Video Conference decreased considerably compared to Report 3. The latter may be ascribed to the fact that usage of same remained limited. Of interest to note is that in final survey round none of the participants indicated that they were not aware of Clever Health components, e.g., all participants were aware of Clever Health, which differed from earlier reports.

Insert Table 2

A series of questions were included to gauge Clever Health stakeholders' **technological readiness**. As Table 4 indicates, technological readiness was consistently high (mean above 5), although confidence in the robustness of technology itself remained low.

Insert Table 3

At the end of the project, a total of 90 room-based units were in place, which was a mixture of older units that had been in place as part of the GHRA infrastructure and new units that have been installed during the life of the Clever Health project. The most common activity among those aware of the **fixed (room based) VC** facilities was cross-campus meetings, followed by dispersed team meetings. Respondents' performance and expectations for the Room Based VC facilities were consistently high (not displayed in separate tables).

Table 4 reflects the social norms around Room Based VC. Participants were generally comfortable using the technology. In the final survey round importance of doing what others do in the same profession reflects increasingly strong peer pressure to use VC technology.

Insert Table 4

Similar to Fixed VC results, there was a relatively small gap between expectations and actual performance, such as ease of use and **technological reliability** of the **Mobile VC** units, indicating that mobile VC performance was living up to **expectations**. As reflected in Table 5, attitudes around the usefulness of Mobile VC for quality clinical support and improved client consultation were generally positive and increased compared to report 3. Respondents' general **attitudes** towards Mobile VC's ability to improve patient care improved (mode value is higher) and attitudes towards Mobile VC to save time increased significantly.

Insert Table 5

In the final survey round, respondents' perceived stronger peer pressure to use the Mobile VC technology, although the level of control over their decision to use VC was not significantly different. Compared to report 3, expectations towards the use Mobile VC and **peer pressure** increased significantly, indicating that a culture was developing where it became the 'social norm' for mobile VCs to be used (not displayed in separate tables).

Overseen and led by one of the Clever Health project partners, a selection of online learning modules were either adapted from existing modules (such as in the United Kingdom) or developed for online delivery by health educators across the Grampians region (see Table 6). The latter approach contributed to a significant uptake of the eLearning modules.

Insert Table 6

Respondents' expectations for **eLearning** significantly increased since Report 3, with eLearning providing the help needed to complete tasks and improve work performance. As illustrated in Table 7, attitudes around the usefulness of eLearning for professional development, access to training, **saving time** and **reducing travel** were very positive, indicating that a strong eLearning culture was developing as a normal and accepted practice. However, the perception that eLearning can assist staff attraction and retention remained relatively low.

Insert Table 7

As indicated in the methodology section, three questions were added to the final survey round to gauge participants' general attitudes towards the Clever Health project. Participants were asked to indicate their general attitude towards Clever Health, and in particular whether Clever Health had significantly changed their work, learning and travel practices. As shown in the Table 12, respondents indicated that they strongly agreed that Clever Health has significantly changed a number of tasks. This was particularly shown to be very high for activities such as travel for health professionals, professional development, and dispersed team meeting.

Insert Table 8

Next, participants were asked whether Clever Health had significantly impacted the **delivery of care** through their work, learning and travel practices. As reflected in Table 13, respondents indicated that they agreed, to strongly agreed, that since the start of the project Clever Health had significantly improved the delivery of care. This was particularly shown to be very high for activities such as, professional development, and less travel for health professionals.

Insert Table 9

The last question in the general attitudes series focused on participants' perceptions in relation to whether Clever Health had significantly impacted on the **quality of care** through their work, learning and travel practices. Again respondents indicated that they agreed or strongly agreed that since the start of the project, Clever Health has significantly improved the quality of care. This is particularly shown to be very high for activities such as less travel for health professionals, and **professional development**.

Insert Table 10

QUALITATIVE FINDINGS

The quantitative data reported in the previous section provided survey results and data on awareness, expectations and use of Clever Health components. It also provided demographic and technological readiness data. This section provides salient themes and implications extrapolated from the survey findings illustrated with qualitative data captured in the open ended question and during key stakeholder interviews.

Survey results show that the make-up of respondents – consisting of senior management, nursing staff, and allied health staff – did not change significantly over time. Overall, results indicated a very high and broadening level of awareness across primary and allied health practitioners as well as down organisational structures. As one stakeholder reported: *“We’ve made some fairly good progress in terms of when [we] first started. [It is] difficult to put infrastructure in before change management [is] in place – that was the directive and that challenge was met – in particular the last 4-5 months [there is] a much greater interest in the project and possibilities what it can do for people”*.

Much of the awareness can be credited to the ongoing demonstration efforts and support provided by the Clever Health Project Office, which progressed general awareness from knowledge to a level of excitement around the vast potential and clinical use of the VC infrastructure. As one participant commented, *“... [The project officer] has been very approachable, reliable, motivated and enthusiastic which has made a difference to the way the project has progressed”*. Of note is that confidence levels in the robustness of the technology itself remained low.

Commenting on the general attitudes towards Clever Health, and in particular whether Clever Health had significantly changed work, learning and travel practices, evaluation, participants overwhelmingly responded that Clever Health significantly changed a number of tasks, and in particular travel for health professionals, professional development, and dispersed team meetings. *“It has been great. The opportunities with education with eLearning and VC education have been great for staff. For multi campus facilities, it saves a lot of travel time with VC meetings, discussions, etc. that before we would have had to travel to”*.

Respondents strongly agreed that since the start of the project, Clever Health had significantly improved the delivery of care through the change in work practices, pointing to professional development and reduction of travel for both staff and patients as major benefits. *“The cost-benefit for travel alone is very significant and additional patients can be seen”*. Respondents also indicated that since the start of the project Clever Health had significantly improved the quality of care through their changed work, learning and travel practices, indicating that – apart from professional development and staff/patient travel reduction – VC-based team meetings and peer support significantly improved patient care in remote locations.

The use of Fixed (room based) VC facilities increased for a quarter of the workforce across the region, which is a significant percentage compared to the start of the project. The most common activity was cross-campus meetings, followed by dispersed team meetings and the continued rise in expectations is indicating that the use of VC is now embedded in every day practices and is becoming part of core health services. Confidence in the technology has grown and attitudes around reduction of travel and VC usefulness for cross campus meetings were generally positive and consistent. Compared to earlier reports respondents ended up slightly more certain about

Fixed VC helping case analysis as well as the reduction of backfill. Of note is the anecdotal qualitative data generated on unanticipated usage of VC generated by the Clever Health project, including examples such as psychiatric and palliative care, speech therapy, online dietician clinics, and pain management training. With sparse access to psychiatric expertise across the region, a psychiatric health worker commented that, *“this initiative has the possibility to greatly improve patient care”*. At the same time, some long standing issues around room-based facilities – such as access to and complex internal room booking systems – have persisted throughout the project. As one participant expressed it, *“[I am] very happy with the initiative. Disappointed we are still working through the internal politics before doctors can use technology for the purpose in which it was designed!”* Illustrated another participant, *“Mobile video conferencing is a fabulous tool in dialysis where we are very isolated, provided our educators are able to access VC facilities at their end”*.

Respondents were similarly positive about Mobile VC technology with expectations and peer pressure contributing significantly towards an increase in use, indicating that a ‘social norm’ or culture is slowly developing in VC use. Said one respondent, *“a change takes time and its still early days as people use it more and become more confident its use will increase and the outcomes will be more significant”*. Of note is the fact that once in place Mobile VC units quite rapidly started to be used for purposes beyond training and meetings, such as case conferencing and clinical/bedside consultations. Although Mobile VC units remain under-utilised, more and more people are starting to see their potential, especially for **continuity of care** such as bedside consultation and post-operative care. In the past a pediatric surgeon from Ballarat, for example, would have had to stay overnight in the region, but is now able to conduct a post-operative consultation via Mobile VC. *“The MediLinks [Mobile VC units] are just starting to be utilised more for clinical situations, and we will see more of this in the future for the benefits of patient and practitioners alike”*.

Although Mobile VC units were highly popular, the network is still coping with some non-compliant technical installation and wireless network issues, which restrict measurement of calling patterns and prevent anywhere-to-anywhere linkages and consultations. Given the large number of units now on the network and the increasing interest in case conferencing (e.g., linking multiple sites via the bridging unit), there were also some reported restrictions around use of VC services during peak times (point to point VC was not affected by this), which could detrimentally affect the use of VC for emergency consultations.

Another, and much more complex, barrier for the use of both Fixed and Mobile VC facilities pertained to external politics. For the duration of the project, VC-based consultations were not formalised within the public health system, thus preventing virtual access to expert medical care. *“It’s fantastic and we love it, but just need to get the arrangements with services and specialists formalised so we can use it to better capacity”*, commented one participant. Said a key stakeholder, *“This is a massive barrier...this needs to on the Federal health agenda! The technology is there, the willingness is there, but there is system failure in terms of financial compensation for doctors. This is delaying the rollout of cancer services, diabetes treatment, to name but a few”*.

The eLearning component of the Clever Health project was seen by stakeholders as one of the most exciting project components, delivering wide ranging benefits for healthcare providers and their staff in terms of improved competency and compliance, reduction in isolation and travel. Of significance is the drop in respondents who have not participated in eLearning course, indicating that they are likely to participate in an eLearning course in the future. The satisfaction levels with

eLearning in terms of its reliability and improvement of work performance significantly increased over the course of the project. Of all components, eLearning is now most embedded in work practices as the norm for professional development and this is likely to increase in the future. Of interest is to note that an impressive number of 4093 core competency eLearning courses (hosted by an external provider) were completed by health staff across the region. *“It has been great. The opportunities with education with eLearning and VC education have been great for staff”*. The perception that eLearning can assist with staff attraction and retention continues to be relatively low, but indirect benefits such as attraction and retention are difficult to measure without hard data.

To gauge the impact of network building activities being undertaken by Clever Health, peer support was monitored throughout the project. As peer support is difficult to measure in and of itself in a quantitative way, peer support was measured through the uptake of VC facilities for such peer related activities as team meetings, mentoring, cross-campus and special interest group meetings. Despite some ongoing hesitancy around the technology itself, participants’ comments pertaining to peer support were overwhelmingly positive. *“For multi campus facilities, it saves a lot of travel time with VCing [sic] for meetings, discussions etc. that before we would have had to travel to”*. The project experienced unexpected demand and usage of VC by regional teams for meetings, case conferencing, training and mentoring across a range of services ranging from emergency to chronic disease and palliative care, increasing the stewardship and effective usage of the network and tools. *“Now that I have started to use VC to support junior/sole therapists out in the region and seen the benefit of this to supplement mentorship programs and cross region meetings, I envisage I will use it more and for broader applications”*.

FUTURE RESEARCH DIRECTIONS

In reviewing the summative outcomes of both the quantitative and qualitative survey responses, it is clear that the Clever Health project has been an innovative project that has been perceived by stakeholders as providing significant benefits to health practitioners in terms of improved competency, practitioner confidence and peer support, which in turn has the potential to result in more effective patient treatment across the region. Although much of the Clever Health **connectivity** potential of ‘anywhere-to-anywhere at anytime’ remained unrealised at the time of writing, the project enjoys strong relationships across the region and there is potential for ongoing innovation, linkages to and interoperability with other e-health initiatives across Victoria. Planned project spin-offs, such as the use of **desktop-to-desktop VC** and **video phones** for remote monitoring will augment delivery of clinical services and chronic disease management such as diabetes management and patient supervision. For example, video phone units placed in patients’ homes would dramatically reduce travel by district nurses and build client-based capacity in terms of **self-management** of **chronic conditions** and **wellness** programs.

It is evident that the Clever Health project was a significant **change management** exercise that will take time to be understood and adopted. Solving infrastructure hurdles, encouraging technology uptake through information and training sessions, and working with stakeholders on establishing appropriate policies and protocols were necessary and important steps towards enabling new, more efficient ways of primary patient care, continuing professional development, learning and teaching in the Grampians region. These findings indicate that resourcing change management to provide support, answer questions and support new ideas and linkages should not be underestimated. Similarly, ongoing network usage requires careful management to

ensure the underpinning infrastructure accommodates the growing take-up of services and updates network resources as software-based applications supersede hardware solutions.

The project has contributed to new policy and governance models, as well as centralisation and sub-regional clustering of services and anecdotal evidence suggests that there are substantial cost-benefits in this telemedicine model in terms of savings in travel costs, back-filling, productivity gains, improved and additional patients care. However, at the time of writing Clever Health remained a 'push' rather than a 'pull' model, partially due to federal systems failure in terms of a financial compensation for GPs and specialists for VC-based consultations.

While the qualitative approach adopted for the Clever Health project was adequate, quantitative results were hampered by both a small sample size and a lack of hard data prior to and post the implementation of the project, e.g., the number of patient transfers to regional centres or number of health care workers travelling for professional development. Thus, the project lacked a framework to accurately assess the value of Clever Health and it is hence suggested that in future a sound cost-benefit analysis and evaluation framework is adopted for these type of projects that focuses on the medium term and provides an opportunity to examine the economic and social benefits to the region and return on investment to future funding bodies and third parties. In other words, that such a model examines the costs and benefits that accrue for different stakeholders.

In a future and more robust **evaluation framework**, the **unit of analysis** should be **patient-centred** and focus on the cycle of care with benefits and costs attributed to all stakeholders, clients and citizens. Both direct and indirect benefits and costs should be included. This is particularly important when considering the benefits to health services in terms of **risk reduction**, improved **professional development, recruitment and retention** of staff. The costs of overcoming barriers to adoption should be considered with change and risk management as key components that will moderate benefits and costs. Contextual and moderating factors such as a network and workforce issues also need to be included.

Of course, a **cost-benefit** evaluation method is only as good as the dataset collected for input into the model. Closely monitoring telehealth processes will generate comprehensive knowledge on the functionality of the system, allowing for timely reconfiguration of processes to focus resources on those areas that create most value for stakeholders.

CONCLUSION

The aim of the Clever Health evaluation was to capture awareness, expectations and projected use of Clever Health components; and to compare those to initial perceptions and expectations for themes and perceived changes in awareness and progress of the Clever Health project.

The project introduced ICT-enabled patient services to the region and ways of providing professional development and peer support to reduce isolation and risk. An important project goal was the engagement of health practitioners in changing work practices and the development of standardised and transferable **work practice** models that could be made available to other health alliances and agencies as a template for similar activities.

These evaluation findings enhance our knowledge of ICT-enabled technologies, sharing lessons learnt by Clever Health in relation to the use of video-conferencing to remotely manage, deliver, access or enhance health services and increase access to healthcare services previously

unavailable in rural and remote locations. The study confirms earlier findings (Moffat & Eley, 2011) in the domains of **policy** and **infrastructure barriers**, adding change management as a key component to be addressed and integrated in the rollout of future e-health programs. Innovative health care delivery strategies can address the healthcare needs of both healthcare workers and patients in regional and rural areas, which face challenges such as limited access to specialised care, long distance travel for professional development, and lack of peer support.

There is much room for additional research in this area, ranging from improving evaluation frameworks that include multiple stakeholder views and cost-benefits to research on the complexities that arise when technology is introduced for better patient care, to much needed practical knowledge on the implementation of telemedicine.

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KEY TERMS & DEFINITIONS

Change Management: A structured approach to help individuals, groups or organisations transition from current work practices to a desired future work practices.

eHealth: the use of ICT and web-based technologies to remotely access, deliver, manage or enhance health services. Interchangeable with telemedicine.

eLearning: online education using web-based technology; also known as online learning or online training.

Peer Support: when people or groups exchange or provide (healthcare) knowledge, experience, emotional, social or practical help to one other.

Perceived Behavioural Control: A person's perception of the freedom or ability to perform a given task.

Professional Development: The skills and knowledge needed or attained for personal development and career advancement.

Social Norm: the rules that a group uses for appropriate and inappropriate values, beliefs, attitudes and behaviours.

Telemedicine: the use of ICT and web-based technologies to remotely access, deliver, manage or enhance health services. Interchangeable with eHealth.

Video-conferencing: using interactive video systems for live interaction with people in different locations.