

Three Examples of Success in Personal Internet Support and Telecare: Consumer-centric Highlights of a Systematic Review of e-Health

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Abstract

The Ministry of Health has commissioned the National Institute for Health Innovation (NIHI) to carry out a systematic literature review about the implementation of eHealth technologies. This review identified 100 articles published between 2003 and early 2009 providing systematically measured benefits from implementations. This paper describes three of the most outstanding examples of success in consumer Internet support and telecare from amongst the review findings. These interventions – involving asthma, Type I diabetes and heart disease – invite us to consider the potential, and the necessary pathways, to realise such benefits on a larger scale.

1. Background and Methods

What Information Technology (IT) innovations have been rigorously demonstrated to provide benefits in health care? New Zealand's Ministry of Health has commissioned the National Institute for Health Innovation (NIHI) to carry out a systematic literature review to address just this question [1]. The review examined 1413 articles retrieved from database queries on MEDLINE, EMBASE, PsycINFO, CINAHL and Business Source Premier for articles appearing between 2003 and early 2009. Of these, 100 articles met the inclusion criteria for providing systematically measured benefits from implementations of relevant eHealth technologies (where 'relevant' involved a variety of criteria to focus on transformation, boundary-crossing and consumer-centred interventions).

Herein we focus on three specific interventions that were identified through the systematic review that are particularly relevant to the conference theme, "Person Centred Healthcare: eHealth as an enabler" and showed particularly strong positive impact on health outcome. These success stories lead us to consider how to realise the benefits of such technology on a larger scale.

2. Results

Fifty of the 100 articles identified in the systematic review concern provider-centric functions of clinical decision support, Electronic Health Records (EHRs), Labs and Pharmacy. The other fifty concerned 'consumer-domain' systems (e.g., Internet sites for use by consumers), telemedicine systems (excluding 'straight' videoconferencing and systems serving only to connect provider sites to other provider sites) and portals (e.g., allowing consumer access to EHRs and self-service appointment booking). Interventions evaluated in this latter set often involved a composite of features – e.g., online education, telemonitoring, online communications and EHR access intermingled in a single intervention.

Three of the consumer-domain systems identified which have particularly impressive evidence of health outcome improvement are:

1. The web-based **Puff City Asthma Management Program** focuses on three core behaviours – controller medication adherence, rescue inhaler availability, and smoking cessation/reduction – and consists of four consecutive educational computer sessions that make use of both normative and ipsative ("compared with your last session") feedback. Access to Puff City as compared to a randomly-assigned control Web site provides significant reduction in symptoms and hospitalisation for urban, African-American high school students (98% African American, 49% Medicaid enrollees, mean age 15.2 years). The students were able to access Puff City from school.

2. Automated monitoring of an **insulin pump at home, with family uploading of data** to the Medtronic Carelink Internet site, significantly improved HbA1c in rural and urban children with Type1 diabetes. Carelink users (almost always parents, occasionally teens for themselves) uploaded pump and glucometer data a mean of 2.2 times per month. Parents were instructed to review reports on the data, and it was reviewed by their diabetes care provider. A mean of 10 minutes was spent by the provider to review a patient report and e-mail the patient's parent.
3. Health outcome improvements were found by Ottawa based researchers with a **3-month post-discharge telemonitoring intervention for heart failure and angina patients**. The intervention involved video conferencing (at least weekly) with a nurse as well as phone line transmission of weight, blood pressure and ECGs. An electronic patient record including nurses' notes and the transmitted data was maintained at the Heart Institute. The intervention resulted in significant reduction of hospital admissions (51% reduction) and days spent in hospital (61% reduction) for angina patients, and improved quality of life and functional status in all patients.

3. Discussion and Conclusions

The three studies highlighted herein fit with a growing evidence base of success in consumer-oriented eHealth interventions for chronic conditions, notably a meta-analysis of interactive health communications applications for chronic conditions which finds significant positive improvement for participant knowledge, social support and clinical outcomes [5]; and a meta-analysis of outcome measures assessed in computer-assisted diabetes education studies that found that 82% of trials (16 of 19) had at least one measured outcome significantly improved, with 42% of the total measured outcomes significantly improved [6]. Nonetheless, it must be said that few evaluations of high quality are available. Even among these select articles, the CareLink sample is small (98 children divided among those without access, non-users and users) and not randomly assigned (although the authors argue that use of CareLink is the best explanation of improvements achieved in the user group over non-users). The Puff City evaluation relies on self-reported outcome measures.

In terms of the nature of successful interventions, it is notable that the health consumers are not passive in these three illustrative systems. While the latter two involve telemonitoring, the parent is an active participant in data logging, review and implementation of provider advice for the insulin pump system. For the heart monitoring intervention, patient knowledge assessment and individualised self-care education via videoconferencing are key components.

While a referral coordinator was the only per-user provider cost for Puff City, the other two applications require the commitment of clinical staff to online communications activities. Despite the demonstration of clinical improvements, a convincing case for cost effectiveness of consumer-centred interventions is badly needed to support wider roll-out and sustainability. Realising the full potential of such interventions will change the shape of 'the health system' and the roles of healthcare workers.

The success of these exemplar studies invites emulation, but will require adaptation of the implementations. Puff City, for instance, is highly tailored to its target demographic. More fine-grained studies are needed to identify the features of these complex and tailored interventions that are critical to their success.

4. Acknowledgments

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5. References

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