An Integrated Electronic Lifestyle and Mental Health Patient Self-Assessment for General Practice: Design and Initial Field Study

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Abstract

The Case-finding and Help Assessment Tool (CHAT) is a validated self-administered lifestyle and mood assessment assessing problem drinking, smoking, other drug use, gambling, anxiety, depression, abuse, anger and physical inactivity. Herein we present development and initial acceptability assessment of an electronic version (eCHAT) for use by patients at the general practice immediately prior to consultation with their general practitioner (GP). The system is designed to allow patients to undertake the eCHAT interview using a touchscreen display and to then provide the assessment data to the GP through their Practice Management System (PMS) for follow-up discussion with the patient. After initial feedback and subsequent minor modifications in a laboratory setting, the tool was deployed consecutively to two general practices. Fifty-one consenting adult patients completed a feedback survey. In addition to the patient feedback, a focus group of GP users, developers and researchers identified further issues for refinement of the system. Initial issues included the challenge of achieving a simple and reliable user interface design for patients to identify themselves. Subsequent to modification for this, eCHAT is found to be usable and acceptable for patients in the GP setting. In response to the focus group feedback, the PMS display for use by the GP in consultation has been modified to provide summary as well as detailed information about the eCHAT results. Further research directions include a randomised controlled trial to assess the impact of eCHAT screening on overall quality-of-life, and development of Web and mobile interfaces.

1. Introduction

Increasing focus on preventive care in general practice settings necessitates identifying lifestyle and mental health risk factors for early intervention. Important risky behaviours which can influence health and well-being include misuse of tobacco, alcohol, recreational drugs and gambling and physical inactivity. Mental health issues include anxiety, depression, difficulty controlling anger and being hurt, threatened or controlled by another person.

The Case-finding and Help Assessment Tool (CHAT), a short self-administered tool for lifestyle and mental health assessment of adult (16 years and over) patients in primary health care, has been developed by a multi-disciplinary team (including the fields of general practice, nursing and psychology) from the School of Population Health at the University of Auckland. The tool assesses for the risky lifestyle behaviours and mental health issues listed above. For each lifestyle domain where a problem is indicated, patients are asked whether this is something with which they would like help, either during this consultation or at a later date. The CHAT is designed to be used as a case-finding tool in primary care to promote greater attention to lifestyle and mental health risk factors. By being applied systematically, rather than opportunistically, it is expected that there will be a greater rate of identification of problems and subsequent appropriate management.

The CHAT has undergone testing for acceptability (evaluation demonstrated that patient objection to potentially sensitive questions is minimised) [1], reliability [1] and validity [2-3]. In studies of the two depression questions [4] and of the anxiety question [5] plus the help question, the addition of the question inquiring if help is needed has been found to increase test specificity (reducing false positives) while maintaining sensitivity. The multi-item nature allows for assessment of co-morbidities [6]. It has been assessed with Māori and Pacific [7] and Asian peoples [8] and has high acceptability with patients. General practitioners (GPs) and practice nurses are keen to use the tool once available.
Up until this point, the CHAT has been studied as a paper-based instrument. In the present work we aim to create and establish the acceptability of an electronic version (hence, the eCHAT). To integrate with the general practice environment, our eCHAT features:

- Input via a touchscreen system to be physically located at the practice such that adult patients can be directed to self-administer an eCHAT while waiting to see the GP; and
- Integration of the results with the Practice Management System (PMS) software such that the GP can view, and potentially follow-up, the eCHAT findings during the consultation.

Moreover, a further benefit of PMS integration is the potential to track the scores acquired in the eCHAT (such as the PHQ-9 depression scale [9]) to monitor individual patient progress or to provide measures for following overall practice caseload characteristics and performance. The integration of the eCHAT with the PMS also allows for decision support options for positive cases, including patient education, brief interventions, prescription of medications or referrals to other appropriate health provider, services or agencies.

In this paper we present the design and initial field study findings assessing the feasibility of eCHAT for routine use in general practice.

2. Materials and Methods

2.1. eCHAT Design

The eCHAT is designed to leverage the experience with the paper-based CHAT while exploiting the opportunities inherent in online delivery and being usable for the broadest possible adult audience.

Practical considerations led to an early decision to utilise a large touchscreen display along the lines of the central interactive component of an automated banking machine or an airport self-check-in kiosk. While smaller devices – with form factors ranging from 3G phones to tablet PCs – are promising in terms of potential usability, it seemed that such devices would be unacceptably exposed to damage or theft in a relatively unsupervised waiting room environment.

Touchscreen systems have, in fact, met with acceptance in similar settings. A patient assessment system (PAS) with a touchscreen user interface for patients and producing a one-page summary for the physician was used by two outpatient mental health clinics by patients with severe mental illness while awaiting their scheduled appointments. This PAS – which reviewed (1) depression/functioning, (2) interpersonal problems, (3) psychosis, (4) substance abuse, (5) self-harm, (6) medication compliance and (7) side effects – was considered enjoyable and easy to learn and use by patients [10]. A touchscreen-based assessment of pain, fatigue and global health using visual scales in a rheumatology setting was found to be valid as compared to paper forms [11]. A touchscreen PHQ-9 was found to have good construct validity and high feasibility (with 96% of patients attempting the full PHQ-9 completing it) for cancer patients in a waiting room setting, taking an average of about two minutes per patient to complete [12].

Moving from paper to online offered the opportunity automate a streamlined workflow based on user responses. For each topic area, the eCHAT asks one or two 'gatekeeper' questions which, if negative, allow further detail or scoring to be skipped. Patients who indicate problems with tobacco, alcohol or other drug use are presented with the relevant sections of the World Health Organization Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), their responses are scored and interpreted (low, medium or high risk) and provided in the GP summary. Similarly, positive responses to the depression or anxiety questions trigger the PHQ-9 or GAD-7, respectively, which gives interpreted scores for depression or general anxiety disorder. A negative response to the gatekeeping question(s) also skips the question on whether the patient would like help with that issue. In this fashion, the pathway of most patients will lead to them being confronted with relatively few of the questions in the eCHAT repertoire, potentially aiding acceptability and shortening the duration of the interview.

We opted for a one-question-per-screen design, like the severe mental illness PAS [10], as this allows the patient to focus and provides screen real estate for large fonts and buttons (much like an automated banking machine). However, unlike the PAS, we opted against a complementary audio presentation of the question as we felt it impractical for most New Zealand general practice settings to require a private room for the interview. Instead, we assume only that the system can be situated such that the patient receives adequate privacy by having the patient somewhat out of the way of main patient seating (e.g., with their back to a wall). Figure 1 illustrates a typical patient question presentation – in this case, one that appears after the patient has indicated that they are a smoker.
New Zealand is recognised as in the top tier of nations with respect to information technology use in general practice [13]. To leverage and extend New Zealand general practice PMS capability, we wanted the results of the touchscreen interview to be highly integrated with the PMS. Thus, rather than printing a summary page (as per [10]), we wanted the results to be available on the PMS as data: (a) summarised for the GP; (b) available for the GP review in detail and possibly extend (e.g., if the patient exited the interview early), and (c) integrated with compatible data elements in the PMS data repository (e.g., so scores could be aggregated across the practice and/or charted over time).

The workflow supported by our solution is illustrated in Figure 2. Touchscreen hardware was acquired – initially an ELO All-in-One Desktop PC 1529L unit and subsequently (due to the former model no longer being available) a 3M 17” MicroTouch™ M170 Dispersive Signal Technology (mechanical touch detection) touchscreen monitor with an ASUSTek Eee Box system unit. In each case, the units are PCs running Microsoft Windows XP and with touchscreen technology approximating the function of a mouse from an application programmer’s perspective. The ELO unit embedded the PC system and touchscreen display in a single casing, whereas the Eee Box system unit is discretely placed behind the touchscreen. A PMS vendor (MyPractice) was contracted to extend their PMS functionality to provide the eCHAT interface for patients running on the touchscreen hardware and providing its results data into the database of the PMS itself. The PMS vendor also implemented a form presentation of the eCHAT interview data to support the GP’s view of the results during the patient consult.
2.2. Assessment and Refinement Protocol

We have taken an approach of iterative feedback and refinement in pursuit of a system well-attuned to user needs. After initial development, feedback from the research team and other staff of the Department of General Practice and Primary Health Care was collected in a laboratory setting (via the Health Technology Laboratory of the National Institute for Health Innovation). This informed minor modifications prior to field study.

The eCHAT was fielded in first one and then another Auckland metropolitan area general practice. In both cases this involved identifying a location for the touchscreen system and upgrading the PMS software to recognise the eCHAT inputs (which, in most respects, is little different from adding any other form to the system). Patients were recruited by a research assistant from the general practice waiting room. Those who consented to participate sat at the touchscreen terminal and proceeded to identify themselves to the system by name and date of birth and then undertake the eCHAT.

Patients could flag the research assistant for help if necessary, or withdraw if they found the line of questioning unacceptable. It was explained that they should exit if called to see the GP before completing the interview (and, moreover, the system would exit and submit their work to the PMS if left idle for more than one minute).

After using the eCHAT patients completed a survey regarding their experience of the system, whether questions were understandable and acceptable, and to express concerns and level of support for such a way of working generally. Patients were recruited in the first practice until systems-related problems were minimal (with active revision of the system configuration as necessary). Once operations appeared stable, the field study moved on to the second practice to recruit further patients for their feedback. This stage ended in late 2009. At this point a focus group of the GPs of the practices along with vendor and researcher representatives identified system issues from the GP perspective. Subsequent to these findings the system was further modified and will shortly be returning for an addition field study phase at the second practice.

The feasibility study received approval from the Auckland Regional Ethics Committee (Reference No: NTX/09/04/034).

3. Results

Subsequent to the laboratory feedback phase, the system was installed in the first feasibility study practice.

![Patient self-identification via touchscreen](image)

**Figure 3 – Patient self-identification via touchscreen (illustrating one-field-per screen interaction).**
Preliminary field experiences identified major usability issues for patient self-identification via the touchscreen interface. An initial multi-field screen design was subsequently apportioned to one field per screen. This redesigned version has first given name requested on one screen and surname on the next (with given name still displayed, but editable only by going ‘Back’ to the previous screen). This redesign eliminated the concept of inter-field navigation from the user interface, which, while a common concept on a conventional Web page, is less intuitive or familiar on a touchscreen (e.g., being outside of the equivalent user experience with an automated banking machine). Figure 3 illustrates the resulting screen design. Another self-identification usability issue was to flexibly and correctly identify names with spaces and apostrophes. There were also initial technical issues with the touchscreen system losing its connection to the PMS that were resolved.

Recruitment proceeded smoothly with 30 patients recruited at the first practice and, once the system was deemed to be performing smoothly from a technical perspective, 23 patients recruited at the second practice. In total, 51 of the 53 patients who used the eCHAT completed the feedback survey. Key findings are summarised in Table 1. An additional 19 patients declined to participate – reasons given are summarised in Table 2.

The patient feedback has driven a number of minor revisions to improve question wording and flow.

The focus group identified that a compact summarisation of the patient’s eCHAT results for the GP was essential to usability in the consultation. eCHAT reviews several domains and the full set of questions with their responses yields a

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**Table 1 – Summary of survey responses from patients using eCHAT in waiting room.**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Blank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Did you find the touch screen easy to use?</td>
<td>45</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>(88%)</td>
<td></td>
<td></td>
<td>(2%)</td>
</tr>
<tr>
<td>Did you find all the questions clearly phrased and easy to understand?</td>
<td>43</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>(84%)</td>
<td></td>
<td></td>
<td>(2%)</td>
</tr>
<tr>
<td>Do you think that this is an appropriate thing for your GP to be offering?</td>
<td>46</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>(90%)</td>
<td></td>
<td></td>
<td>(4%)</td>
</tr>
<tr>
<td>Are there any questions you object to being asked?</td>
<td>1</td>
<td>49</td>
<td>1</td>
</tr>
<tr>
<td>(2%)</td>
<td>(96%)</td>
<td></td>
<td>(2%)</td>
</tr>
<tr>
<td>Did you have any concerns about privacy with the process?</td>
<td>0</td>
<td>45</td>
<td>6</td>
</tr>
<tr>
<td>(0%)</td>
<td>(88%)</td>
<td></td>
<td>(12%)</td>
</tr>
<tr>
<td>Did the GP have access to your responses during the consultation?</td>
<td>24</td>
<td>7</td>
<td>14 + 6 unsure*</td>
</tr>
<tr>
<td>(47%)</td>
<td>(14%)</td>
<td></td>
<td>(27% +11%)</td>
</tr>
<tr>
<td>Did you discuss any of your responses on the touch screen during your consultation with your GP?</td>
<td>13</td>
<td>27</td>
<td>11</td>
</tr>
<tr>
<td>(25%)</td>
<td>(53%)</td>
<td></td>
<td>(22%)</td>
</tr>
<tr>
<td>If yes, did you find this helpful?</td>
<td>9 **</td>
<td>2 **</td>
<td>2 **</td>
</tr>
<tr>
<td>(70%)</td>
<td>(15%)</td>
<td></td>
<td>(15%)</td>
</tr>
</tbody>
</table>

* 6 patients wrote in “unsure” or “don’t know” for this question  
** Only includes responses from those 13 who had answered yes to the prior question

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**Table 2 – Reasons patients gave for declining participation.**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not comfortable with questions</td>
<td>3</td>
</tr>
<tr>
<td>Time constraints – didn’t want to be held up after consultation</td>
<td>2</td>
</tr>
<tr>
<td>Feeling unwell</td>
<td>1</td>
</tr>
<tr>
<td>Hard of hearing (uncomfortable to participate)</td>
<td>1</td>
</tr>
<tr>
<td>Mental illness</td>
<td>1</td>
</tr>
<tr>
<td>Not interested</td>
<td>1</td>
</tr>
<tr>
<td>Happy with transferring this info to GP verbally</td>
<td>1</td>
</tr>
<tr>
<td>No comment made</td>
<td>9</td>
</tr>
</tbody>
</table>
display that must scroll (or tab) to fit the display real estate. The resulting solution was to provide a summary at the top of the form display with clear signals as to areas where issues are arising, scores and their interpretations for the validated instruments incorporated into eCHAT (e.g., the PHQ-9) and indication of patient help request status. This is illustrated in Figure 4.

4. Discussion

Patients find lifestyle and mental health screening in the general practice waiting room via a self-administered touchscreen interface to be acceptable and usable. This can be technically integrated with the general practice PMS database, but GPs require succinct summarisation of the findings in order to use them during consultation with the patient. Lifestyle issues, mental health and chronic disease are all inter-related. People with co-morbidities are more likely to be anxious and / or depressed [14] and relationships may be bi-directional. Depressed people are less likely to exercise. Furthermore, there is some evidence that exercise is effective as an intervention for depression [15]. Pre-consultation enquiry and recording of issues of concern adds greater efficiency to the time-strapped general practice consultation, and allows the GP to work with the patient to address issues that otherwise may have not been raised in the course of that visit.

Opportunistic screening in the general practice setting is likely to have limited effect compared with routine screening by invitation [16]. Given consultation time restraints, compliance with routine screening regimes can be low for both patients and practitioners [17-18]. For this reason, the eCHAT as a tool for systematic use with adults attending general practice clinics offers huge promise to boost the detection and management of lifestyle and mental health issues in the community.
Given the success of the paper based CHAT [1-8], and the success of touchscreen based self-administered patient assessment systems in primary care settings internationally [10-12], it is unsurprising that an eCHAT system is feasible in the New Zealand general practice setting. However, the experience of the initial field studies and focus group reported herein illustrate the value of careful iterative feedback even when the pathway appears quite clear. Initial problems, such as those we encountered with the patient self-identification dialog or the summarisation of findings to GPs on their PMS display, nonetheless more subtle issues around question phrasing and flow, could easily advance undetected in a system rushed to production use or large-scale trial.

While we have found the system to be acceptable, we must acknowledge the non-trivial percentage of patients who declined to participate (26%). It is unclear how this rejection may apportion between an unwillingness to participate in the research study as compared to a rejection of an online lifestyle and mental health survey per se. Also, the results are based only on two practices. Broader GP feedback in particular will be valuable.

The research reported herein is preparatory to a randomised controlled trial (RCT) that will assess quality-of-life improvement over six months for patients having an eCHAT interview in general practice as compared to those who do not. As a further direction, the eCHAT could be extended with minimal modification for availability as a Web browser and/or mobile phone based service.

The CHAT is included as a recommended screening/case-finding tool in the NZ evidence-based best practice guideline on the identification of common mental disorders and management of depression in primary care [19]. In 2009, the Ministry of Health funded the Best Practice Advocacy Centre (BPAC) to make the CHAT, along with several other tools, freely available on GPs’ practice management systems nationwide. However the version of the CHAT made available to GPs through the PMS is as a PDF form which takes a number of ‘clicks’ to access. Because it cannot be entered electronically nor be self-administered by the patient, this format does not facilitate practices to easily use the CHAT either before or during consultations. Standardisation with the validated version would be highly desirable both to maximise evidence based effectiveness and to support comparability of data.

Cardiovascular risk assessment tools such as PREDICT are already available in New Zealand, which translate clinical information into patient-specific recommendations and decision support and provides on-going care management tools [20]. The eCHAT will follow this same model, with one-click links to decision support. For all eCHAT conditions the practitioner and the patient can discuss the issues and decide what if any interventions might be suitable and chosen. For all conditions specific information sheets can be either printed or emailed to the patient. Goals may be set, further appointments scheduled or referrals made to other practitioners or agencies. There are also a number of interventions possible that are specific for each.

5. Conclusion

We have taken a lifestyle and mental health self-assessment tool that has been validated in paper format (the CHAT) and adapted it for online delivery in the General Practice environment. The resulting eCHAT is delivered via a touchscreen interface for the patient in the waiting room and provides the data in an integrated format into the PMS software for review by the GP during consult. The eCHAT is found to be usable and acceptable by patients in this setting. We are currently making refinements, particularly to the GP summary presentation, and reconfirming feasibility general practice in preparation for an RCT to evaluate quality-of-life gains. It is intended that having a tool to support wide-scale case-finding of the adult population on the CHAT issues will significantly enhance awareness and hence management of patient lifestyle and mental health in general practice.

6. Acknowledgments

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7. References


