Outcome scores collected by touchscreen: medical audit as it should be in the 21st century?

SEAN DIXON¹, TIMOTHY BUNKER², DANIEL CHAN²

¹Department of Trauma and Orthopaedics, Royal Cornwall Hospital, Truro, Cornwall, UK

²Department of Trauma and Orthopaedics, Royal and Exeter Hospital, Exeter, Devon, UK

ABSTRACT

INTRODUCTION Collecting outcome scores in paper form is fraught with difficulty. We have assessed the feasibility of, and patient's attitude towards, entering scores using a touchscreen.

PATIENTS AND METHODS A touchscreen was installed in the orthopaedic out-patient clinic. If relevant, patients were asked to complete either an Oswestry Disability Index (ODI) or Oxford Shoulder Score (OSS) using the screen. Patients were given written instructions and their hospital number by the receptionist who had no further input. Scores were completed with two identifiers. A paper questionnaire was used to assess computer experience and attitude towards the touchscreen.

RESULTS A total of 1348 patients, average age 50 years, successfully completed a score in the first 12 months. One-third were over 60 years. Overall, 91% correctly entered their hospital number and date of birth, falling to 84% in patients over 70 years. All patients were identifiable. The average time to complete the scores was 4.7 min rising with age. Of 170 patients completing the paper assessment of the touchscreen, one-third had little or no experience of computers and a third were over 60 years. Of patients, 93% were willing to repeat the score using the touchscreen to monitor progress. Two-thirds found it easier to use than expected. Only 10% would prefer a paper score. These results were maintained among patients over 60 years. Only two were unable to complete the score and 80% of those potentially eligible did so. The remainder were called to clinic before the touchscreen was free.

CONCLUSIONS Orthopaedic outcome scores can be collected in very large volumes using a touchscreen. Data are then in an immediately usable form. The method is acceptable to patients, independent of age and computer experience. Even in the oldest patients, the accuracy is higher than for paper versions of the score. Combined with operative data, this simple method has the potential to provide a very powerful audit tool indeed.

KEYWORDS

Outcomes Assessment – Audit – Computers

CORRESPONDENCE TO

Sean Dixon, Department of Trauma and Orthopaedics, Royal Cornwall Hospital, Truro, Cornwall TR1 3LJ, UK
e: dixonsm@doctors.org.uk

Validated, patient-based scores such as the Oxford Shoulder Score (OSS) and Oswestry Disability Index (ODI) provide a means of assessing functional impairment resulting from a limb or joint problem.^{1,2} They can be collected independently from the operating surgeon who may otherwise introduce observer bias.^{3–5} They are reproducible and, when applied pre- and postoperatively, they enable surgeons to evaluate the effect of their treatments.

To administer scores routinely in paper form is possible but the data then need to be collated or entered onto computer to be usable. Retrieving the scores from notes is time consuming and unreliable and there is considerable scope for error in completing paper forms.^{6,7} The aim of this study was to assess the feasibility of scoring large volumes of patients with minimal supervision using a touchscreen, thereby collecting the data in an immediately usable form.

Patients and Methods

A touchscreen was installed in a private area of the orthopaedic out-patient department. This was an inexpensive, self-contained personal computer, mounted vertically in a purpose-built, lockable cabinet. It was positioned such that it could be used easily from a chair, a wheelchair or while standing and with minimal shoulder movement. Microsoft Access was used to create an on-screen version of four different outcome scores using clear language and large text.

Patients presenting to relevant clinics were asked by the receptionist if they were attending with a shoulder or back problem. Those answering yes were given a laminated card. The receptionist then wrote their hospital number on the card and ticked a box indicating which score they should complete. The touchscreen was pointed out to the

patient and they were asked to sit at it and follow the instructions on the screen when it was next available. No further help was provided.

On touching the screen, patients were provided with a short explanation of the rationale behind scoring. They were then asked to select the OSS or ODI from two other scores and to enter their hospital number from the card. Having completed the shoulder score, they entered their date of birth. The score was thus bounded by two unique identifiers.

Time taken to complete the scores, the error rate in entering the hospital number and date of birth, average age and the scores themselves were recorded. The chi-squared test and Student's *t*-test were used to evaluate the difference between patients aged under 70 years and those over 70 years in terms of error rates and time taken, respectively.

Age, experience of computers and attitude to the touchscreen were assessed by a separate paper questionnaire after completion of the touchscreen score. Patients were also asked to give details of any help they had needed.

Results

In the first year of use, 1348 patients successfully completed a score. The average age was 50 and one-third were over 60: 91% correctly entered their hospital number and date of birth, falling to 84% in patients over 70 (Fig. 1). The difference in the error rate between those under 70 years and those over 70 years was significant ($P < 0.0001$). 22% of patients completing the OSS did so for both shoulders.

The average time taken to complete the scores was 4.4 min for the OSS and 5.0 min for the ODI rising with age (Fig. 2). The difference between the mean times for patients younger and older than 70 years was highly significant ($P < 0.0001$) for both the OSS and ODI.

Monitoring in the first 5 months of the study showed that 80% of those potentially eligible completed a score. The remainder were called to clinic before the touchscreen was free. Only two patients were unable to complete the score. One was unable to get sufficiently close to the screen in her motorised wheelchair and the second was too disabled to touch the screen. Fifteen patients refused.

A total of 170 patients completed the paper questionnaire assessing attitudes to, and experience with, computers. Of these patients, one-third rarely if ever use a computer and a quarter were not very or not at all comfortable with computers. Despite this, 93% of patients were willing to repeat the score using the touchscreen to monitor progress. Only 10% would prefer a paper score. These results were maintained among patients over 60 years.

Discussion

It has previously been shown that scores gathered by touchscreen correlate well with paper versions.^{7–10} Our results show that this method is acceptable to patients, irrespective of age and computer experience and confirm the findings of similar studies in other settings.^{6,7,11}

The hospital numbers at our institution comprise five digits and two letters including the letters B, I and S which

Figure 2 Time to complete score.

are easily confused. The most elderly patients in our study were, nevertheless, able to enter identifiers with an accuracy of 84% and the overall success rate was 91%. This is very much higher than the success rate for paper scores which may be no better than 60%.⁷ Where errors had occurred, it was possible in all cases to identify the patient from the details entered. Manual checking of the data introduces staff time or cost, however.

If very low error rates are required and manual error checking is not possible in a clinic where patients are predominantly elderly, consideration should be given to other means of identifying patients. Members of staff might enter identifying details, issue patients with a swipe card or with a machine-readable ticket. Accuracy would be further enhanced by integration with existing hospital networks.

The touchscreen offers other advantages. Multiple language versions of the scores can readily be provided and text on the screen is generally very much larger than on paper. Common errors made on paper forms include omitted questions, incorrectly selecting more than one answer and omitting date and side. These can be eliminated altogether with a touchscreen. A central position in the outpatient area with nearby seating is important in maintaining a steady flow of patients through the system.

Conclusions

The success of this simple system suggests that the routine scoring of all patients is now feasible. It is surprisingly inexpensive to achieve and exciting in the prospect it creates of comprehensive data collection. Combined with operative details it has the potential to create a very powerful audit tool.

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