Economic evaluation of voice recognition for the clinicians' desktop at the naval hospital

Roosevelt Roads

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Voice recognition (VR) plus Electronic Medical Record keeping (EMR) to transcribe clinical encounter notes.

Type of intervention
Other (record keeping).

Economic study type
Cost-effectiveness analysis. The authors claimed to have conducted a cost-benefit analysis (CBA). However, the benefits, including 'fast turn around time for documenting notes in patient charts', were not assigned a monetary value.

Study population
The study population consisted of adult patients in the Family Medical Centre of the US Naval Hospital, Roosevelt Roads, Puerto Rico.

Setting
Secondary/primary care (family medical centre in a hospital) for the effectiveness study, extended to the Naval Hospital, Roosevelt Roads (NHRR) for costing.

Dates to which data relate
Dates for the effectiveness evidence were December 1996 to February 1997 for the patient satisfaction and consultation duration data and November 1996 to March 1997 for the thoroughness and time to document data. The date for resources used for alternative A was 1996. The price year was 1996.

Source of effectiveness data
Effectiveness data were derived from two studies (see dates above).

Link between effectiveness and cost data
The cost data for alternative A referred to resource use for the intervention. The cost data for alternative B did not refer directly to any resource use for the comparators in the study to determine effectiveness, but seemed to be based on a link made by the authors regarding the consequences of hiring transcriptionists for manual recording.

Study sample
The paper gave the results of several different studies that were carried out on different samples. However, those for a 'perception questionnaire' and 'implementation questionnaire' seemed to relate to a study reported elsewhere.
A patient satisfaction questionnaire was given to 60 patients who were randomly allocated to three doctors using one of three methods of note recording. There were 20 patients in each group (Group A: manual, Group B: keyboard, Group C: VR). No details of allocation, randomisation, power calculations or representativeness of the population were given.

In a second study, 'Clinical encounter narrative scenarios' were distributed to the three doctors to record the information, presumably as a simulation of a patient encounter. The study took place in one centre.

**Analysis of effectiveness**
The analysis was based on intention to treat. Patient satisfaction in the first study, and thoroughness in the second, were used as measures of effectiveness. The patient satisfaction questionnaire was stated to be 'patterned after the Service Evaluation and Family Practice Clinic Questionnaires' and used a 5 point Likert scale. Thoroughness was measured by the number of times a recording method was reported as being the most thorough 'i.e. the most complete, legible, and accurate' by a set of 5 clinicians.

**Effectiveness results**
There was no statistical analysis of the patient questionnaire results. For the patient satisfaction questionnaire, it was reported that 85% in Group C responded with the top 2 categories of the Likert scale concerning the information given to them. In fact, out of 10 questions comparing A, B and C, the frequencies of scoring the highest percentage for the top 2 categories were: A:0, B:7 and C:6, although this summary was not reported. VR was selected as being the most thorough 9 out of 15 times, and manual recording was never selected.

**Clinical conclusions**
The authors described the questionnaire results as showing that there was no significant effect on patient-clinician relationships of using VR and that it was more thorough.

**Measure of benefits used in the economic analysis**
There was no summary measure of benefit, implying a cost-consequences analysis.

**Direct costs**
Resource quantities included the duration of interview in the first study. The mean visit length for 25 minutes for group A, 27.3 minutes for group B, and 24.5 minutes for group C. Clinical encounter narrative scenario results of time to complete record were given as a graph of means, medians and standard deviations. The graph showed that VR took longer than manual recording, and slightly shorter than keyboard recording. However, these results were not used to estimate costs. The costs were estimated from the cost per clinician of $1,400 for the VR equipment and hiring 4 extra transcriptionists at $25,000 per day for alternative A, and dictaphone equipment at $1,000 per clinician and a transcription system at $10,000 for alternative B. There were stated to be 32 clinicians in the NHRR. Costing was only undertaken for one year of the project, and therefore discounting was not relevant. In fact no running costs were reported. The price year was 1996. The costs of alternative A were based on data for introducing VR for the clinicians on the project. The source for resource quantities or prices for alternative B was not reported, except salary as 'GS-5'. No difference between marginal and average costs was reported and no indication was given as to whether or not costs of learning the new technology had been included.

**Statistical analysis of costs**
Statistical analysis of costs was not carried out.

**Indirect Costs**
Indirect costs were not reported.
Currency
US dollars ($).

Sensitivity analysis
No sensitivity analysis was carried out.

Estimated benefits used in the economic analysis
See effectiveness results above.

Cost results
The cost of alternative A was $44,800 and the cost of alternative B was $142,000.

Synthesis of costs and benefits
This was not applicable given the cost-consequences nature of the analysis.

Authors' conclusions
The authors concluded that 'the findings indicated the following primary health care advantages (for VR): increased productivity with comparable or better accuracy; and negligible effect on patient satisfaction'. They also concluded that alternative A offers NHRR clinicians greater potential benefits at lower cost than that required to implement alternative B.

CRD COMMENTARY - Selection of comparators
No explicit justification for the choice of comparators was provided, although the keyboard and manual methods seem to represent current practice. The study used a different comparator in the cost analysis from that used in the effectiveness analysis, therefore bringing the status of the paper into question. A measure of resource use, duration of interview, was included for the same comparators as the patient satisfaction results, although this was not used to calculate costs.

Validity of estimate of measure of effectiveness
The analysis was based on a study design that was inappropriate for the study questions, given the lack of link between measures of effect, resource use and cost. No evidence was given to show that the patients were representative of the general population or that the patient groups were comparable. Although patient satisfaction is a useful measure of effectiveness to supplement health outcome, there was no statistical description, analysis of difference or possible confounding. Although only three doctors took part in the study there was no attempt to argue that they were representative of all doctors. There was no standard measurement of 'thoroughness' or accuracy.

Validity of estimate of measure of benefit
Not applicable.

Validity of estimate of costs
The main problem was the use of a different comparator from that used in the effectiveness study. Although alternative A seemed to represent at least some of the costs of VR, alternative B seemed to be an extrapolation of doubtful validity from manual recording. It was useful to report duration of interview and recording, but again these were on different samples, with no details of method being provided. As the authors only calculated costs for one year they underestimated the difference between the costs of the two methods considered. This was because labour costs of the alternative method would carry on in future years and the costs of VR in future years are likely to be very small. This
would have made the authors’ conclusions weaker. No statistical or sensitivity analyses were carried out. For example there was no attempt made to establish at what wage hiring medical transcriptionists would become cheaper than using VR.

Other issues
The authors referred to another study that described patients’ attitudes to doctors using computers and stated that the computers were used differently from this study; but they did not explain the way in which they were used differently. The issue of generalisability to other settings was not addressed and the authors appeared to present their results selectively in terms of patients’ satisfaction. The first questionnaire, which was distributed at a conference, yielded a low response (30%). The authors did not comment on the fact that this was low or that it was probably biased towards people who were enthusiastic about the introduction of VR. The authors only presented part of the interviews with staff who had to introduce VR, and it was not clear what proportion of the total information available this represented. Reading the interviews one can see that there were some real enthusiasts and some more reluctant users. As far as other institutions are concerned, they would require a realistic idea of the likely response of physicians to the introduction of VR, which cannot be obtained from this paper. The authors acknowledged the need for strong support from the Management Information System to introduce the new technology, (something they did not cost). This was the only limitation reported.

Implications of the study
The research question was potentially valuable and the results do indicate that, when judged by patient satisfaction, VR was similar to the other technologies, and, by some measure of thoroughness, was better and cheaper than the other technologies. However, this must be viewed in the context of major methodological problems. Ideally another study, in which two similar institutions (or two similar sections of the same institution) were compared, one of which introduced VR, and the other did not, would be helpful. There should be sufficient doctors and patients in the study so that the authors would be able to derive reliable conclusions. In the study there should be a convincing measure of patient and doctor satisfaction, and of accuracy of note taking. The cost data should be given directly relating to the resources used to gain patient satisfaction by intervention and comparators.

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Other publications of related interest


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