A descriptive feast but an evaluative famine: systematic review of published articles on primary care computing during 1980-97

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Authors' objectives
To appraise findings from studies examining the impact of computers on primary care consultations.

Searching
MEDLINE, the Science Citation Index, the Index of Scientific and Technical Proceedings, EMBASE and OCLC ProceedingsFirst (via FirstSearch) were searched from 1980 to 1997. Non-English language journals were included in the search. Books, bibliographies and conference proceedings of related topics were reviewed, as were citations in these sources. References provided by colleagues were also reviewed. The Cochrane Effective Practice and Organisation of Care Group provided references of articles containing the term 'computer', and authors active in the field were contacted for information on studies in progress and unpublished work.

Study selection
Study designs of evaluations included in the review
Prospective studies (controlled and uncontrolled) were included.

Specific interventions included in the review
The use of any computing system designed for use by a doctor or nurse in primary care. Studies on the validation of data or administrative use were excluded, as were studies in dentistry or veterinary medicine.

Participants included in the review
General practitioners and patients involved in primary care consultations.

Outcomes assessed in the review
The outcome measures were the effect on the consultation process, in terms of the impact on doctors' performance and patient outcomes; attitudes towards computerisation; and potential barriers to effective implementation.

How were decisions on the relevance of primary studies made?
Both authors independently reviewed the abstracts of the articles and then, having excluded the unsuitable studies, the full-length articles. Any differences in the evaluations were discussed and a consensus was reached for each study. The K-coefficient for inter-rater agreement was calculated.

Assessment of study quality
The methodological quality of the included experimental studies (randomised controlled trials, clinical trials, and controlled before-and-after studies) was assessed using a scoring system based on that proposed by Johnson et al. (see Other Publications of Related Interest). A method of scoring non-experimental studies was developed, using a two-round Delphi survey to reach a consensus on those methodological criteria to include. Each paper was given a score using the scoring system relevant to its study design. Both authors independently reviewed each included study. An agreed score was given where the quality scoring differed.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

Tables of the extracted data are available on the BMJ website. See Web Address at end of abstract. The categories of data listed were: study design; research topic; participants; effect on performance; methodology score; main outcomes;
positive aspects mentioned; and negative aspects mentioned.

**Methods of synthesis**

How were the studies combined?

A narrative synthesis was undertaken. This combined the studies under headings relating to the following: the impact on practitioner performance (i.e. content of consultation, immunisation rates, performance of preventive tasks, disease management, prescribing); the impact on patient outcomes; and practitioners' and patients' attitudes.

How were differences between studies investigated?

Differences between studies were discussed briefly within the narrative.

**Results of the review**

Eighty-nine studies were included in the review. Of these, 61 examined the effects of computers on practitioners' performance, 17 evaluated their impact on patient outcome, and 20 determined practitioners' or patients' attitudes (all questionnaires or interviews). Nine studies examined more than one aspect.

The 61 studies assessing practitioners' performance comprised 39 randomised controlled trials (RCTs), 2 controlled trials, 5 controlled before-and-after studies, 7 before-and-after studies, 2 case-control studies, and 6 case or time series. The 17 studies assessing patient outcome comprised 11 RCTs, 1 controlled trial, 2 controlled before-and-after studies, 2 before-and-after studies, and 1 case-control study.

The median score for quality was 6 out of 10 (range: 4 to 8). Computer use during consultations lengthened the consultation. Reminder systems for preventive tasks and disease management improved process rates, although some returned to pre-intervention levels when reminders were stopped. The use of computers for issuing prescriptions increased prescribing of generic drugs. However, the use of computers for test ordering led to cost-savings and fewer unnecessary tests. There were no negative effects on those patient outcomes evaluated. Doctors and patients were generally positive about the use of computers, although there were some issues of concern. These included the impact on privacy, the doctor-patient relationship, cost, time and training needs.

**Authors' conclusions**

Primary care computing systems can improve practitioner performance, particularly for health promotion interventions. This may be at the expense of patient-initiated activities, making many practitioners suspicious of the negative impact on their relationships with the patients. There remains a dearth of evidence evaluating the effects on patient outcomes.

**CRD commentary**

The inclusion criteria for selecting studies for this review were broad; this was necessary to answer the review question. The literature search was comprehensive and attempts were made to identify unpublished work. No language restrictions were applied. The validity of the studies was assessed, and results were presented. Study details were discussed briefly in the text and were tabulated in more detail on the Internet. A narrative synthesis was appropriate given the wide range of outcomes assessed.

The authors' conclusions seem to follow from the results presented.

**Implications of the review for practice and research**

Practice: The authors did not state any implications for practice.

Research: The authors suggest a programme of research on the best ways of integrating the computer into the consultation, starting with examples of current best practice and refining these in line with the principles of effective communication. The authors also state that the most fruitful areas of current research are preventive care, prescribing support, chronic disease monitoring, test ordering and hospital referral. Few studies have dealt with nursing research in
general practice, and little has been published on the impact of computer systems on the other members of the primary care team.

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