Improving Information Management in Family Practice: Testing an Adult Learning Model

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Information management training has been neglected in family practice in the UK in the past. An adult learning model for such training is introduced. A pilot study using the adult learning approach showed improvements in information management processes over the six-month study period. The research project described in this paper compares the effectiveness of on-site training using adult learning methods, written information, and no intervention, in 33 family practices in the UK. Nine of the eleven practices in the on-site training group completed the training sessions and eight provided full data, whereas only one of the eleven practices in the written information group, and only one of the eleven practices in the control group provided full data. Preliminary analysis demonstrates that on-site training practices made considerable changes to the information systems in their practices, and appreciated the importance of high-quality data, both for patient care and reporting requirements. Full comparisons of data quality and information management methods are presented, and an assessment of priority training needs for maximum benefit is made.

INTRODUCTION

Family physicians (GPs) in the United Kingdom have been computerising their practices for ten to fifteen years, and over 90% of practices are now computerised. Since 1990, reimbursement of part of the costs of computerisation has been available[1]. Also, since 1994, systems have had to comply with the *Requirements for Accreditation*[2]. Despite these structural changes, however, GPs and their staff are not using their expensive computer systems to their full potential.

Most GP computer systems were originally designed as medical record-keeping systems, and few of them have comprehensive search and reporting facilities[3]. Those that do are rarely used to their potential by practices[4]: indeed, some practices seem unaware of the facilities built in to their systems.

With the development of information technology and its use in primary care, there is increasing scope in the UK for the aggregation of clinical data for use in health needs assessment, health gain programmes, and resource allocation.

The use of computers in UK family practice has developed in an unstructured way, and the training needs of clinicians and practice managers have not been fully assessed or met. In many cases, practices installing a new computer system will have received only minimal system-specific training from the system supplier at the time of the installation. Only a few practices have used their system fully: in direct patient care, in using information to evaluate and improve care, and in managing the practice.

TRAINING NEEDS AND SOLUTIONS

Family practice workers now need an increased understanding of the basic principles of information management, specific skills in using their own computer system, and an appreciation of the wider uses of clinical data. Education and training in information management should be focused on individual learning needs and styles[5,6]. It should concentrate not so much on the technicalities of the particular clinical system, but much more on the storage and use of data and information – the 'added value' which ensues from using clinical software rather than paper.

In 1995, the national Institute of Health and Care Development commissioned the authors to produce the JIGSAW curriculum specification[7] for information management training in primary care. This specification is designed to promote an understanding of how information systems can be used to improve patient care, and it is currently being used to inform the inclusion of medical informatics into the wider medical undergraduate and postgraduate curricula. The programme is designed primarily to "train the trainers" who will be needed to support practices in attaining information proficiency, and to help clinical professionals and managers to

move beyond a concern with the technology of computing, towards an exploration of the quality of information and its potential uses.

The curriculum is founded on an adult learning model[8,9], which envisages a collaborative relationship between tutor and learner. This model requires the tutor to recognise that the course members will already have prior knowledge and experience in many areas of the curriculum; they must be involved in planning their learning programme; they should carry out activities relevant to their daily work for use in assessment of their competence; and rapid feedback on performance and competence should be built in to the programme. To facilitate this adult learning approach, a set of diagnostic tools has been constructed to promote discussion and formative assessment at regular intervals through the programme. Learners who successfully complete the programme will then teach key elements in other practices, using the same model of workplace training will be the same as in the trainer programme. The schedule for delivery of the programme should be based on individual learning needs, time constraints and preferred learning styles.

PILOT STUDY

The JIGSAW approach was used in a pilot study in Lincoln, UK[10]. From October 1995 to April 1996, two volunteer practices received a variety of training inputs from the authors in order to ascertain what forms of education and training in information management were effective in producing more efficient and effective use of information and the clinical computer system.

Methods
The authors used a facilitative approach throughout, and encouraged personnel in both practices to apply the concepts being taught to areas of information management relevant to their own work. They responded to the individual learning needs indicated by the diagnostic questionnaires, and enabled each practice to define its own learning priorities and activities for evidence.

Before any interventions were made, baseline measures of current levels of recording of various clinical conditions, preventive measures and lifestyle markers were carried out. These measures were repeated at the end of the study. Some basic data quality measures were also employed.

Diagnostics
In order to establish levels of knowledge and expertise in both information management and computer skills, three questionnaires were administered to each member of staff at each practice: the first looked at data recording, the second examined use of information in clinical audit, and the last considered knowledge and skills in information management. The last two question-naires were used in discussions with individuals, and became part of the teaching process. Some items on the questionnaires were administered again at the end of the study to assess changes in knowledge and attitudes.

Teaching methods
A variety of teaching methods was used; they were all developed from the JIGSAW programme, and were firmly based on data and processes relevant to and usually selected by the practices, as recommended by Davis et al[11]: one-to-one and group discussion; development of data quality control systems; design of clinical guidelines; development of data entry policies using guidelines; analysis of practice data using spreadsheet software; analysis of information flows, both internal and external; computerisation of information handling systems; clinical audit exercises; videos; and computer-based training packages.

Other interventions
After discussion on each practice's particular needs, computerised conditional branching protocols were designed, for use in clinical care and clinical audit. Specific training was given to key staff members on data reporting and extraction for further analysis using commercial software. Basic system administration skills (backup procedures, security, and data integrity) were reinforced.

Results: Baseline measures
The practices' baseline measures showed very different patterns of data recording, reflecting differing philosophies on using computers for clinical care and differing requirements from central government: the fundholding practice held much more data on computer, and used conditional branching protocols more frequently. In the non-fundholding practice, a larger number of staff members, both clinical and non-clinical, entered clinical data, and problems with consistency of data entry were apparent.

Results: Diagnostics

Most of the staff in both practices were clear about the purposes for which specific data items were recorded. Both practices used clinical audit extensively as a quality improvement tool, but found accessibility of data difficult using either manual or computer systems. Most personnel were not aware of principles of information management. Individuals were not clear as to their responsibility for data items; both practices could see both benefits and drawbacks to increased use of information technology; there was little appreciation of information flows and the individual's place in them; and data quality was an unfamiliar concept.

Results: Post-intervention measures

The post-intervention measures were carried out after six months, and demonstrate improvements in data quantity and consistency, most noticeably in lifestyle marker and preventive medicine recording; review of and revisions to information handling systems in order to eliminate dual recording; increased use of computerised clinical guidelines and protocols; and the implementation and review of data security and confidentiality policies.

Results: Changes in attitudes

It was clear from the diagnostic questionnaires that almost every individual, from GPs to receptionists, was apprehensive about what their responses would reveal about their knowledge and expertise. In fact, the GPs were probably more anxious than any other group: they were unwilling to betray that they lacked knowledge in front of their staff or each other. On the other hand, some of the administrative staff were anxious that increasing use of information technology might lead to redundancy.

The audit and information management questionnaires were used as the basis for conveying basic concepts during the subsequent individual discussions (formative assessment).

During the period of the study, most individuals made considerable progress in their understanding and ability to operationalise new concepts, most notably with the concept of data quality. This concept was felt to be crucial to achievement of more efficient and effective data recording and subsequent use of data and information.

Structured data entry[12,13] was a new concept to both practices: there had been no co-ordination or agreement on the terms and codes used for clinical data. Both practices decided that it was important to implement a medium-term strategy to agree data entry policies for common clinical conditions and the creation of on-screen guidelines for the management of some of these conditions. One practice reported a considerable improvement in the level of teamwork since participating in the project, mostly brought about by the focused discussion on clinical guidelines between GPs and nurses.

Discussion points

This project was designed as a pilot study to examine the effectiveness of various training approaches. The practices were both volunteers, and therefore likely to respond well to the training input. They may not be representative of the majority of practices. Although both practices had many other competing pressures on their time, other factors were drivers towards improving information management processes: fundholding, electronic links with the Health Authority, increased clinical audit activity, and increasing requirements to provide aggregated clinical data for health planning purposes. Both practices perceived a consequent need to improve both data quality and access to the data. Certainly personnel in both practices reported that they had found participating in the project to be worthwhile, both in terms of the direct improvements in information management processes, but also in improved teamwork and greater interest and job satisfaction for many team members.

CURRENT RESEARCH

The pilot study was designed as a hypothesis-forming exercise. The hypothesis could be stated thus:

"Education and training using an adult learning model is more likely to lead to improved data recording and data quality than other instructional methods."

Testing of this adult learning approach has now been carried out. The diagnostic tools, training topics and training methods have been refined following discussion with the pilot practices. The topics covered are:

1. data recording
2. information flows
3. data quality
4. data entry policies
5. information handling
6. targeting patient groups
7. improving patient care

Method

Thirty-three practices agreed to participate out of the 107 practices invited. The participants were divided into three groups matched for practice size and computer system used: intervention group 1 received on-site diagnosis and training in the seven areas above over a period of six months, intervention group 2 received written "suggested activities", and the control group received neither training nor information. Baseline measures were sought from all participating practices in October 1996, and these measures were repeated in April 1997.

Individuals in intervention group 1 practices were sent diagnostic questionnaires covering the seven topics, and then received three 2-hour visits from one of the researchers (SJT). At the first visit the project was introduced, queries and worries were answered, and individuals were given the opportunity to discuss their responses to the diagnostic questionnaire. This was used as the first teaching intervention for individuals and as an opportunity to assess the practice's priority information needs. Using this knowledge, a number of written "suggested activities" were discussed with the lead individual nominated by each practice, for appropriate practice team members to carry out before the next visit. The second and third visits were used to assess progress on the activities, and to discuss further activities.

Practices in intervention group 2 were sent the written "suggested activities" used as training materials with intervention group 1 in October 1996. Practices in the control group received no information.

In March 1997, all participating practices were sent further questionnaires asking them to repeat the baseline measures taken six months previously; intervention group 1 was asked questionnaires to assess the effects of the teaching inputs, and groups 1 and 2 were asked to assess the usefulness of the "suggested activities" to their practices.

Preliminary Results

Group 1 (on-site intervention) practices maintained their involvement in the study. Two dropped out at an early stage, one because of organisational problems within the practice, the other because none of the doctors was willing to be involved. Of the remaining nine, all received three visits, and only one failed to return data at the end of the study. This was a very small practice with staffing problems. The GP involved felt that the project had helped him, but he did not have time to carry out the final data searches. Group 2 (information only) and Group 3 (control)

practices sent little data back at any stage, with only one in each group returning data at the beginning and the end of the study. This was predictable, in that those maintaining involvement were those having the highest level of help and support, tailored to their needs.

The data quality measures indicate that several practices made significant changes in their recording of particular conditions, especially those that are common in general practice, like asthma, diabetes, hypertension and depression. Some also used a narrower spread of codes for recording the same condition, as well as greater use of recall dates, both of which make it much easier to target those patients for care and for quality assessment of the process of care.

Results from the intervention group 1 (on-site training) practices indicate that these practice teams made the following changes to their working practices:

- review and streamlining of information handling systems, particularly involving setting up automatic checking processes and reducing duplication of systems
- increased familiarity with and ability to use the facilities available on their clinical computer system
- increased appreciation of the importance of high-quality data, both for patient care and reporting requirements, leading to discussion and implementation of data entry policies for common conditions
- improved communication and teamwork between clinical professionals, particularly on clinical guidelines

The practices themselves indicated that they had found participating in the study to be a useful exercise, although several mentioned that they felt that making significant changes to the quantity and quality of their data would take longer than the six months' duration of the study. They all valued the facilitative approach taken which targeted their particular problems. Several practices found that they were considerably hampered by the clinical computer system in use in their practices: one system in particular was very cumbersome to use, and there was no structured data entry method (templates or protocols). The three practices in the study that used this system were all planning to change to a better one by the end of the study, having discovered that it no longer fulfilled their information needs.

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Of the nine practices receiving the on-site training intervention, one did not return the Suggested Activities questionnaire, and one replied that they were unable to tackle the activities properly because of the limitations of their clinical computer system. Of the remaining seven practices, all completed activities 1 and 4 (data collection and storage, and data entry policies), 6 completed activities 2 and 3 (team use of information, and data quality), and 5 completed activities 5, 6 and 7 (monitoring information handling systems, targeting groups of patients, and searches and reports). The practices were asked to assess the usefulness of the activities: no activities were rated 'not useful', and most of the ratings were 4 or 5, i.e. useful or highly useful. Their assessment of the utility of the training visits was also highly positive.

LIMITATIONS OF THIS STUDY

A preliminary analysis indicates the following limitations of the study:

- The high drop-out rate in the 'information' and 'no intervention' groups: no true comparison could be made between the groups. Using a researcher to search the database (if practices were willing to permit this) might be a way of solving this problem, but this could be very time-consuming.
- The Hawthorne effect: merely participating is likely to raise awareness of and interest in the issues.
- Inadequacy of some systems to permit improvement in data quality: this is a major drawback. Although the participating practices using such poor systems are increasingly dissatisfied with them, they face major expenditure to correct the problem.
- Short timescale: six months was not long enough to produce significant effects on data quantity and quality for most of these practices. Although it is hoped that they will continue to work through the suggested activities in order to improve both their data and their information management skills, this may not happen without further support.
- All the practices were volunteers: this method may not be effective with less well-motivated practices.
- Trainer well-known to practices: the effects may not be obtainable by other trainers.

CONCLUSIONS

Data quantity and quality did not change significantly in all practices for all conditions. Certainly practices targeting their efforts on one or two conditions produced considerable improvement. The six-month period was long enough to get practice teams thinking more carefully about the data and information they needed to treat patients and run the practice effectively, but probably not long enough to change data quality to a great extent. The methodology was liked by all the practices, as the set of "suggested activities" could continue to be used independently for a variety of information problems. It is clear from the study that there is still a large gap in practices' understanding of the principles and practice of information management, and more support is needed for practices to be able to organise their information systems so that they are effective and efficient in supporting patient care. There may be major resource implications for the future, both in improving clinical computer systems to suit practices' increasingly sophisticated needs, and in ensuring that skilled trainers are available to help practices manage information better.

POSTSCRIPT

A couple of comments from the participants:

"It seems a shame that this sort of training was not available at the outset of the drive for computers in general practice. A lot of time and effort have been wasted and a lot of useless data has been collected randomly and inconsistently."

"I suspected that our data quality was poor and badly organised and you have given me the push I needed to do something about it. It is comforting to know that other practices have similar problems."

Acknowledgments

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