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Requirements of Time Management Tools for Outpatient Physiotherapy Practice

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Abstract

The effects of electronic appointment booking systems on the time management activities of health professionals have received little attention to date. We report on time management practices in three outpatient physiotherapy departments with different paper and electronic systems. The study has identified a set of time management activities and associated social behaviours common to physiotherapy departments. The convenience, flexibility and expressive nature of paper diary systems is of significant value to users, whilst the clarity and superior database functionality of electronic systems are valued by staff using this medium. The study highlights several potential barriers to the effective deployment of electronic booking systems in physiotherapy departments including poor resource and training provision, concerns regarding restrictive diary control measures, the continued reliance on burdensome duplication procedures and the need to coordinate multiple information artefacts, which need to be addressed if such technology is to be successfully designed and deployed.

Keywords: diaries; physiotherapy; socio-technical systems; time management

Introduction

The implementation of a national electronic appointment booking system is a strategic tool in the delivery of healthcare in the UK [1], and there is currently great investment in Information and Communications Technology (ICT) in healthcare to improve the

delivery of patient services [2]. The introduction of technology imposes a change in working practices and changes the roles of individuals within the organisation. The focus of this paper is on time management systems (of which electronic booking systems are an example) and their use within one healthcare setting: outpatient physiotherapy departments.

The maintenance and use of a diary is recognised as an integral means of managing time. In a physiotherapy department this involves managing both personal and professional time commitments – for example, the scheduling of patient appointments, meetings with colleagues and arrangements for cover during periods of absence.

This study investigated the current practice in Physiotherapy Outpatient Departments with differing access to time management tools (both paper and electronic) to uncover the nature of time management tasks and the requirements on tools to support physiotherapists' professional practice.

Background

We consider a time management tool to be anything used by a person to help them manage their time – for example, a paper diary or handwritten 'to-do' list. Advances in technology have led to a new generation of time management tools, for example electronic diaries and group scheduling systems, designed to support people in managing their personal and collective time commitments.

Research into the acceptance and use of time management systems has, to date, been conducted in office environments and academia. These studies have identified positive and negative features of shared diary systems and varying levels of acceptability to individuals, depending on their role and the overall organisational culture. Blandford

and Green [3] have highlighted many shortcomings of the current generation of tools; they conclude that there is no universal ideal time management tool capable of fulfilling the diverse spectrum of user needs. Conversely, studies of the introduction of other IT systems in the NHS (e.g. [4,5]) have shown that, to be successfully deployed, new technologies need to be designed to fit well with the broader aims of the organisation and the individuals working within them.

The socio-technical approach

The approach taken in this work has been to investigate the social, organisational and user context within which time management tools are used by physiotherapists. As Schein [6] observes, an organisation's culture has a direct impact on the informal working practices that can develop into social and organisational norms. If the formal working practices do not support the work that needs to be done then informal practices will emerge to facilitate that work. When hospital information systems were first introduced, it was found that the greatest difficulties in their deployment lay with the users and their needs to acquire new skills and adapt their work practices, rather than with technological issues [7]. There is growing evidence that social and organisational factors can determine the success or failure of healthcare IT developments [8,9,10]. One important aspect of this is threat to social status. Symon *et al* [11] found that higher status professionals were often more concerned with retaining their status as experts than with adhering to formal organisational practices; technology can provoke perceived empowerment or exclusion by changing working practices. Another aspect is learning and adapting to new technologies. Adams *et al* [12] discuss the important role 'communities of practice' [13] can have in supporting the take-up of new technologies in healthcare. In particular, they note the importance of individuals working within a

work community that supports learning and the evolution of practice to effectively exploit the potential strengths of new systems.

Handy [14] recommends that organisational culture and communication patterns should be taken into account when considering the overall usability of a system and the impact of deployment. Kling [15] elaborates on this further by stating that the success of a system is context dependent. He recognises the role that computerised systems play in altering work and group communication patterns, interdependencies and power relationships. Applications intended to support users and their communication within organisations need to relate strongly to the social setting and social relationships between the end-users – in the current case: those working in a physiotherapy department.

The Physiotherapy perspective

There is growing evidence of barriers to the implementation of the proposed advances in patient appointment booking in the NHS. The Garner project [16,17] was the culmination of a study to identify the specific needs of physiotherapists and occupational therapists with respect to ICT. This report cites the lack of suitable equipment and inadequate involvement of staff in the development of electronic systems as factors in the failure of physiotherapy staff to fully embrace the information age. The report further recognises that health informatics should form an integral part of the continuing professional development strategies adopted by all clinicians throughout their careers.

Latchford, [2] investigated the factors that influence the use and acceptance of information technology in eight clinical professions operating in the N.H.S. The

physiotherapy professions' response rate in this survey was 72 per cent (362 returns from 500 questionnaires). The survey identified two main barriers to widespread information communication technology (ICT) use. The first was poor resource provision: 46 per cent of the clinicians reported that they share a computer with six or more colleagues. Inadequate training was the second barrier, with more than a quarter of the respondents indicating that they require training in ICT. Other concerns included the provision of outdated equipment, slow connections and systems that were perceived to be wasting valuable clinical time. The fear of duplication of effort, incompatible systems and the demands of adopting new technology were further general concerns highlighted in the survey.

Physiotherapy departments are complex, dynamic organisations. Their functioning relies on the collective co-ordination of clinicians with diverse roles. The maintenance and use of a diary is an integral means of managing time. To be successful, physiotherapy time management systems needs to reflect and support the diversity of professional working practices. Clearly, the overarching factor in the successful deployment of new technology is that it offers a demonstrable advantage over established methods for staff and patients alike. The possible advantages of new technology include improved speed, convenience, accessibility, efficiency, cost savings, safety and usability. The challenge lies in designing and implementing systems that provide a tangible benefit to this genre of health care professional at acceptable cost (where costs include inconvenience, loss of control, error rate, etc.).

This study focuses on the identification and evaluation of traditional and electronic time management tools, and how these tools are integrated to achieve and support personal and organisational time management within physiotherapy practice. Acknowledgement

of this practice will provide insight into the situated use of time management systems, enabling system designers to address the demands of both individuals and the organisation.

Method

The study was conducted in three separate NHS Trust Physiotherapy Outpatient Departments in England over the summer of 2003. The departments were selected to represent the spectrum of resources available for time management in physiotherapy departments and the different time management strategies employed by the staff. The departments (referred to throughout this paper as A, B and C) represent different points on the spectrum between totally paper and totally electronic time management systems. Hospital A has a paper-based system, B a hybrid system and C a computer-based one.

Qualitative data relating to the time management strategies employed by physiotherapists was gathered through observation, semi-structured interviews and an examination of their time management artefacts.

The physiotherapy staff were observed as they conducted their daily work activities in their natural working environment. Observation provided the opportunity to witness the interaction between personal time management and the social coordination demands of the outpatient department staff members, bounded by organisational and environmental constraints. In addition, direct questioning was employed to achieve clarification of complex or detailed information and procedures.

The time management tools used in each department were examined with regard to their functionality and usability – i.e. how well they supported physiotherapy work practices.

Observational data was supplemented by semi-structured interviews with representative physiotherapy staff. Interviewees were selected to reflect the demographics of a standard Physiotherapy Outpatient Department, as shown in Table 1.

Table 1- Interview Sample

Staff Role	Hosp. A	Hosp. B	Hosp. C	Totals
Managerial Role (Manager & Superintendent Positions)	1	1	2	4
Senior Clinician (E.S.P. & Senior I Positions)	2	1	2	5
Junior Clinician (Senior II & Junior Positions)	2	2	3	7
Administrative Role (Physiotherapy Assistants, Reception Staff)	2	4	3	9
Totals	7	8	10	25
<i>Approx. number of outpatient physiotherapists in dept.</i>	<i>20</i>	<i>11</i>	<i>10</i>	<i>41</i>

Interviews lasted between 15 and 30 minutes. The interview data was transcribed to support the subsequent analysis of the physiotherapy staff's individual time management behaviour, attitudes and personal experiences of technology.

Results

The findings of the study at each site are summarised below, drawing out commonalities and differences across sites. To ensure anonymity, all quotations identify the interviewee by role, as categorised in Table 1.

Outline of the Time Management Systems

Hospital A

The Hospital A department does not maintain a central appointment schedule. Each physiotherapist is issued with a standard A4 work diary and is directly responsible for

keeping their own diary. All patients referred to the department are registered on the standard hospital software system. Electronic registration of patient referrals has been utilised since April 2003. A central paper diary grid is located at the main reception area for the allocation of new patient appointments following patient registration. The new patient appointment scheduling information, contained within the central paper grid, is then transferred to their individual diaries by the relevant physiotherapists.

Hospital B

The physiotherapy department in Hospital B uses a time management system that combines a standard hospital computer system and a paper diary system unique to the department. This specific paper system had been in use for approximately one year at the time of the study.

The primary diary is a paper file system located at the main physiotherapy outpatient reception desk. The file contains paper print-outs of standard daily diary templates for each physiotherapist. Each physiotherapist has a personalised template, formulated at the commencement of service in the outpatient department using the standard hospital software, that reflects the physiotherapist's weekly work schedule and commitments.

The standard templates are printed out a few months in advance and are stored in the central diary file. Each physiotherapist is provided with a photocopy of their daily paper grid at the start of each treatment session. This paper copy remains with the physiotherapist; all respondents reported using it to annotate their daily activities.

The computer system is only used for the registration of patients referred to the department for physiotherapy treatment. A paper index card is simultaneously created. The attendance record of new patient appointments is updated on the computer system,

under the relevant patient episode. No follow-up appointment attendance figures are recorded on the computer system.

Hospital C

The department in hospital C utilises an electronic booking appointment system that had been used to arrange appointments for approximately one year.

All physiotherapists have individual passwords to access the system, and permissions can be set to allow or deny actions as determined by the system administrators. The daily clinic lists are printed in the morning and attached to a central notice board in the department work area. Physiotherapists are required to annotate patient attendances and patient discharges on this printout. A receptionist then collates this information onto the central booking system at the end of each day.

Uses of Time Management Systems

This section outlines the time management activities undertaken, and the artefacts used to support these activities, in the three physiotherapy departments studied.

Planning and Scheduling Professional Services

The scheduling of patient appointments requires collaboration and co-ordination between physiotherapist and patients, with regard to availability and the patient's clinical requirements. Appointments must be scheduled within the confines of the individual physiotherapist's work schedule and in accordance with organisational strategy. This requires fluid co-ordination of information sources and responsive management of departmental resources.

A common feature in all three hospitals was the reliance on reception staff for the registration and scheduling of new patient appointments following initial triage. Across all three departments, referrals are currently processed from paper. Hospital B is able to receive electronic referrals from GP practices but reception staff still print a paper copy of this information.

A patient appointment waiting list is maintained electronically at Department C while the others keep paper lists. All three systems require the manual scheduling of new patient appointments into designated time slots following the creation of a patient care episode. There is a feature on the system used in Hospital C that enables the user to identify the next available appointment time. However, due to poor design, this feature is not currently used. One respondent explained:

'we never use this feature because it is too time-consuming and it is easier to just quickly scan the diary of each individual physio' [Administrative role]

New patient appointments in Hospitals B and C are directly recorded into the centralised diary systems. At Hospital A, new patient appointments are recorded on the weekly paper grid sheets. Each physiotherapist then regularly transfers this information into their individual work diary. Follow-up appointments are integrated into the remaining time frame to ensure an optimal caseload for each physiotherapist.

In Hospitals B and C, the individual physiotherapist is not directly involved in scheduling these appointments. The number of treatment sessions required by a patient is determined by their presenting condition and individual circumstances. The physiotherapist discusses the overall treatment schedule with the patient and agrees the parameters of the treatment plan. The patient then informs the receptionist of the next

appointment time span, and the follow-up appointment session is finalised by the receptionist.

In contrast, in Hospital A, all follow-up appointments are scheduled and recorded by physiotherapists directly into their diaries. Although this practice is considered time consuming, the sense of control afforded by this method is deemed, by respondents, to justify its continued use. The relinquishing of direct control over subsequent appointments, observed in Hospitals B and C, appears to reduce physiotherapists' overall planning capability. This was confirmed by one respondent from Hospital B:

'The problem with this is I don't know when I am running short of appointments, so I do keep a check. I will go every few days and just check whether I am fully booked next week already. That is the down side about someone else booking your slots, you don't know quite how busy or not busy you are.' [Senior Clinician]

One feature of diary control in Hospital C is that only reception staff and specific physiotherapy assistants are permitted to enter or alter diary content. Access is managed through individual password control. To add or amend diary entries, physiotherapists have to fill in a 'Request for Diary Alteration' form and submit this to the reception staff. This contrasts with Hospitals A and B, where staff members are able to make direct amendments to their own diaries and, subject to implicit professional codes of conduct, colleagues' diaries. The freedom to manage their own work schedule and commitments, according to their personal commitments and the needs of patients, was seen by all physiotherapists as a fundamental entitlement in their practice as professionals.

Amendments to the paper diary systems used in Hospitals A and B often result in entries being made outside the conventional areas, ignoring printed lines and often spanning several demarcated time slots. This was highlighted by several informants as leading to confusion and error, due to the idiosyncratic markings used by various members of the department. In contrast, several informants from Hospital C noted the clarity afforded by the standardised typography and clear, structured templates utilised in their system.

Recording activity levels

Outpatient activity in all three sites is recorded. For example, patient attendance figures and waiting list statistics are required to monitor compliance with NHS Booked Admissions Targets. The time management artefact is therefore used to record individual and departmental activity levels and to provide additional archival support for patient treatment records.

In Hospitals A and B, statistical information is prepared by the individual physiotherapist and submitted monthly. Physiotherapists in Hospital B record this information directly on the photocopied daily diary sheets, while respondents in Hospital A note this information directly in their work diaries. The statistical data submitted by each physiotherapist is then collated by the physiotherapy manager or superintendent and used in short- and long-term departmental target setting and planning. At Hospital C, monthly performance figures can be generated by the system administrator with no additional input from individual physiotherapists. In addition, it is used by management staff to monitor levels of non-attendance and cancellations, and provides a full appointment history for each patient.

A set of standard codes for classifying diary amendments is utilised by all respondents in this study. Amendments to the scheduled appointments are directly recorded in the central paper diary used in Hospital B and on the electronic appointment system at Hospital C. In Hospital A, messages are left in a central message book stored at the main reception desk, and physiotherapists update their diaries with these messages. This was considered by all respondents to be time consuming and inefficient.

All three time management systems require extensive maintenance to ensure the production of accurate monthly statistics. In each system there is duplication of data, and the double-checking procedures employed by staff were reported to be time consuming and susceptible to human error. Even in Hospital C, each physiotherapist is required to annotate the daily diary printout to ensure that patients who have not attended or failed to report to the reception desk are recorded on the system.

Remembering non-scheduled activities

As well as supporting the remembering of future activities such as patient appointments, diaries also need to support the user in remembering informal, solo activities and work-related information. These items are varied, but include annual leave and study leave plans, deadlines for reports, on-call rotas, hospital contact numbers and treatment codes.

Across all the departments, all appointments and meetings are recorded in the respective diary systems; this also provides an explicit archival record for accounting for time usage. Examination of the time management artefacts revealed that many activities undertaken by physiotherapists (e.g. writing reports, preparing in-service training, contacting patients) are not time based activities and therefore need to be managed and recorded differently.

Perhaps the most stable characteristic shared by all informants is a continued reliance on some additional time management tool for solo activities relating to both work and personal commitments. For most participants, this is an additional paper diary; one reported relying on memory for personal engagements and another used a personal digital assistant (PDA). The individual work diaries maintained by Hospital A staff support the inclusion of all work commitments, including solo ones; the use of an additional diary was for information of a personal nature. Staff using the centrally maintained diary systems at Hospitals B and C typically maintained two additional time management artefacts, one for solo work activities (not directly related to patient appointments) and one for personal information.

All informants reported using other informal methods to remind themselves. A majority reported that they use to-do lists and record this information in their work diary or on scraps of paper (Hospitals A and B), or on paper or post-it notes (Hospital C). One respondent reported using the position of patient note folders in her work tray as an indication of an ongoing action requirement:

'I would probably leave it in my pigeon hole at a different angle. Angles mean different things to me. So I could look at the angle of the notes and know that one has got something ongoing in it.' [Junior Clinician]

Post-its and pieces of paper are often placed in a fixed location, usually one frequently used by the physiotherapist to write patient records or store patient treatment folders.

Group Uses

All respondents, except reception staff, reported the main reasons for consulting a colleague's diary as being to identify suitable times for planning and delivering

supervisory sessions and in-service training, scheduling meetings and booking appointments for patients who have been transferred into their care. Superintendent physiotherapists across the different sites all reported an additional ‘monitoring’ role, which involves reviewing the time management of staff members.

The central diary systems used at Hospitals B and C directly support access to staff schedules, but no information is centrally stored on resource availability. Most informants from Hospital A reported significant problems with locating the individual work diaries of colleagues, and with interpreting diary content.

A common feature across the three departments is that meetings and supervision sessions are predominantly arranged through direct consultation with the physiotherapists involved. Despite all informants having access to email, none reported using this service exclusively to arrange meetings. Several physiotherapists at Hospital C did, however, report using electronic mail to circulate meeting minutes and general messages, but most would not rely solely on email to arrange meetings. The main reasons offered by respondents for not relying on email fall into two categories. The most apparent reason relates to the commonly held belief, by study informants, that physiotherapists do not regularly check their NHS email accounts. This is confirmed by a respondent:

‘We did an audit a while back to actually see how many people were using it. It was just over 50 percent in this department. We asked the reason why they weren’t and they said ‘it is because I have a hotmail account’. Well that is fine for contacting friends but for communicating within the service it is not.’ [Managerial Role]

Further evidence of this was observed on a whiteboard in the staff room at Hospital C, where a handwritten message implored staff to check an email message sent to all staff.

Poor access to computer terminals and work time pressures were additional reasons offered for lack of confidence in email for effective communication. In addition, physiotherapists believe that time spent accessing email and using the internet for research purposes is still viewed by certain staff members as time wasting and obstructive to other staff, who need access to the same facilities for data inputting etc. Adams & Blandford [4] uncovered similar perceptions, where computer usage by staff on hospital wards was deemed to be wasteful and detracting from the primary role of patient treatment.

The scheduling of meetings and supervision sessions in Hospital B involves all meeting attendees consulting the central diary grid sheets to find a mutually convenient time. A similar joint consultation process is undertaken in Hospital A, with each physiotherapist consulting their individual diary. In both these departments, the physiotherapist can note meeting arrangements directly into their diary. In contrast, the system used in Hospital C enables the simultaneous viewing of five individual appointment schedules, but there is no support for the automatic location of a jointly suitable time period. Once an appropriate meeting time has been located this information is noted on the 'Request for Diary Alterations' form and handed to the receptionist for inputting. The physiotherapists using this system are forced to record the meeting details (e.g. the location, meeting attendees, meeting topic or agenda) using an additional time management tool, as this information is not directly accessible to them once input onto the system. Informants reported recording this information on separate pieces of paper or in individual diaries.

It is recognised social practice for physiotherapists to consult each other prior to arranging a meeting. However, it is acceptable for arrangements to be made without prior consultation if the physiotherapist is unavailable. This places additional demands on the individual, in terms of making information about their activities explicit and publicly viewable.

Other time-based information

Physiotherapists have a personal responsibility to ensure that the central diary system is regularly updated and accurately reflects any annual leave, study leave and personal commitments that may affect their daily work schedule. This information must be incorporated into the central diary system at Hospitals B and C or the ‘new patient’ grid in Hospital A in a timely way to avoid having to cancel or reschedule patient appointments. In all departments this information is also available on wall chart year planners, strategically located in the staff room or work areas.

Most respondents reported substantial editing and maintenance in relation to these additional commitments. This was regarded by most respondents working in Hospitals A and B as the most common source of error. The maintenance of the paper central diary system relies on physiotherapists remembering to integrate and co-ordinate information recorded in multiple diaries and locations. The system used in Hospital C reduces the overall burden associated with this maintenance, but interestingly this information is still presented on a wall chart which affords an instant overview of all staff members’ activities.

In each department, several physiotherapists are involved in external service commitments – for example, service provision at GP practices or fracture clinic cover.

These additional commitments are arranged within defined parameters and no conflict or overlapping between these services was reported.

Many informants reported using their diaries to record other information. These include:

- Details relating to a patient's presenting condition or a planned procedure which requires forward planning to secure specific resources.
- A note for in-service training preparation work and details of session content.
- A note of when they are due to cover a colleague's clinical session.
- A reminder of a deadline or an action to be undertaken on a particular day.
- A note of events that affect the user – for example, a person visiting the department or the expected arrival of a work experience student.
- One respondent records meeting minutes in her diary.

This does not constitute an inclusive list; however, it highlights the miscellany of information that physiotherapists record in their work diaries. Due to the restrictive nature of the system used in Hospital C, several respondents expressed the need to record this information using additional methods, namely pieces of paper or an additional diary.

Usability Issues relating to Time Management Systems

In describing their use of time management tools, the physiotherapy staff made reference to important global properties which, in their opinion, directly affect the overall usability of these systems. Here, we consider the issues raised by informants on the nature of the different systems and the resultant degree of support they provide for standard physiotherapy work practice.

Accessibility

An element common to all the time management systems is the general accessibility to view the diary contents of all staff members. This was given paramount importance by all informants as arranging meetings would be impossible without this access.

All staff members in Hospitals A and B are able to make entries and amendments directly into their work schedules. In contrast, at Hospital C, password restrictions limit staff access. Several senior physiotherapists reported frustration over the loss of control of their own diary scheduling, and regard it as undermining their status and professional integrity.

'I find it very frustrating and almost insulting that this control has been removed, it undermines my professional judgement and position and I was opposed to it from the start.' [Senior Clinician]

The reason for the inclusion of this control feature was cited by one respondent as

'...if only one person can do it then people cannot abuse their diaries'
[Administrative Role].

This view was supported by another respondent who stated

'This is a very transparent system, everybody can see what everybody else is doing- so there is no hiding.' [Managerial Position]

Respondents were divided into two camps: those who could input and alter diary entries and those who could not.

Restricted diary access led directly to another conflict, namely role reversal. This was summed up by one senior respondent who remarked,

'I do not like the fact that unqualified staff can alter my diary but I cannot.' [Senior Clinician]

There is clearly tension between the departmental control strategy and the adaptive time management requirements of physiotherapists based on their clinical judgement and level of seniority.

The inefficiency of this practice was noted by one respondent:

'I cannot change a thing on there. So I see what I want to do but I then have to fill in a form and hand it in. Now there have been problems, because if they are busy at the front then it is in sort of a holding area, so by the time they get to fill it in someone has already booked something else in, in the mean time. So I was pointing out that it is not a failsafe system, it seems to be creating double work for everyone'.
[Senior Clinician]

The central diary file in Hospital B is generally only consulted by staff if an expected follow-up patient is not waiting in the reception area, or in the event that a new patient is scheduled, who is not instantly recognisable to the physiotherapist. One respondent remarked,

'... if I have gone out to find a patient and they are not there I will normally just flick through the diary to see whether or not they are coming'. [Junior Clinician]

The paper diary supports this rapid access.

At Hospital C, the arrival of a patient is noted by the receptionist and the computer details are updated accordingly. Physiotherapy staff are then able to access this information from a single computer terminal located in the designated work area. This constitutes a ratio of one computer to approximately eight physiotherapists. All

respondents believed that their access to the electronic appointment system could be greatly improved by the provision of additional computers. The access problems are compounded by the fact that they are also required to use this terminal for other patient administrative duties – for example compiling GP letters and patient exercise sheets. To overcome this problem, staff have developed their own ‘user etiquette’:

‘viewing appointments takes priority over other activities’. [Junior Clinician]

Hospitals A and B also had one computer being shared between approximately eight staff members, a figure that is similar to that found by Latchford [2]. Queuing for computer access causes delays in the natural work flow of the outpatient physiotherapists. In a time-pressurised environment like the NHS, the provision of efficient access to IT facilities is essential.

In Hospital C, an additional three computers, located away from the outpatient treatment area, are available for use by physiotherapists. However, the inconvenient location of these computers, and the need to share them with other physiotherapy assistants and administrative staff, means that they are only used during lunch periods and unplanned breaks. The demand on computer resources has resulted in an increase in tension between different users. Patient administrative duties, for example inputting diagnostic codes, are viewed as taking priority over physiotherapists using these resources to access email or the diary. This may partly account for the low usage of email, highlighted earlier:

‘...due to a lack of access, because we have only got so many computers in the department, if somebody is already on it you cannot get to the computer to open your email’. [Managerial Role]

Accessibility problems identified at Hospital A are predominantly related to difficulties in locating individual work diaries. This was noted as a particular concern by several informants when trying to deal with patient enquiries regarding appointment arrangements. For example one reported,

'...it is more a problem that I have my diary with me in a meeting and the girls cannot get hold of my diary to change it. In that case they leave messages for me and I have to phone the patient back.' [Managerial Role]

The inaccessibility of individual work diaries generally requires diary amendments to be made retrospectively by the physiotherapist and reportedly results in unnecessary time spent returning patient calls and making subsequent diary amendments. Several respondents from Hospital A believed that a centrally maintained diary would assist in the time management of patient services:

'Putting all the patient appointment details onto the computer, so that if somebody does ring up and says 'I have got an appointment with so-and-so on this day and I want to change it', you can then just bring it up on the computer and see who they are meant to be seeing and change it, rather than having to run around finding who it is they are meant to be seeing.' [Junior Clinician]

Portability

Portability is viewed by most respondents as a key usability feature of their time management systems. Although informants from Hospital A were aware of the inconvenience to reception staff and the delay in diary amendments, the ability to carry their work diary around with them was seen as advantageous. Although working from a

central diary system, the staff working at Hospital B also managed to achieve this, to a more limited degree, by keeping the photocopy of their daily diary sheet.

All diary users reported regularly consulting their various time management tools.

Several respondents reported a pattern of checking the diary content each morning and evening, for the relevant day and the following week, to assist in forward planning.

Respondents from Hospitals A and B were satisfied with the level of access to and the portability of the time management tools. In contrast, all respondents from Hospital C reported difficulty accessing their diary content. The fixed location and insufficient number of computer terminals were cited as the main reasons for this dissatisfaction.

Senior staff, across the three sites, believed that a portable diary system that could be accessed from multiple locations would be advantageous. This need was predominantly recognised by physiotherapists who were responsible for service provisions from multiple venues:

'the only computer screen, and it is actually a very basic one, is in the reception area and that doesn't access [the system] at all. I think one of my colleagues actually takes a laptop into the clinics with her, because I think access is a huge problem.' [Senior Clinician]

Properties of the time management tools

Overbooking or overlapping of patient follow-up appointments is possible in the paper diary systems used at Hospitals A and B. This practice was observed as the physiotherapists are able to adjust treatment times and record additional patient details in the paper margins, or adjust their writing size to accommodate additional information. The system used at Hospital C does not directly support this practice.

However, physiotherapists have developed a method of circumventing this restriction by altering the standard inputting procedure; several informants specifically noted that this was an important part of their working practice and one that the system does not sufficiently support. This finding is consistent with that reported by Adams & Sasse [18], who note that practices that are perceived to restrict informal activities will be bypassed.

One respondent commented on the inflexibility of the diary templates used in Hospital B when arranging appointments to suit the needs of her patients,

'we work off the same template, and it is not very flexible, I can wiggle it a bit but not very much' [Senior Clinician]

In contrast to this, the majority of physiotherapists using the paper based systems at Hospitals A and B felt that this system gave them enough latitude to alter time slots to maintain a coherent, efficient service:

'if I am really booked up I will just be illegal and split a new slot into two follow-up appointments'. [Senior Clinician]

The advantage of a paper diary system was acknowledged by one respondent stating that

'anyone can use the paper system....., but with the computer system unless they have had the necessary training they would not be able to do that.' [Managerial Position]

The majority of respondents at Hospital C believed the training provisions for using the system were inadequate – a common concern with new technology [2].

A concern echoed by all respondents using the electronic appointment booking system was about frequent technical problems:

*'I think it is more likely to be a server problem rather than a software problem. We have got our own IT department talking to *****, who is the software house, and each says that it is not their responsibility, so we always fall in the middle.'*

[Managerial Position]

Expressiveness of the time management tool

The electronic booking system used in Hospital C forces users to conform to standard entry terminology. The limited entry options and text space are perceived to be restrictive and inadequate. For example, a physiotherapist viewing their diary schedule cannot access any additional meeting details. The meeting details, initially completed by the physiotherapists on the 'Request for Diary Alterations' form, are therefore not accessible to the people for whom this information is most pertinent. Consequently, users are forced to record meeting details (e.g. participants, location and purpose) using a supplementary tool.

Several informants indicated that they would like to be able to fill in additional details relating to a patient in a separate 'Notes' section. This could be used to record details to assist the physiotherapist in planning their daily activities.

'It is quite difficult because you just see names, what you actually want is to be able to look at the name and know what type of patient that is. So in that case the paper system would have been better because we would have used a little caption next to their name, so a little initial, so that you can instantly see 'Oh that is a bronchiectasis patient'. [Senior Clinician]

Another respondent commented that he would like a place to record the name of the physiotherapist who had previously treated the patient, to help in locating the patient treatment records.

Paper diary systems support diverse typography. Standard codes for recording patient attendance are supplemented by the use of colour, highlighting and annotations (e.g. marking with an asterisk). In all cases, this additional symbolic notation was specific to the individual. This is clearly advantageous to the user but not helpful for others interpreting the diary information:

'People's handwriting is a problem, and people have different ways of recording their time slots. So it is a case of just knowing and understanding what they do'.

[Managerial Role]

This implicitness can cause difficulties – for example, when someone is trying to rebook a patient and there is ambiguity in the time slot parameters. A widely recognised advantage of electronic diary systems is that they make the implicit explicit [19].

The Hospital C system uses specific colour coding to help the user quickly identify available time slots and provide an overview of activity. For example, a grey blue background colour indicates a time slot allocation for the local police service while other routine new patient slots are green. This use of colour is viewed by staff as an invaluable aid in the routine scanning of diary columns to locate available appointment times.

Explicit and implicit information

To function smoothly and efficiently physiotherapy departments require explicit scheduling. Electronic systems are well suited to this particular task. Appointments and

meetings vary in duration and must therefore be adjustable. The system used in Hospital C offers this option but its use relies heavily on the memory of the reception staff:

'I have to just remember that respiratory outpatient follow-up appointments last one hour and normal outpatient appointments are thirty minutes.' [Administrative Role]

Rather than being a hindrance, many informants reported that having to make this information explicit helped them manage their work schedules more effectively.

Respondents from Hospital C all recognised the advantage of this when arranging shared diary activities. E.g.:

'the diary works well because it is there for all to see, no interpretation is needed as everything is clear and standardised'. [Senior Clinician]

One physiotherapist reported on the added demands of calculating the travel and preparation time required to attend a meeting or external event on the 'Request for Diary Alterations' form. The Hospital C system does not provide the facility to schedule a 'buffer zone' prior to a meeting start time, so meeting start times must reflect this requirement. This information would normally remain implicit:

'I would know that it takes me half an hour to get to the other hospital site and I would therefore know not to book a patient in the half an hour prior to the meeting'.

[Junior Clinician]

This is an example of shared diary systems forcing the user into making premature, explicit diary entries [3].

Regular events

A common characteristic in all physiotherapy departments is that several events (e.g. in-service training sessions, patient classes and clinical service commitments) occur at regular times. The Hospital C system has a frequency feature which is used to record regular events. Hospital B has tried to incorporate this into the standard templates of each individual physiotherapist. Unfortunately, due to the *'lengthy process'* [Administrative Position] involved in formatting these templates, any amendments are normally made by physiotherapists manually annotating the weekly paper printouts.

At Hospital A, individual physiotherapists have to manually maintain their diaries for recurring events. Informants reported that they record their work commitments in their diaries for an average of two or three weeks in advance. Critical incidents were reported when patient appointments and meetings were scheduled on behalf of the diary owner beyond this typical entry period:

'You then don't know what slots and things they have got on or what would be convenient for them.' [Junior Clinician]

As highlighted by Palen [20], systems such as that used at Hospital C offer advantages for managing event series.

Coordinating information resources

All informants in this study, with the exception of one who relied on memory, had to co-ordinate a minimum of two time management tools.

All the time management failures recalled by respondents from Hospitals A and B were attributed, directly or indirectly, to the inaccurate integration of information across these

tools. Thus the most common reason for scheduling errors was the explicit demand of maintaining multiple diaries. This finding is in line with Kelley & Chapanis' [21] study in which fifty percent of their respondents reported difficulties in accurately updating multiple diaries.

Several references were made to scheduling problems over annual and study leave. A recurring explanation for this problem was summed up by one respondent:

'There are four places actually, would you believe, for booking annual leave. It is very confusing.' [Senior Clinician]

In an attempt to resolve this problem, several respondents reported that they had developed their own checking system. A respondent from Hospital B confirmed this:

'I have a double check system, in that I write it in my diary and then write 'desk' and put a tick next to this once I have told them at reception.' [Senior Clinician]

No critical incidents of this nature were reported by informants using the system at Hospital C. This may be explained by the unpopular restriction procedures which require physiotherapists to document all new diary entries onto the 'Request for Diary Alterations' form. Payne [19] would argue that this formal process acts as an important prospective memory aid, compelling the user to reconcile information sources prior to making these arrangements public in the shared diary system.

Duplication of data was evident at all three sites. This was clearly unacceptable to one respondent who remarked that

'we have duplication of data, not because we want double checks and we need to verify everything, it is just that the system that we have got is ineffective and slow and you cannot find the information that you need'. [Administrative Role]

Justification for maintaining the patient index cards in Hospital B, for example, is explained by one respondent:

'If a patient phones up to ask whether we have received their referral it is quicker to open up the drawer and see, because if we have received it there will be a card for them, otherwise we would have to get their date of birth, log onto the system and then go through the screens.' [Administrative Role]

All three physiotherapy departments offer a variety of patient rehabilitation classes. The class time details are all scheduled into the various diary templates but no provision is made to incorporate the patient attendance list and patient details into the primary time management system. In all cases this information is recorded in a separate diary or notebook. This aspect of physiotherapy service contributes further to the plethora of artefacts that need to be maintained, consulted and integrated in order to achieve a coherent patient service. Palen [20] warns that this 'competition' between artefacts is rarely without some struggle and inevitably results in the suboptimal maintenance of one or more artefact.

One possible cause for the onerous record keeping is the various government initiatives on target setting and physiotherapy role evolution. There does not appear to be a unified organisational strategy to ensure that these changes are streamlined and time efficient. As a result the systems appear haphazard, relying on duplication procedures to provide an acceptable level of accuracy.

Exploiting time management systems for additional services

Several additional patient services, indirectly related to time management, are included in the diary systems at each site. The most notable of these is the inclusion of patient transport requirements in the diary content.

The Hospital A respondents use the symbol 'T' in their individual diaries as a reminder to fill in the required transport details in the separate 'Transport Bookings' diary.

Physiotherapists in Hospital B use the same symbol in the central paper diary to indicate that a patient is relying on hospital transport services. No additional information is conveyed to the physiotherapist by the presence of 'T' – i.e. this does not indicate that this service has actually been arranged. The system at Hospital C is used to print a request form which is subsequently hand delivered to the transport department.

A feature common to most physiotherapy departments is the regular provision of student placements. The Hospital C system supports the inclusion of student diary scheduling into the main diary system. In contrast, the centrally maintained paper system at Hospital B does not support the integration of student diaries or specialist physiotherapy services. One of the informants reported not using the central diary file when supervising students, stating that

'I actually find it easier, when students are here to have my own diary, so that I can juggle my time around the students and my other roles'. [Managerial Role]

The students are provided with separate paper sheets detailing their weekly commitments and the student supervisor employs her own paper diary for all appointment scheduling during supervision periods.

An apparent advantage of the electronic system over paper diary systems is the provision of timely information to physiotherapists regarding the arrival of their patients. This significant advantage overcomes the common complaint voiced by staff using the paper systems, that waiting for the arrival of a patient is wasted time that could be used more productively. As a respondent from Hospital C noted:

'We just look on the screen and we can see that they are here or they have not come in. It helps in that way, because we don't have to keep trekking down and shouting names out.' [Junior Clinician]

The problem has been recognised in Hospital A and options to reduce this time wastage are being considered,

'We are looking at having journals and articles up at the front desk so that they can sit down and read if the patient does not turn up, but invariably they want to get on with their discharges and that type of thing. It is a long way down the corridor unfortunately.' [Managerial Role]

Summary

This study has shown that physiotherapists regard diaries as essential to the day-to-day management of their professional work. It is important to recognise both the advantages and disadvantages of the different diary media currently employed in physiotherapy outpatients departments. The topic of diary attributes has been extensively researched, with the majority of studies reporting that the power and flexibility of the simple paper diary is matched by only a few electronic systems [19,20,22].

The advantages and disadvantages of different diary media, as reported by study participants, are summarised in Table 2. Many of these features are widely recognised,

inherent features of specific media, while others are more specifically related to the physiotherapy context of use.

Table 2- Comparative Attributes of Diary Types

Type of Diary	Advantages	Disadvantages
Standard Paper Diary	<p>Quick, direct access</p> <p>No specific training requirements</p> <p>Adaptable and flexible</p> <p>Diverse formats available</p> <p>Portable</p> <p>Supports personalised notation</p>	<p>Poor legibility and lack of precision</p> <p>Potential to ‘abuse’ diary content by ‘scheduling defensively’</p> <p>Onerous maintenance procedures</p> <p>Difficult to share</p>
Electronic Diary System	<p>Supports explicit scheduling</p> <p>Visual clarity</p> <p>Standardised system reducing the need to interpret other people’s diary content</p> <p>Potential for additional functionality e.g. automatic scheduler and frequency feature</p> <p>Ability to control access</p> <p>Ability to ‘split screens’ for cross referencing</p> <p>Supports an accurate appointment history</p> <p>Data base supports statistical analysis (reduces the demands for individual collection of monthly figures)</p>	<p>Passwords and logging on procedures tedious</p> <p>Restrictive with respect to descriptive abilities; forces respondents to use manual systems in conjunction with the electronic system</p> <p>Technical difficulties can create adverse working conditions</p> <p>Restrictive/rigid procedures and format: inability to double book, overlap or record simultaneous events or patient appointments.</p> <p>Cumbersome entry criteria</p> <p>Fixed location</p> <p>Diary content is unavailable when other system facilities are in use</p> <p>Manual duplication of entries already made on the computer</p> <p>Limited resources</p> <p>Inability to provide a broad overview of staff levels and diary content</p> <p>No provision for entries that are not time specific</p>

Discussion & Conclusions

Implications for the Introduction of Electronic Appointment Systems

Blandford and Green [3] concluded in their study that it is unlikely that a single time management tool will ever be capable of supporting all aspects of a person’s time management. The study reported here corroborates this earlier finding.

Outpatient physiotherapy departments differ with respect to size and the variety of patient services offered; there are, however, many core features and practices common to all departments. These similarities make it possible to highlight areas that require consideration prior to and following the deployment of electronic systems.

Physiotherapists across the three sites all consult a minimum of two diaries. The introduction of central electronic appointment booking systems is unlikely to reduce this number and may increase it. The first, and arguably most important, focus should be on improving integration across the various time management artefacts to streamline this process and reduce information duplication.

Location and portability are also important. In the departments utilising a paper system, all users carry their diary or photocopied versions of their diaries around with them. Conversely, respondents in Hospital C reported lack of ready access as a particular problem, highlighting the need for sufficient hardware resource provision to support electronic booking systems.

An additional implication, particularly for departments where physiotherapists are responsible for scheduling follow-up appointments, is the potential need for more administrative personnel as well as more computers.

A deeper problem may be the underlying perception among certain staff members that computer users are 'wasting' valuable clinical time, leading to a degree of tension between staff:

'the physiotherapists come in here to check their emails and block the computers, and then we have to tell them off.' [Administrative Role]

This perception must be addressed by senior management to encourage staff to embrace technological changes and acquire a level of confidence and competency to enable them to capitalise on the potential benefits of technology.

The lack of suitable IT training for health professionals has long been recognised as a concern [2]. Physiotherapists, particularly the more senior clinicians, view themselves as technically under-qualified. The majority of respondents using the system in Hospital C reported unsatisfactory levels of system training and support. The provision and implementation of directed IT training must be prioritised if the introduction of time management technology is to be accepted and fully utilised.

Another crucial factor in the successful implementation and maintenance of these electronic systems is the need for a sound technical support infrastructure. Staff in Hospital C were in regular contact with the software house but, as noted above, support and training with regard to system upgrades was perceived as inadequate. One explanation was that software training was deemed too expensive. A respondent further remarked that she felt there was a lack of assistance from the hospital IT department and the software manufacturer when there were technical difficulties. To combat this problem the planning and implementation of a support infrastructure should be part of the conceptualisation process. Kling ([15], pg. 8) explains this further: ‘the support systems for the focal computing system is integral to the effective operation of the technology.’

The usability of the Hospital C system was inhibited by the poor design of several interface features. For example, respondents reported that the daily template structure prevented the direct insertion of a meeting if patient appointments were already scheduled on either side of the available time slot. The administrative staff had to

remove the existing patient appointments, insert the meeting arrangements and then re-enter the patient appointments. Understandably, this led to user frustration and increased the likelihood of errors. This study has not considered software or interface design; however, the findings highlight the major influence these usability issues have on the overall usefulness and effectiveness of systems.

The importance placed on diary ownership and control was evident in this study. Senior staff members expressed a perceived threat to their professional status with the implementation of password restricted access and the re-direction of power to less trained staff members to whom they were required to justify their use of time – a theme highlighted by Symon *et al* [11]. The organisation's culture underlies the informal practices which develop into organisational and social norms [6]. The introduction of password restrictions and control measures threatens to contravene the implicit, informal collaborative activities and social protocols. This is an issue that will require sensitive handling. If this policy is to be accepted by the users, the benefits of implementing these measures need to outweigh the convenience, power and support of other less restrictive systems. As noted by Adams and Blandford [4], if these social and organisational issues remain unresolved they can impede the effective introduction of technology.

Conclusions

Time management tools are indispensable aids in the planning and delivery of patient services in physiotherapy departments. Time management in a physiotherapy outpatient department involves a complex interplay between scheduled activities of both a personal and work nature, in harmony with the ongoing need to be adaptable and

responsive to external events and the priorities of the patients. It is the existence of this dynamic work balance that justifies this investigation into the potential implications to current work practice following the proposed widespread implementation of electronic patient appointment booking systems.

Due to the diverse nature of time management tasks, as illustrated by this study, it is unlikely that the electronic appointment systems will replace all existing time management tools. Consequently, the central focus should be on designing and integrating these systems to enable the streamlined exchange of information across multiple tools, so as to facilitate efficient, effective, cohesive time management that complements the social and organisational practices that characterise physiotherapy outpatient departments.

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References

- [1] Department of Health (2002): Delivering IT to the NHS- a summary of the national programme for IT. Accessed from <http://www.doh.gov.uk/ipu/whatnew/deliveringit/deliveringit.htm> [viewed April 2003]

- [2] Latchford, G. (2002) *CPIAG Access Survey Report, Computers at Work Survey: positive thoughts, negative experiences*, August 2002. Accessed from the Library and Information Services, The Chartered Society of Physiotherapy, London
- [3] Blandford, A.E. & Green, T.R.G. (2001) Group and individual time management tools: what you get is not what you need, *Personal & Ubiquitous Computing*, **5** (4); 213-230.
- [4] Adams, A. & Blandford, A. (2002) Acceptability of Medical Digital Libraries, *Health Informatics Journal* 8(2) 58-66, Sheffield Academic Press.
- [5] McNulty, T. & Ferlie, E. (2002) *Reengineering Health Care: the Complexities of Organisational Transformation* Oxford: Oxford University Press.
- [6] Schein, E. (1990) Organizational Culture, *American Psychologist*, **45**; 109-119.
- [7] Harrison, G. S. 1991. The Winchester experience with the TDS hospital information system. *British Journal of Urology*, 67.5, 532-535.
- [8] Gremy, F. and Bonnin, M. 1995. Evaluation of automatic health information systems: what and how: Assessment and evaluation of information technologies. In Gennip, E. and Talmon, J.L. (eds.) *medicine van*. Amsterdam, IOS Press. 9-20.
- [9] Heathfield, H. 1999. The rise and fall of expert systems in medicine. *Expert Systems*, Vol. 16, No.3. 183 – 188.
- [10] Heathfield, H., Pitty, D. and Hanka, R. 1998. Evaluating information technology in health care: barriers and challenges. *BMJ*, 316, 1959 –1961.
- [11] Symon, G., Long, K & Ellis, J. 1996. The Coordination of work activities: co-operation and conflict in a hospital context. *Computer supported cooperative work*, 5,1. 1-31.
- [12] Adams, A., Blandford, A. & Lunt, P. (in press) Social empowerment and exclusion: A case study on digital libraries. To appear in *ACM Transactions on CHI*.

- [13] Wenger, E. 1999. *Communities of practice: Learning, meaning and identity*. Cambridge: Cambridge University Press.
- [14] Handy, C. (1999) *Understanding Organisations 4th Edition*, Penguin Books.
- [15] Kling, R. (1993) 'Organisational Analysis in Computer Science.', *The Information Society*, **9**(2), 71-87.
- [16] Garner, R., (1999) Garner project: scoping information management needs in occupational therapy and physiotherapy- *available from the Chartered Society of Physiotherapy, College of Occupational Therapy, London*
- [17] Physiotherapy Frontline Journal (1999) Garner to raise IT awareness, March 3rd , **5**(5) 21, *The Chartered Society of Physiotherapy*, London.
- [18] Adams, A. & Sasse, M.A. (1999) The user is not the enemy, *Communications of ACM (Dec 1999)*; 40-46
- [19] Payne, S.J. (1993) Understanding Calendar Use, *Human Computer Interaction* **8**; 83-100.
- [20] Palen, L. (1999) Social, Individual and Technological issues for Groupware Calendar Systems, *Proceedings of Computer Human Interaction '99*, 17-24. New York: ACM Press
- [21] Kelley, J.F. & Chapanis, A. (1982) How professional persons keep their calendars: Implications for computerization, *Journal of Occupational Psychology*. **55**; 241-256
- [22] Kincaid, C.M., Dupont, P.B. & Kaye, A.R. (1985) Electronic calendars in the office: an assessment of user needs and current technology, *ACM Transactions on the Office Information Systems*. **3.1.**; 89-102.