

Attitudes towards, and utility of, an integrated medical–dental patient-held record in primary care

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SUMMARY

Background. The need for closer coordination between primary care medical and dental services has been recognized.

Aim. To assess the attitudes of general medical practitioners (GMPs), general dental practitioners (GDPs), and patients to an integrated medical–dental patient-held record (integrated medical–dental PHR); to examine patients' use of these records, and the utility of the records for doctors and dentists.

Method. A three-phase study was carried out: (1) postal survey of GMPs and GDPs; (2) randomized trial of patients, using postal questionnaires before and one year after the issue of integrated medical–dental PHRs to cases; (3) assessment by doctors and dentists of anonymized integrated medical–dental PHRs from this trial. The study was carried out in medical and dental practices in affluent and deprived areas in Greater Glasgow Health Board. Two hundred and thirteen GMPs, 183 GDPs, and 369 patients registered with GMPs and GDPs were surveyed. Eighteen GDPs and GMPs assessed the integrated medical–dental PHRs.

Results. Eighty per cent of dentists had contacted a doctor and 16% of doctors had contacted a dentist in the previous three months; 87% of dentists and 68% of doctors thought an integrated medical–dental PHR would be of some use. Twenty-one per cent of dentists and 85% of doctors had practice computers. Most patients wanted to be able to see and read their own records. Twenty-four per cent of patients said there were mistakes and 30% noticed omissions in the integrated medical–dental PHR issued. Experience of having an integrated medical–dental PHR made patients more positive towards the idea of having a patient-held record and being able to check the accuracy of records. Integrated medical–dental PHRs contained important information for half the GDPs and one-third of the GMPs.

Conclusion. Both professionals and patients have reasonably positive attitudes towards the use of patient-held records. Among patients, the experience of having the integrated medical–dental PHR led to greater enthusiasm towards the idea. Dentists in particular would benefit from the transfer of information from doctors, but better methods are needed to ensure that patients take the integrated medical–dental PHR with them. Given the current lack of ability to easily produce an integrated medical–dental PHR, further examination of the routine issue of a copy of their medical summary, by GMPs, to all patients would be worthwhile.

Keywords: primary care; patient-held records; integrated care.

Introduction

THE need for closer coordination between primary care medical and dental services has been recognized.^{1–3} However, separate professional development and service organization, perhaps exacerbated by recent changes to contracts for general dental practitioners (GDPs),⁴ mean that integration of services will not be easy. Simple measures to improve communication between GDPs and general medical practitioners (GMPs) should be sought. Previous studies of more integrated care between GDPs and GMPs have included joint consultations, the sharing of records, and the improvement of communication.⁵ The current study investigated the use of an integrated medical–dental patient-held record (PHR).

Patient-held records (PHRs) have been used successfully to improve communication,⁶ to allow patients to audit the quality of data,^{7–9} to identify gaps in their knowledge,¹⁰ and to prompt them to attend for reviews.¹¹ Patients may feel an increase in empowerment,^{7,8,12–15} be reassured,^{7,8,12,20} and most think that the use of PHRs is a good idea.^{9,16–19} If presented with an exact copy of the medical record, patients may not understand all the terminology,¹⁸ but computer 'translation' methods could be used.²¹ Some doctors have claimed that the increase in time to discuss records with patients was time well spent.⁸ Patients appear not to lose their PHRs, although frequency of bringing them to consultations has been variable.^{15,22–30} PHRs for patients with particular illnesses such as diabetes³¹ and hypertension³² were acceptable to both patients and practitioners. Four out of five Australian GMPs thought a PHR would be useful.³³ Community dental staff in London approved the concept of both a PHR and a dental section within it, but no opinions were sought from GDPs.³⁴ We have been unable to identify other studies of PHRs in general dental practice. The purpose of the current study was to investigate the use of integrated medical–dental PHRs, and the attitudes of GMPs, GDPs, and patients towards an integrated medical–dental PHR in primary care.

Method

This was a three-part study: survey, randomized trial, and

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assessment of records.

Postal survey. A postal questionnaire was mailed to all 213 principal GMPs and 183 GDPs registered with Greater Glasgow Health Board. One hundred and fifty-three (72%) GMPs and 152 (83%) GDPs returned completed questionnaires.

Randomized trial. The hypothesis was that there would be no difference in attitudes towards the use of patient-held records comparing cases with controls both before and one year after the issue of patient-held records to cases.

Practices. Two Glasgow practices, one in an affluent area, the other in a deprived area, participated in the study. The affluent practice collaborators, a single-handed GMP and a single-handed GDP, practised from the same premises. The deprived area practice collaborators were one GMP in a four-partner practice and two GDPs based in the same health centre. The affluent practice collaborators, but not the deprived, had worked together before on joint consultations.⁵

Recruitment. In the summer of 1995, cross-referencing of practice records identified 547 patients at the affluent practice and 421 at the deprived practice who were registered with both GMP and GDP. Between then and December, patients were approached, as they attended the practices, to obtain their consent to be included in the study. By December 1995, consent had been obtained from 512 (53%) patients (302 from the affluent practice; 210 from the deprived practice).

Baseline survey. In February 1996, the 512 patients were surveyed to ascertain their pattern of dental and medical attendance, and opinions about integrated and patient-held records. After two reminders, the response was 408 (80%): 257 (85%) at the affluent practice and 151 (72%) at the deprived practice. Of these, 39 children, who had their questionnaire completed by a parent, were excluded, leaving 369.

Intervention. Patients were randomized to case (185) and control (184) groups; data were abstracted manually from medical and dental records for patients in the case group and checked with relevant GMPs and GDPs. In May 1996, a two-page, A4 size integrated medical-dental PHR, held within a pocket sized plastic 'wallet', was issued to the 185 patients in the case group. Patients were asked to check the details and to notify their GMP, GDP, or the project office of mistakes or omissions. Patients were told that the integrated medical-dental PHR was theirs to use as they wished and that they should take it to their doctor or dentist when attending, but that there was no requirement on the doctor or dentist to enter any data on it.

One-year follow-up survey. Of the 369 patients randomized, 355 remained in the study for the follow-up survey in February 1997. Reminders were sent to non-responders after three and six weeks.

Assessment of utility of PHRs

Anonymized copies of the PHRs for the 185 patients in the case group were made, and six samples of 62 records were selected (each record being in two samples). Each of the six samples was assessed by either two dentists and a doctor or two doctors and a dentist. The total of nine doctors and nine dentists were asked to identify records that passed important information from the

'other' profession and, for these records, to indicate the important information. Kappa statistics were calculated for each of the six same profession pairs to assess agreement.⁴²

Results

Postal survey

Of the dentists, 80% (121) had contacted a doctor in the previous three months, of which three-quarters enquired about a patient's heart condition or medications. Twenty per cent of dentists had contacted a doctor more than twice. All doctors had at least one patient, and one-third had more than five patients who had consulted with an oral health problem in the previous three months. However, only 16% of doctors had contacted a dentist. Over half (81, 53%) the dentists considered that 30% or more of their patients were unable to give an accurate medical history. Most dentists (130, 87%) but fewer doctors (101, 68%) thought that an integrated medical-dental PHR would sometimes be of use. Twenty one per cent of doctors and 11% of dentists thought it would be of little use. There were no differences in attitude to the use of an integrated medical-dental PHR by locality, existing computer use, or date of qualification. Eighty-five per cent of doctors, but only 21% of dentists, had a computer in their practice.

Randomized trial (Figure 1)

Patients leaving during the year of study. Sixteen patients had left the practices or died, three withdrew consent, 60 did not respond to the final survey. There was no difference between these 79 and the remaining 290 for age, sex, baseline opinions about the integrated medical-dental PHR and access to records, and most use of services. There were two differences: patients from the deprived practice were more likely to leave or fail to respond to the final survey than those from the affluent practice (34% versus 15%; $\chi^2 = 17.2$; 1 df; $P < 0.001$), and were less likely to have visited a dentist in the past six months (42% versus 64%; $\chi^2 = 11.8$; 1 df; $P < 0.001$).

Use of services. There were no differences at baseline or follow-up between cases and controls for the frequency of visiting doctors or other health professionals, having repeat prescriptions, visiting the doctor for oral problems, being referred to hospital, or calling doctor or dentist out of hours. At one-year follow-up, patients issued with an integrated medical-dental PHR were slightly more likely than controls to have visited the dentist once or twice during the year, rather than not at all or three or more times (67% versus 52%; $\chi^2 = 6.9$; 2 df; $P < 0.05$). Although patients in the affluent practice were more likely to have visited the dentist than those in the deprived practice (87% versus 51% had visited; $\chi^2 = 43.2$; 2 df; $P < 0.001$), the change in dental attendance for cases occurred at both sites.

Exchange of information between doctor and dentist. At baseline, most (85%) patients thought the doctor needed to know about other health care treatment, such as from a dentist or other doctor; one-quarter had been given a prescription by a dentist, but only half said that the dentist had, at some time, asked about their health before examination or treatment, and 30% about possible allergies to medicine. Eighty-one per cent were confident that they knew enough about their medical history to tell dentists everything they needed. However, only 46% thought the dentist needed to know their *full* medical history, 33% did not, and 21% were unsure. Nine per cent thought there were sensitive things in the medical history that they would not tell the dentist. One in five (22%) had been to a doctor for an oral problem at some

Joint patients between medical and dental practices were identified from practice lists in the summer of 1995. August and December 1995, patients were contacted as they attended practices, to obtain consent.		Between
Registered or eligible patients (n = 512) (joint patients between dental and medical practice) who had been contacted and consented to take part by January 1996.		and
Baseline survey started beginning of February 1996. Two reminders sent at three and six weeks. Responded to baseline survey (n = 408). 64 (13%) did not reply. 36 (7%) had died or gone away 1 withdrew consent 3 were still with the practice but had moved		
39 children for whom parents had completed the questionnaire were excluded, leaving 369		
	369 randomized	
No patient-held record issued (n = 184)	Followed up in February 1997 with reminders at three and six weeks. 290 responded.	Patient-held record issued in May 1996 (n = 185)
Withdrawn (n = 33) comprising Left practice or dead = 5 GPO said had gone away = 2 Withdrew consent = 0 No response follow-up = 26 Completed trial = 151		Withdrawn (n = 46) comprising Left practice or dead = 6 GPO said had gone away = 1 Withdrew consent = 1 No response follow-up 38 Completed trial = 139

Figure 1. Trial profile.

time. Six per cent said they had sometimes attended a doctor or dentist and the relevant records were not available; 86% said this had not happened. Four per cent had had to correct a detail that a doctor or dentist had referred to, whereas 91% had not.

Preferred format of records. Table 1 shows that a summary was slightly more popular than a full record as far as format was concerned. Virtually all agreed with the inclusion of information about medications, allergies, and vaccinations, but there was less agreement regarding social and psychological problems.

Censoring at time of issue. Of 185 integrated medical-dental PHRs issued, 14 (8%) had problems removed from the problem list by the GMP. Censored problems included five psychiatric problems (two alcohol related), an alcohol problem, a maternal history, speech therapy, termination of pregnancy, two family histories, and asthma on a child's record, which the mother would not accept.

Accuracy reported by patients. Twenty-four per cent said there were mistakes and 30% said there were omissions including allergies, dates of birth, addresses, current medications and items on the problem list, smoking details, height, weight, alcohol, and family history.

Use of IMPDHR. Of the 139 in the case group in the follow-up survey, six patients claimed not to have received the integrated medical-dental PHR, three no longer had it, and 15 did not answer the question. Of the remaining 115, 80 (70%) liked having a copy, 34 (30%) had no feelings one way or the other, and one person disliked having a copy. At baseline, 17% of the whole sample said they would show the record to family and friends and 36% to other health-care providers. However, at follow-up among the cases, only 16% (18 out of 115) had taken their record to their GMP, 10 to the GDP, four out of 42 who went to the hospital, and none of the 13 who saw a doctor or dentist out of hours. On the other hand, 47 (41%) had discussed the record with their family, 13 with a friend, 12 with their doctor,

Table 1. Patients' views at baseline on the format of a PHR (n = 369).

Items to be included on the PHR	Percentage of patients agreeing
Medications taken	96
Medications causing adverse reactions	95
Allergies (all types)	94
Vaccination/immunization details	93
Medical investigations or tests performed	88
Health problems and diagnoses (including mental health)	82
Reminder list of things to do to keep healthy	79
Personally sensitive or confidential information	73
Psychiatric problems and diagnoses	58
Social and psychological problems	53
Preferred format of records	Percentage of patients agreeing
Summary of record	45
Full record	36
No record	14
Don't know	6
Card in protective wallet	23
Ring binder (Filofax type)	20
Pocket book size	14
Credit card size	14
Paper folded in wallet	12
No record	10
Don't know	7

but only one with the dentist. Sixteen had taken it on holiday.

Attitudes towards seeing or holding their own records. Table 2 shows that, although 84% of patients at baseline wanted to read their records, only 54% agreed that having a record to carry for themselves was a good idea, perhaps because it might get lost or

Table 2. Percentage of patients in case and control groups who agreed with each of five statements, shown at baseline and one-year follow-up survey.

Statement	Baseline all n = 290	Baseline cases n = 139	Baseline controls n = 151	P-value from χ^2 (1 df) for difference at baseline	Follow-up cases n = 139	Final controls n = 151	P-value from χ^2 (1 df) for difference at follow-up
I would like to be able to see and read my own health records	84%	88%	77%	0.02	84%	64%	<0.001
My health records would be more accurate if I could check them	36%	35%	36%	0.83	52%	32%	0.001
Having my own copy of my records would make me more likely to worry about my health	25%	21%	29%	0.14	15%	23%	0.072
My knowledge of my own health would be increased if I had a copy of my own medical/dental record	71%	73%	69%	0.46	65%	53%	0.044
Having a record of my health to carry myself is a good idea	54%	53%	54%	0.91	71%	51%	<0.001

damaged or create extra work for the doctor or dentist otherwise. In the follow-up survey, patients in the case group who had the experience of an integrated medical-dental PHR were more positive towards the idea. They had also recognized their role in improving the quality of information held. Table 3 shows that significantly more patients in the case group changed their view to be positive about 'having a record of my health to carry myself is a good idea' and about 'my health records would be more accurate if I could check them'.

Utility of IMDPHRs to doctors and dentists

Table 4 shows that half the dentists and one-third of the doctors thought there was important information on the integrated medical-dental PHR from the other profession. Examples of the items that doctors and dentists thought important are shown in Box 1. However, agreement between professionals was poor. It is suggested that for a Kappa value of >0.8 agreement is excellent, >0.6 substantial, >0.4 fair, and <0.4 poor.⁴³ Kappa scores for the doctors were 0.07, 0.21, 0.56, and for the dentists, 0.17, 0.25, 0.66. One of the doctors, unlike the rest, thought presence of dentures was important. This was responsible for the Kappa of 0.07.

Discussion

Are these findings applicable to elsewhere in the United Kingdom (UK)? Our postal survey of GMPs and GDPs had a good response rate, and there is no reason to suppose that views of these practitioners are different from others. The patient population in our randomized trial had a certain degree of self-selection. The proportion for which contact and consent was achieved was not high. Of these, we 'lost' a further 20% at baseline and a further 79 between baseline and final survey. Although we found little difference between the remaining 290 and the 79 who left the study, this self-selection may cause some bias.

Both case and control groups changed their opinions over the course of year. There will have been a number of influences on opinions during this time, including the press, experiences with the health service, and discussion with family or neighbours. Some patients allocated to case and controls were from the same family or may have been neighbours. It is not clear why those in the control group tended to be less favourable at the end. Nevertheless, an increase in those who are positive to the idea of a PHR among cases is fairly clear, and, overall, most patients

were in favour. Although there was consistency in the type of information listed as important by dentists and doctors, the variability between ratings was high.

There is a need to improve communication between doctors and dentists in primary care.^{1,2,5} Two-thirds of the integrated medical-dental PHRs in this study contained information rated as important either by doctors or by dentists. Our postal survey showed that both dentists and doctors had positive attitudes towards the use of integrated medical-dental PHRs. Our randomized trial showed that most patients would like to be able to see and read their records, and more than half thought that having a copy of their own record was a good idea. This proportion significantly increased among cases that had a more positive attitude at the end of the study compared with both their own opinions at the beginning and with controls. Few patients, however, took the record to the doctor or dentist.

A previous Glasgow study showed the benefits of information exchange between doctor and dentist — for example, in terms of reduced referrals⁵ — but the doctor and dentist in this study were physically close. Elsewhere, the number of joint patients between doctors and dentists, particularly in urban areas, may be quite small. Although use of the NHSNet is developing, there are still obstacles to the routine use of an electronic medical-dental record. These include whether the record will be held on one system or distributed across the two, how the information will be accessed by GDP and GMP, and concordance of terminology, for example, through the extension of Read codes to dentistry.

One solution suggested for information exchange is the use of smartcards.³⁵⁻³⁷ Although, in continental Europe there is widespread use, evaluation studies in the UK have not yet been conclusive. Smartcards require a computer to enable patients to access the data. As more computers become available for use by patients for education or pre-consultation interview,³⁸ smartcard-controlled access may become commonplace, but with full networking of providers there seems little need for smartcards as a transfer mechanism. Furthermore, smartcards are relatively expensive, whereas paper PHRs can be produced at small, marginal cost.^{16,18,32}

One problem to be addressed is security of access and the patient's control over whether information *should* be shared between GMP and GDP. In this study, GMPs wanted to modify the record released to the patient. Information made available to the GDP was therefore 'censored'. Furthermore, at baseline, less than half the patients thought the GDP needed to know their *full*

Table 3. Patients who changed their opinion about a statement between baseline and one-year follow-up survey, showing number (percentage) who did not agree at baseline but did agree at follow-up (more positive), and vice versa (less positive).

Statement	Cases			Controls			P-value χ^2 (2 df)
	Constant opinion	More Positive	Less Positive	Constant opinion	More positive	Less positive	
I would like to be able to see and read my own health records	122 (88)	6 (4)	11 (8)	112 (74)	11 (7)	28 (19)	0.012 8.83
My health records would be more accurate if I could check them	97 (70)	32 (23)	10 (7)	117 (78)	14 (9)	20 (13)	0.003 11.8
Having my own copy of my records would make me more likely to worry about my health	111 (80)	9 (7)	19 (14)	129 (85)	7 (5)	15 (10)	0.46 1.58
My knowledge of my own health would be increased if I had a copy of my own medical/dental record	101 (73)	14 (10)	24 (17)	102 (68)	14 (9)	35 (23)	0.46 1.56
Having a record of my health to carry myself is a good idea	88 (63)	37 (27)	14 (10)	116 (76)	16 (11)	19 (13)	0.002 12.4

Table 4. Number of IMDPHRs that were thought by doctors and dentists to contain important information from the 'other' profession.

Doctor rating	Dentist rating		
	Not important	Important	All records
Not important	69	58	127 (69%)
Important	19	39	58 (31%)
All records	88 (48%)	97 (52%)	185

Items on the dental record rated important by doctor

- allergies in particular to penicillin, nickel and chrome, ponstan, and ibuprofen;
- information relating to surgery, in particular, post extraction bleeding, and the need for antibiotics prior to treatment;
- dental treatment in those patients for whom it was particularly extensive, or patients who had gross caries;
- temporomandibular joint problems;
- pathology of lip lesions;
- presence of dentures (for anaesthesia);
- further or different information on problems including previous jaundice, partial sight, mental illness, high blood pressure, rheumatic fever, heart murmur, penicillin and other allergies, cerebrovascular accident, candidiasis, diet and smoking information, and a difference in date of birth between dental and medical record.

Items on the medical record rated important by the dentist

- drug histories, in particular, use of steroids; allergies, e.g. to penicillin, septrin;
- problems including epilepsy, rheumatoid arthritis, oral sequelae of radiotherapy, vascular disease, heart disease, angina, hypertension, heavy drinker, asthma, previous myocardial infarction, temporomandibular joint, cranial nerve palsy, iron deficiency, diabetes, coronary artery disease, alcohol abuse, pancreatitis, smoking.

Box 1. Examples of items on the integrated medical-dental PHRS thought to be important by doctors and dentists.

medical history. More work is needed on information exchange between professions and the role the patient should play in that exchange.

There is still a low level of computerization in general dental practice. Furthermore, general dental records are not routinely forwarded. A 1983 study found that patients who had changed dentists received almost twice as many restorations as those who did not.⁴⁰ Analysis of accurate records is also needed to predict a patient's caries risk level.⁴¹ A detailed patient-held dental record could therefore have major benefits. Higher levels of computerization in general dental practice could be achieved with more incentives for electronic links to the Dental Practice Board. Further work on methods of information exchange between doctor and dentist would then be worthwhile.

One way forward is through a paper medical PHR. Some of the benefits of a PHR were illustrated by this study. Professionals and patients have a positive attitude towards such a record, and patients were able to audit the information. Some patients took their record on holiday, which could be of use if there was a need to see a doctor. For others, the record may have provided a useful catalyst for discussing health issues within the family. We failed to institute its regular use with the professionals and needed better instructions for its use. Nevertheless, most GMP systems can routinely produce a summary record at very low, marginal cost. The routine issue of records to patients to audit could be cost effective.³⁹ A further study of the feasibility and cost-effectiveness of the routine issue to all patients, by GMPs, of a copy of their medical summary would be worthwhile.

References

1. The Nuffield Foundation. *An inquiry into the training and education of personnel auxiliary to dentistry*. London: Nuffield Foundation, 1993.
2. Mason D. Future relationships of medicine and dentistry in education and practice. *Br Dent J* 1992; **173**: 2-4.
3. Department of Health. *House of Commons Health Select Committee report on the dental services*. London: HMSO, 1993.
4. Department of Health. *The Dental Contract - detailed guidance*. [Annex to FPN 524.] London: Department of Health, 1990.
5. Haughney MGJ, Devennie JC, Macpherson LMD, Mason DK. Integration of primary care dental and medical services: a three year study. *Br Dent J* 1998; **184**: 343-347.
6. Gilhooly MLM, McGhee SM. Medical records: practicalities and principles of patient possession. *J Med Ethics* 1991; **17**: 138-143.
7. Baldry M, Cheal C, Fisher B, *et al*. Giving patients their own records in general practice: experience of patients and staff. *BMJ* 1986; **292**: 596-598.
8. Tomson P. Sharing problem cards with patients. *J R Coll Gen Pract* 1985; **35**: 534-535.
9. Sheldon MG. Giving patients a copy of their computer medical record. *J R Coll Gen Pract* 1982; **32**: 80-86.
10. Dowell T. Personal medical record card. *BMJ* 1983; **286**: 526-527.
11. Lawrence M. A computer generated patient carried health check card. *J R Coll Gen Pract*, 1986; **36**: 458-460.
12. Bronson DL, Rubin AS, Tufo HM. Patient education through record sharing. *Qual Rev Bull* 1978; **Dec 4**: 2-4.
13. Elbourne E, Richardson M, Chalmers I, *et al*. The Newbury Maternity Care Study: a randomised controlled trial to assess a policy of women holding their own obstetric records. *Br J Obstet Gynaecol* 1987; **94**: 612-619.
14. Essex B, Doig R, Renshaw J. Pilot study of records of shared care for people with mental illnesses. *BMJ* 1990; **300**: 1442-1446.
15. Lovell A, Zander LI, James CE, *et al*. The St Thomas's Hospital maternity case notes study: a randomised controlled trial to assess the effects of giving expectant mothers their own maternity case notes. *Paediatr Perinat Epidemiol* 1987; **1**: 57-66.
16. Giglio RJ, Papazian B. Acceptance and use of patient-carried health records. *Med Care* 1986; **24**: 1084-1092.
17. Bird AP, Walji MTL. Our patients have access to their medical records. *BMJ* 1986; **292**: 595-596.
18. Jones RB, McGhee SM, Hedley AJ. Patient access to information. In: Roberts J, Windsor P (eds). *Current perspectives in health computing 1988: pulling it together*. Weybridge, Surrey: BJHC Books, 1998.
19. Melville AWT. Patient access to general practice medical records. *Health Bull* 1989; **47**: 5-8.
20. Fisher B, Britten N. Patient access to records: expectations of hospital doctors and experiences of cancer patients. *Br J Gen Pract* 1993; **43**: 52-56.
21. Cawsey A, Jones RB, Pearson J, *et al*. A personalised patient information system using GRAIL. In: Richards B (ed). *Current perspectives in healthcare computing*. Surrey: BJHC Books, 1998: 259-266.
22. Reuler JB, Balazs JR. Portable medical record for the homeless mentally ill. *BMJ* 1991; **303**: 446.
23. Jeffs D, Nossar V, Smith W, *et al*. Retention and use of personal health records: A population-based study. *J Paediatr Child Health* 1994; **30**: 248-252.
24. O'Flaherty S, Jandera E, Llewellyn J, Wall M. Personal health records: an evaluation. *Arch Dis Child* 1987; **62**: 1152-1155.
25. Campbell H, Halleran J. An evaluation of the personal child health record in Fife. *Health Bull* 1993; **51**: 399-406.
26. Saffin K, Macfarlane A. How well are parent held records kept and completed? *Br J Gen Pract* 1991; **41**: 249-251.
27. Miller SA StJ. A trial of parent held child health records in the armed forces. *BMJ* 1990; **300**: 1046.
28. Macfarlane A, Saffin K. Do general practitioners and health visitors like 'parent held' child health records? *Br J Gen Pract* 1990; **40**: 106-108.
29. Jeffs D, Harris M. The personal health record - making it work better for general practitioners. *Aust Fam Physician* 1993; **22**: 1417-1427.
30. Charles R. An evaluation of parent-held child health records. *Health Visitor* 1994; **67**: 270-272.
31. Jones RB, Hedley AJ. Patient-held records: censoring of information by doctors. *J R Coll Physicians Lond* 1987; **21**: 35-38.
32. McGhee SM, Hedley AJ, Jones RB, *et al*. A computer-based shared-care scheme for hypertension in Glasgow: feasibility and acceptability. In: Moore RS, Bengtsson S, Bryant JR, Bryden JS (eds). *Medical Informatics Europe '90*. [Proceedings.] Berlin: Springer-Verlag, 1990.
33. Liaw ST. Patient and general practitioner perceptions of patient-held health records. *Fam Pract* 1993; **10**: 406-415.
34. Gallagher J. Personal Child Health Records. The Dental Section. In: *Patient held records*. [Report of conference proceedings.] London: Unit of Dental Public Health, UMDS Guy's, 1993.
35. Neame R. Smart cards - the key to trustworthy health information systems. *BMJ* 1997; **314**: 573-577.
36. Beattie JAG, Petrie JC. Optical healthcards: comprehensive patient-carried medical records. In: Richards B (ed.). *Current perspectives in healthcare computing*. [HC94.] Weybridge, Surrey: BJHC Books, 1994.
37. Consejería de Salud, Servicio Andaluz de Salud. *Proyecto TASS*. Presentation at II Congreso Nacional de Informatica de la Salud. Madrid 17-19 April 1997. Madrid: Sociedad Española de Informatica de Salud (SEIS), 1997.
38. Jones RB. *Information for the citizen*. Multimedia publication on the World Wide Web: <http://www.fundesco.es/it-eductra>
39. Jones RB, Nutt RA, Hedley AJ. Improving the quality of data in a computerised patient master index - implications for costs and patient care. *Effective Health Care* 1984; **3**: 97-103.
40. Davies JA. The relationship between change of dentists and treatment received in the general dental service. *Br Dent J* 1984; **157**: 322-324.
41. Anusavice KJ. Decision analysis in restorative dentistry. (Review.) *J Dent Educ* 1992; **12**: 812-822.
42. Fleiss JL. Measuring agreement between two judges on the presence or absence of a trait. *Biometrics* 1975; **31**: 651-659.
43. Landis JR, Koch GG. The measurement of observer agreement for categorical data. *Biometrics* 1977; **33**: 159-174.

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