Information in practice

Randomised trial of personalised computer based information for patients with schizophrenia

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Abstract

Objectives To compare use, effect, and cost of personalised computer education with community psychiatric nurse education for patients with schizophrenia.

Design Randomised trial of three interventions. Modelling of costs of alternatives.

Participants 112 patients with schizophrenia in contact with community services; 67 completed the intervention.

Interventions Three interventions of five educational sessions: (*a*) computer intervention combining information from patient's medical record with general information about schizophrenia; (*b*) sessions with a community psychiatric nurse; (*c*) "combination" (first and last sessions with nurse and remainder with computer).

Main outcome measures Patients' attendance, opinions, change in knowledge, and psychological state; costs of interventions and patients' use of NHS community services; modelling of costs for these three, and alternative, interventions.

Results Rates of completion of intervention did not differ significantly (71% for combination intervention, 61% for computer only, 46% for nurse only). Computer sessions were shorter than sessions with nurse (14 minutes *v* 60 minutes). More patients given nurse based education thought the information relevant. Of 20 patients in combination group, 13 preferred the sessions with the nurse and seven preferred the computer. There were no significant differences between groups in psychological outcomes. Because of the need to transport patients to the computer for their sessions, there was no difference between interventions in costs, but computer sessions combined with other patient contacts would be substantially cheaper.

Conclusions The computer based patient education offered no advantage over sessions with a community psychiatric nurse. Investigation of computer use combined with other health service contacts would be worth while.

Introduction

Reasons for providing health information for patients include "consumer demand,"[1][2] patient decision mak-ing,[3][4] and improving compliance.[5][6] Although computer based methods have been accepted by a wide range of patients,[7–10] their use by patient groups who show poor compliance has received less attention. There have been few randomised trials of computer based patient information that incorporate economic modelling.[11] Cancer patients preferred individualised information based on their medical records to general information,[11] but this approach may be inappropriate for other patients, so we have now tested it in a less compliant group.

Patient education in schizophrenia has shown limited but positive outcomes, but it is difficult to engage patients.[6][12–14] A Glasgow study showed that group education aimed at improving schizophrenic patients' factual knowledge improved social functioning and quality of life for the 28% of patients who participated.[12]

We developed a computerised education package based on patients' case records and piloted it with 15 patients (see appendix A on *BMJ*'s website for details).[15] We report the results of a randomised trial comparing the computer education with education delivered by a community psychiatric nurse and with a combination of computer based and nurse based education. We hypothesised that the computer system might give better outcomes in knowledge and patient satisfaction and would cost less than the community psychiatric nurse alone but that the combination of nurse and computer might provide the best results.

Participants and methods

Study population and sample

All 420 patients with a diagnosis of schizophrenia (F2 on ICD-10, international classification of diseases, 10th revision) who were living in the community in south Glasgow[15] were considered for inclusion in the study. Patients were excluded if they were aged over 65 years, had an uncertain diagnosis, were judged by community psychiatric nurses at the time of contact to be acutely ill, had chronic symptoms or physical problems restricting participation, were persistent defaulters, or had recently been involved in an education programme. This left a population of 301 (72%). Greater Glasgow Community and Mental Health Trust gave ethical approval for the study.

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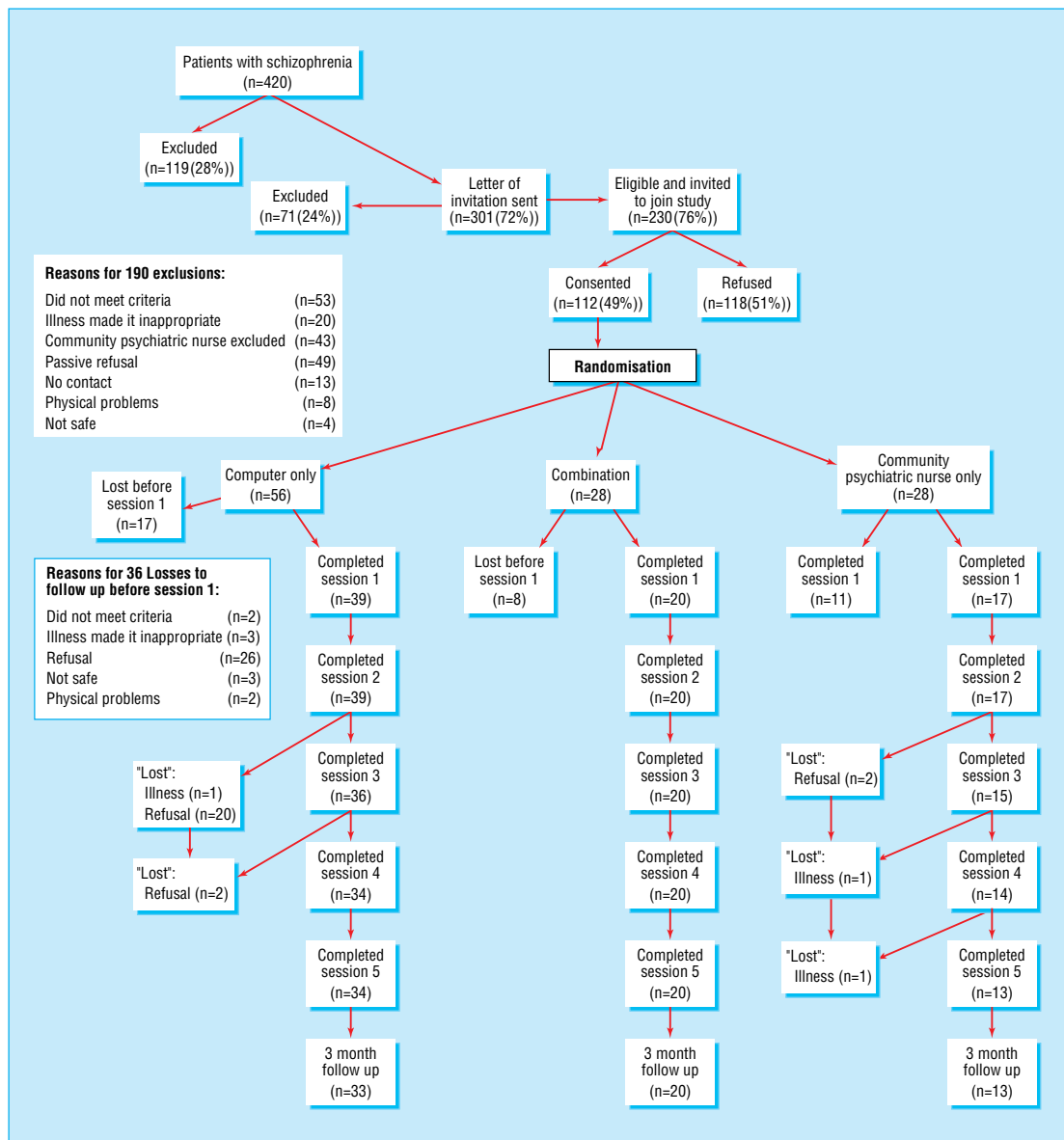
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Further details of methods and results appear on the BMJ's website

Patient flow through study

Recruitment and randomisation

Patients were sent a letter inviting them to join the study and could opt out without further contact. Researchers attempted to arrange meetings either at home or at an NHS facility to explain the study and seek consent. Some patients were excluded at this stage as new information became available. Of the 230 who seemed eligible and were contacted, 118 (51%) refused to participate. The remaining 112 patients were randomly allocated to one of the three interventions: 56 (50%) to computer education, 28 (25%) to sessions with a community psychiatric nurse, and 28 (25%) to the combination intervention. We had aimed to recruit 140 patients, giving 84% power at the 5% significance level to find differences in drop out rate of 10% v 30% for the group given nurse based education and those given computer based education. (See appendix B on *BMJ*'s website for further details.)

Interventions

All interventions involved five sessions and were intended to increase patients' knowledge about schizophrenia. Sessions on the computer were held in a dedicated room at a resource centre through which all community services are organised. Sessions with the community psychiatric nurse could be at home or in the resource centre.

Computer only—Patients were shown how to use the computer by a researcher (LP). Patients could only go forwards to the next screen—until the end of the session, when they could recap. There were three types of screen display: (*a*) general information, (*b*) personal information from the viewing patient's medical record "embedded" in more general information, and (*c*) questionnaires (including medical record audit), plus feedback displays (see appendix A on *BMJ*'s website for examples). At the end of the session, LP printed out the information displayed if the patient requested it.

Community psychiatric nurse only—The hour long sessions with the community psychiatric nurse (KMcK) covered the same content as the computer system. Personal issues could be introduced by the patient. Patients could also be given a printed summary, but this did not include any personal information.

Combination of community psychiatric nurse and computer—The first session was with the community psychiatric nurse, sessions 2-4 were on the computer, and the last session was again with the nurse. Patients were given relevant printed summaries from sessions.

Data collection

We used four psychological measures. We assessed patients' knowledge with a structured interview, the knowledge and information about schizophrenia schedule (KISS), which was developed for the pilot study partly on the basis of the KASI used for carers (see appendix C on *BMJ*'s website).[16] We carried out this interview three times: before the first session, at the end of the fifth session or at a separate contact shortly after (patient choice), and three months later. A consultant psychiatrist (DAC) assessed the patients' mental state (with the brief psychiatric rating scale (BPRS)[17]), insight (insight and treatment attitudes questionnaire (ITAQ)[18]), and functioning (global assessment of functioning (GAF)[19–21]) in a separate interview before the intervention and three months after the last session.

We assessed patients' opinions about the interventions using questionnaires, specifically about the computer for the computer group at the end of the first session and, for all groups, at the end of the fifth session and three months later.

The computer automatically monitored the time taken by patients on each screen display, and the community psychiatric nurse recorded time spent on sessions. Times spent in contacting patients, transporting them to their intervention if necessary, and preparing for the intervention were also recorded. Patients' contacts with community health services were routinely recorded (by Joan Jamieson, information nurse in primary care trust, extracting information from Peak system (Peak Systems, Irvine, Scotland)).

Data analysis

In our intention to treat analysis (112 patients), we assumed that the values for psychological variables for patients who did not complete follow up had not changed. We compared changes in scores between groups using analysis of variance *F* tests and Kruskal-Wallis tests. We used the χ^2 test to compare patients classified as improved or not improved on the psychological and patient satisfaction measures.

Economic analysis

We estimated the "long run opportunity marginal cost" of interventions.[22] Patients not taking part in the intervention had zero intervention costs. Community health service contacts were costed for three months before consent until three months after the intervention for each patient. We modelled NHS costs over four years assuming that computer hardware was "written off" over this period and that future costs were discounted at 6%. Eight options were modelled: the three interventions in this study, the same three interventions assuming the existence of an electronic

patient record (with no need to extract data from a manual case record), and two options using a computer based approach as an addition to other routine contacts. (See appendix D on *BMJ*'s website for more details.)

Results

Patients completing the intervention and non-attendance

The 112 participants were aged from 18 to 65 years, and 67% were men. The figure shows their passage through the trial. Sixty seven (60%) of the patients completed all five sessions, and completion rates in the three interventions were not significantly different (71% for combination education, 61% for computer only, 46% for community psychiatric nurse only). Thirty six patients (32%) were lost from the study before the first session. These were more likely to be women (49% of women *v* 24% of men; $\chi^2 = 6.9$, df = 1, P = 0.009). Nine (8%) of the patients, all men, attended the first session but dropped out subsequently.

Use of, and reaction to, computer sessions

The overall time spent on the five computer sessions was quite short (median 69 minutes (range 34-143)). Of the 39 patients who completed the first session, 27 found the touch screen easy to use, nine found it "OK," and three found it moderately difficult. All knew where to touch the screen, and all felt "OK" or keen to use the computer again. Twenty two thought that the computer was easy to use, and the other 17 thought it "OK." Nearly a third (12/39) encountered a display or part of a display in which they were uncertain about what to do next. (See appendix E on *BMJ*'s website for more details.)

Patients' opinions about interventions

Among the patients who completed all five sessions, all of those given nurse based education only thought that the information was definitely relevant, compared with three quarters of those given computer based education only and half of those given the combination (table 1). For nearly all other items, the patients given nurse based education only were more satisfied, although no measure reached significance. Of the 20 patients given the combination, 13 preferred the nurse based sessions and seven preferred the computer for most items asked (see appendix F on *BMJ*'s website). One patient preferred the computer sessions because the sessions with the nurse were too long, another because it helped to see information "in black and white." Patients who preferred the nurse sessions mentioned the personal touch, empathy, helped to have a chat, and preferring to talk than read.

Psychological outcomes

The patient groups showed no differences in baseline psychological measures, but the range of scores was high (table 2). Mean scores for all four measures improved for the 67 patients who completed the five sessions, although the level of improvement was fairly small (table 3). Using an intention to treat analysis, we found that fewer of the patients allocated to nurse based education only had improved knowledge at three months, but those who completed the sessions

Table 1 Satisfaction among 64* schizophrenic patients who completed the intervention with health education sessions given by computer, by a community psychiatric nurse, or by a combination. Values are percentages (numbers) of patients who definitely agreed with the propositions unless stated otherwise

| | Intervention | | | |
	Computer (n=32)	Combination (n=20)	Nurse (n=12)	Difference (P value)†
Propositions				
Positive				
Sessions very useful?	67 (21)	60 (12)	75 (9)	0.69
Learn anything new?	59 (19)	65 (13)	92 (11)	0.12
Information relevant?	75 (24)	60 (12)	100 (12)	0.03
Enjoy coming for the sessions?	72 (23)	75 (15)	92 (11)	0.38
Get enough information (v too much or little)?	63 (20)	75 (15)	83 (10)	0.35
Get what you wanted out of the sessions?	53 (17)	55 (11)	67 (8)	0.72
Illness described in way you could understand?	59 (19)	60 (12)	58 (7)	0.99
Enough information about your own circumstances?	50 (16)	75 (15)	58 (7)	0.20
Negative				
Information you wanted but did not get?	12 (4)	35 (7)	33 (4)	0.12
Information you would rather not have got?	38 (12)	55 (11)	58 (7)	0.32
Mean satisfaction score‡	5.5	6.2	7.2	0.16

*Three of the 67 patients who completed the intervention (2 in computer group and 1 in nurse group) did not complete this questionnaire.
†From χ^2 test (df=2) for differences between percentages (Fisher's exact test for "Information relevant?") and from analysis of variance for differences in mean satisfaction scores.
‡Score from 0 (not satisfied) to 10 (very satisfied).

Table 2 Baseline psychological measures of 112 schizophrenic patients randomised to health education sessions given by computer, by a community psychiatric nurse, or by a combination

| | Intervention | | | |
	Computer (n=56)	Combination (n=28)	Nurse (n=28)	All (n=112)
BPRS:				
No of completed scores	40	21	18	79
Range of scores (possible 0-108)	0-30	3-23	3-23	0-30
Mean (SD) score	9.8 (7.6)	10.9 (5.1)	11.9 (6.0)	10.6 (6.7)
ITAQ:				
No of completed scores	40	21	18	79
Range of scores (possible 0-18)	0-18	7-18	5-18	0-18
Mean (SD) score	13.4 (5.8)	15.8 (2.9)	12.8 (4.3)	13.9 (4.9)
GAF:				
No of completed scores	40	21	18	79
Range of scores (possible 0-90)	40-75	50-75	45-75	40-75
Mean (SD) score	61.6 (9.8)	61.9 (8.0)	58.3 (7.7)	61.0 (8.9)
KISS:				
No of completed scores	41	22	19	82
Range of scores (possible 0-26)	0-22	8-21	7-20	0-22
Mean (SD) score	14.6 (5.7)	15.4 (2.9)	13.5 (4.7)	14.6 (4.8)

BPRS=brief psychiatric rating scale. ITAQ=insight and treatment attitudes questionnaire. GAF=global assessment of functioning. KISS=knowledge and information about schizophrenia schedule.

showed greater improvement in insight and mental state.

Intervention costs

The main costs were staff time in contacting patients and carrying out the intervention—about £200 for each patient who completed treatment (table 4). There were no differences between groups for NHS or patient costs. A major contributor to the cost of the computer sessions was travel time: for patients who required transport, staff had to make four journeys per session. Of the 76 patients who attended one or more sessions, 19 required no transport, eight required transport for some sessions, and 49 required it for all the sessions they attended. The capital costs of the computer and its maintenance over four years was £3300.

Effect of intervention on other community health service costs

We compared other community health service costs with intervention costs. One patient, living in the community when identified, was admitted to our study with an approximate three month inpatient cost of £9720. After excluding this patient, we found that the patients' mean cost in the three months before the intervention was £55 (median £30 (range 0-616)), compared with £65 (median £37 (0-825)) in the three months after. The mean number of attendances at community health services before the intervention was 7.6 (median 6 (0-66)) and was 7.7 (5 (0-84)) afterwards. For the patients given nurse based education only, community health service costs declined in the three months after the intervention whereas the costs rose for the other two groups. However, costs generally displayed a wide range, and some of the difference seen might have been due to "regression to the mean."

Modelling of alternative interventions

We modelled the cost of the interventions over four years for eight alternative methods of delivery: the three interventions in this study, the same three interventions but with an electronic patient record system, and the computer intervention used as an additional activity at an already planned health service contact (with or without an electronic patient record).

The three interventions used in this study would cost between £360 000 and £380 000 over four years. With an electronic patient record, these costs would be reduced to between £210 000 and £290 000. However, patients tended to have at least seven contacts with health services in three months, and if computer based educational sessions were combined with these other visits staff workloads and costs would be substantially reduced and patient costs would also be less. The option assuming an electronic patient record and computers based at each of the seven clinics in south Glasgow that the patients routinely attended would cost only £40 000 over four years (see appendix D on *BMJ*'s website).

Discussion

This study showed that personalised, computer based health education for patients with schizophrenia was acceptable and as effective as educational sessions given by a community psychiatric nurse. However, the computer based intervention had no advantage in terms of costs.

Psychological measures and patients' opinion

Nearly two thirds of the patients who completed the intervention and 38% of those randomised to an intervention showed improved knowledge at six months after randomisation, but there was little difference in this or other psychological outcomes between the three intervention groups. Patients given nurse based education showed more improvement in mental state at the end of the sessions, even though the intervention was not designed to make any difference. On the whole, patients were more satisfied with the nurse based education, but the difference was not great. Although most patients in the combination group preferred the nurse's sessions, a third preferred the

computer. Most patients given computer based education only found the computer reasonably easy to use, and drop out from this group was similar to that in the group given nurse based education only. There were no major problems with including information from the patients' medical records in the computerised material.

Cost

From our pilot study, we predicted that the computer based intervention would be less costly, but, because of the need to transport patients to the computer, this was not the case. In general, the cost of the educational interventions organised as separate sessions was high compared with other community care contacts (£200 for intervention v £120 annual contact costs), and this did not include recruitment costs. However, our study was short term, examining costs over only six months, and improvements in schizophrenic patients' functioning may be associated initially with greater use of psychiatric services.[23] Schizophrenia costs the NHS nearly £500m a year to treat.[24] The patient in our study who had an inpatient stay costing over £9000 shows that the potential savings from improving schizophrenic patients' functioning are substantial, but evaluation of educational interventions, whether computer based or not, needs to be carried out for longer than six months and in a larger population to measure any impact on cost.

Recruitment and follow up

The effectiveness of educational interventions in routine practice depends on their being able to recruit patients and maintain their participation. After exclusions and refusals, only a quarter of the original population took part in our study, and this is not unusual for studies of patients with schizophrenia. Furthermore, of the 112 patients who agreed to participate, most required transport by the researchers if they were to attend. Even then, only 67 (60%) completed their intervention.

Conclusions

Computer based educational sessions for patients with schizophrenia were no less effective than sessions with a community psychiatric nurse and were acceptable to most, and preferred by some. However, running special educational sessions, whether by computer or by community psychiatric nurse, is costly and does not seem to be the way forward. It would be worth investigating the feasibility and effectiveness of giving computer based education as an addition to other health service contacts. Although this has higher capital costs, the overall cost would be less and it might lead to greater patient participation.

Table 3 Psychological outcomes among 112 schizophrenic patients randomised to health education sessions given by computer, by a community psychiatric nurse, or by a combination

	Intervention				Difference (P value)*
	Computer	Combination	Nurse	All	
Intention to treat analysis	**n=56**	**n=28**	**n=28**	**n=112**	
Improvement in mean score after intervention:					
BPRS	0.09	0.5	1.3	0.5	0.30, 0.28
ITAQ	0.7	0.04	1.0	0.6	0.25, 0.48
GAF	0.9	0.0	2.0	0.9	0.45, 0.27
KISS:					
1st to 2nd interview	0.7	1.5	1.6	1.1	0.33, 0.21
1st to 3rd interview	1.0	2.1	1.0	1.3	0.35, 0.36
% (No) of patients with improved scores:					
BPRS	23 (13)	32 (9)	21 (6)	25 (28)	0.59
ITAQ	30 (17)	21 (6)	21 (6)	26 (29)	0.56
GAF	23 (13)	18 (5)	29 (8)	23 (26)	0.64
KISS:					
1st to 2nd interview	30 (17)	43 (12)	36 (10)	35 (39)	0.52
1st to 3rd interview	39 (22)	50 (14)	21 (6)	38 (42)	0.08
Patients completing intervention	**n=34**	**n=20**	**n=13**	**n=67**	
Improvement in mean score after intervention:					
BPRS	0.2	0.9	4.1	1.0	0.09, 0.11
ITAQ	1.3	0.01	3.2	1.2	0.05, 0.16
GAF	1.6	0.0	6.1	1.8	0.18, 0. 11
KISS:					
1st to 2nd interview	1.2	2.1	3.7	1.9	0.15, 0.15
1st to 3rd interview	1.7	2.9	2.1	2.2	0.62, 0.55
% (No) of patients with improved scores:					
BPRS	38 (13)	45 (9)	46 (6)	42 (28)	0.31
ITAQ	50 (17)	30 (6)	46 (6)	43 (29)	0.35
GAF	38 (13)	25 (5)	62 (8)	39 (26)	0.11
KISS:					
1st to 2nd interview	50 (17)	60 (12)	77 (10)	58 (39)	0.24
1st to 3rd interview	65 (22)	70 (14)	46 (6)	63 (42)	0.36

BPRS=brief psychiatric rating scale. ITAQ=insight and treatment attitudes questionnaire. GAF=global assessment of functioning. KISS=knowledge and information about schizophrenia schedule.
*From analysis of variance F tests and Kruskal-Wallis tests for improvements in means scores, from χ^2 tests (df=2) for percentages of patients with improved scores.

Table 4 Staff and patients' costs (£) patient for among 112 schizophrenic patients randomised to health education sessions given by computer, by a community psychiatric nurse, or by a combination

	Intervention		
Costs	Computer	Combination	Nurse
Intention to treat analysis	**n=56**	**n=28**	**n=28**
Staff costs:			
Time	124.75	131.25	99.50
Travel	13.62	8.58	8.46
Total	138.37	139.83	107.96
Patients' costs:			
Time	11.87-29.67	14.07-35.17	11.10-27.75
Travel	2.38	3.02	0.90
Total	14.25-32.05	17.09-38.19	12.00-28.65
Patients completing intervention	**n=34**	**n=20**	**n=13**
Staff costs:			
Time	187.25	183.75	184.74
Travel	19.35	10.43	14.01
Total	206.60	194.18	198.75
Patients' costs:			
Time	18.55-46.36	19.70-49.24	20.05-50.13
Travel	3.71	4.22	1.38
Total	22.26-50.07	23.92-53.46	21.43-51.51

What is already known on this topic

Education of patients with schizophrenia has limited but positive outcomes

Computer based approaches have not been thoroughly evaluated

What this study adds

A computer based method of education for patients with schizophrenia, which personalised the information with details from each patient's medical record, was acceptable and as effective as educational sessions given by a community psychiatric nurse

However, because of the need to provide transport for patients to attend their sessions, the computer based intervention was as costly as the nurse based one

Investigating the addition of computer based education to other routine patient contacts would be worthwhile

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One hundred years ago
The medical profession as an example

Novelists and preachers have unrivalled opportunities for the expression of unfettered opinion, and play no small part in fixing the average point of view of the general public. Novelists as a class have, perhaps, been about equally fair and unfair to their doctors. Thackeray's Dr. Goodenough was compensation for Dr. Firmin. The hero of *Bleak House,* though very shadowy, is obviously a picture flattering enough. Kipling has a sympathetic sketch of an Indian surgeon in one of his short stories. The doctors of George Eliot's *Middlemarch* and Thomas Hardy's *Woodlanders* are not characters which do much credit to their profession. But no writers of fiction have dealt more kindly with the physician than the modern Scotch school, notably Mr. J. M. Barrie and the Rev. John Watson, D.D. Dr. Watson—perhaps better known as "Ian MacLaren"—in an address delivered to the students of the Manchester Baptist College, and reported in the *British Weekly* of June 27th, drew a contrast between the devotion to their profession displayed by young medical men and young ministers respectively, much to the advantage of the doctors. He spoke of a medical acquaintance of his own, qualified to practise by a distinguished degree, still studying at the London hospitals and proposing to study at certain Continental hospitals before entering upon private practice. "If," said Dr. Watson, "he were offered to-morrow the choice of a practice of his own in some country town, or the chance of being an assistant to some distinguished surgeon in London or Vienna, it would not matter to him that in the country town he would have a few pounds more salary, and would be—save the mark!—his own master. His desire—and it is that of all the best men who study medicine—is not to be as soon as possible a doctor, but to be as perfectly qualified as possible to do the work of a doctor." The opinion here expressed is not startlingly new, but it is interesting as coming from a member of a profession whose point of view is necessarily different from the scientific standpoint, and whose praise of the ordinary practitioner has been too often given, as Tennyson gave it, at the expense of the scientist.

(BMJ 1901;ii:226)