

Cost effectiveness of minor surgery in general practice: a prospective comparison with hospital practice

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SUMMARY. *The cost effectiveness of general practitioners undertaking minor surgery in their practices was determined in a prospective comparison of patients having minor surgery undertaken in five general practices over a 12 week period in 1989, and in the departments of dermatology and general surgery in Rotherham District General Hospital over a contemporaneous eight week period. There were no differences between the settings in the reported rates of wound infection or other complications and only one general practice patient was subsequently referred to hospital for specialist treatment. General practitioners sent a smaller proportion of specimens to a histopathology laboratory than hospital doctors (61% versus 90%, $P < 0.001$); incorrectly diagnosed a larger proportion of malignant conditions as benign (10% versus 1%, $P < 0.05$) and inadequately excised 5% of lesions where this never happened in hospital (difference not significant). General practice patients had shorter waiting times between referral and treatment, spent less time and money attending for treatment and more of them were satisfied with their treatment. The cost of a procedure undertaken in general practice was less than in hospital — £33.53 versus £45.54 for the excision of a lesion and £3.00 versus £3.22 for cryotherapy of a wart (1989–90 prices).*

Performing minor surgery in general practice would seem cost effective compared with a hospital setting. However, the risk of general practitioners inadequately excising a malignancy and not sending it to a histopathology laboratory must be addressed and the conclusion regarding cost effectiveness only applies where general practice is a substitute for the hospital setting and not an additional activity.

Keywords: *minor surgery; cost effectiveness; patient satisfaction.*

Introduction

THE 1990 general practice contract¹ offers remuneration for minor surgical procedures undertaken by general practitioners. The government hopes that this will encourage general practitioners to undertake this work, that the results will be a rapid and more convenient service for patients who would otherwise be faced with long waiting times for hospital treatment, and that hospital outpatient resources will be released for more serious problems.²

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General practitioners have undertaken minor surgery for many years and studies have shown that they can and do undertake a wide range of surgical procedures,³ and that patients wait for a very short time and are satisfied with their treatment.^{4,5} Previous studies have shown that some procedures undertaken in general practice can cost less financially than when undertaken in hospital,^{4,6,7} but there is no agreement on the size of this saving. In addition, these studies did not take patient costs into account. With the prospect of minor surgery being offered as a standard general practice service there is a need to provide an up-to-date comparison of costs in the two settings. It is also important to address aspects of the quality of care provided by general practitioners undertaking minor surgery.

In 1989 a scheme was set up in Rotherham where the health authority used funds from the national waiting list initiative to provide packs of sterilized instruments and flasks of liquid nitrogen to local general practices to facilitate minor surgery. Advantage was taken of this scheme to compare outcomes in general practice with those in hospital and to cost procedures undertaken in both settings.

Method

Study design

The ideal design for this study would have been to allocate patients attending general practice randomly to general practice or hospital intervention. However, this was not possible as the scheme was set up to facilitate minor surgery in general practice and to maximize the numbers of patients treated in this setting. A case-control study was, therefore, undertaken.

Five general practices, covering 19% of the quarter of a million population of Rotherham, were recruited to the scheme. The doctors in these practices did not form a representative sample of Rotherham general practitioners but were motivated to maintain or set up a minor surgery service prior to the 1990 contract. General practitioners chose to undertake minor surgery on some patients and referred others to hospital. Patients undergoing minor surgical procedures in these practices over a 12 week period (July–September 1989) were included in the study.

As a comparison, patients undergoing minor surgical procedures in the departments of dermatology and general surgery in Rotherham District General Hospital over a contemporaneous eight week period were included in the study. These patients had been referred to the hospital by all general practitioners in Rotherham. These departments deal with the majority of minor surgery cases in the hospital although other departments do undertake minor surgery.

Patients in both settings were asked to fill out two questionnaires. The first, completed prior to treatment, asked about the distress and disability caused by the condition, and also asked for a contact address to which a postal questionnaire could be sent six weeks after treatment. This postal questionnaire was followed by a reminder three weeks later and included questions on the following outcomes: presence of wound infection and other complications, problems requiring a return visit to a doctor, time taken for wound to heal, presence of unsightly scarring and cosmetic result. Patients were also asked about the

waiting time between referral and treatment, their satisfaction with treatment, distance travelled, mode of transport, money spent on travelling (for example, bus fares; when patients indicated that they had travelled by car petrol costs were calculated) and time involved in attending for treatment.

The histological reports of all specimens sent to a histopathology laboratory were followed up as part of the study, and the histological diagnosis was recorded against the clinical diagnosis made at treatment by the general practitioner.

Case mix

In terms of the type of condition treated, the case mix in the two settings was considerably different because the general practitioners in the study were unwilling to treat some conditions treated in hospital, and some conditions treated by the general practitioners were treated in hospital departments not included in the study. In order to compare like with like only conditions treated in both settings were selected for the study (Table 1). However, the case mix in the two settings remained significantly different (chi square test, $P < 0.01$) with more seborrhoeic warts, moles and other lesions, and fewer warts and skin tags, treated in the hospital setting. This difference was taken into consideration in the analyses, although no account was taken of the severity of conditions.

Statistical analysis

Analysis of patient satisfaction/convenience was carried out using the chi square test for proportions, and the Mann Whitney *U* test for continuous variables. For clinical and histopathology outcomes, odds ratio were calculated separately for each condition, and when found to be constant across strata were pooled to determine the Mantel-Haenszel pooled estimate of the odds ratio.⁸ This further analysis was undertaken to overcome the potentially confounding effect of the different case mix in the two settings.

Table 1. Conditions treated in both settings: percentage of patients selected for study and percentage responding to postal questionnaire.

Condition	% of patients selected for study		% of respondents to postal questionnaire	
	General practice (n = 112)	Hospital (n = 153)	General practice (n = 88)	Hospital (n = 105)
Cysts	11.6	11.8	12.5	15.2
Moles	13.4	18.3	15.9	20.0
Warts/plantar warts	32.1	17.6	26.1	17.1
Seborrhoeic warts	9.8	19.0	11.4	14.3
Skin tags/ papillomas/ polyps	23.2	13.7	26.1	13.3
Dermatofibroma	3.6	2.6	3.4	2.9
Other lesions: lipoma, ganglion, haemangioma, granuloma, haematoma, naevus, solar keratosis, spider naevus	6.2	17.0	4.5	17.1

n = total number of patients in group.

Costings

The total costs to the National Health Service were estimated for patients who had lesions excised and for those undergoing cryotherapy of warts in both settings using 1989–90 prices. The method of costing involved the identification of the services used by patients in each setting, a measurement of the use of these services by patients and an estimation of the standard costs for each service. A total cost-estimate was derived by multiplying the use of services by standard costs. Where there were uncertainties in the estimates of standard costs, sensitivity analyses were performed to examine whether the results were significantly altered by different standard cost values.

Each service activity involved costs in terms of staff time, equipment (including sterilization) and the use of facilities. Staff costs were estimated by observing the time spent by doctors and nurses in providing the service, and then multiplying these times by the appropriate NHS rates of pay (allowing for sickness and absence). The costs of histopathology tests and of providing packs of equipment to the general practitioners and hospital staff were provided by the respective hospital departments. It was assumed for costing purposes that full use was made of histopathology services and that all excisions in both settings were undertaken using packs of equipment. An approximate estimate of overheads, such as administration, heating and lighting, was added to these costs.

Results

The response rate to the questionnaire asking about distress and disability was higher in general practice than in hospital — 96% versus 84%. As this questionnaire provided a contact address for the postal questionnaire, the response rate to this second questionnaire was also higher in general practice — 79% versus 69%. However, 82% of the patients in each setting who received a postal questionnaire responded to it.

The case mix of patients responding to the postal questionnaire in the two settings was significantly different ($P < 0.05$) (Table 1). There were no differences in the age or sex of patients responding in the two settings.

Distress and disability

Approximately half of the patients in each setting (45% in general practice and 47% in hospital) were distressed by their condition; they were worried, embarrassed or in pain. A small proportion of all respondents to the first questionnaire (14/235, 6%) suffered some physical limitation — mainly plantar warts causing difficulty in walking.

Treatment outcomes

Table 2 summarizes treatment outcomes as reported by patients responding to the postal questionnaire (some patients did not respond to all of the questions). The low response to the question on healing time was due to patients with warts and seborrhoeic warts replying 'not applicable' to this question. General practice patients were significantly less likely to report unsightly scarring than were hospital patients. No statistically significant differences were found for other outcomes although more general practice patients than hospital patients reported that they returned to a doctor for future treatment. A sensitivity analysis was undertaken by assuming that non-respondents either all had positive outcomes or negative outcomes. This analysis elicited similar results.

One of the 88 general practice respondents reported being sent to hospital for further treatment because the histology report had recommended specialist attention.

Use of histopathology

The type of procedure used to treat each condition was the same in both settings. General practitioners removed lesions from 67 people and sent specimens from 41 of these (61%) to a histopathology laboratory; hospital doctors removed lesions from 94 people and sent specimens from 85 (90%) to a histopathology laboratory (Mantel-Haenszel odds ratio 0.15; 95% confidence interval 0.05 to 0.41; $P < 0.001$). The results for specimens sent to a laboratory show that general practitioners do not match hospital doctors for accuracy when diagnosing the condition and in particular are more likely to diagnose malignant conditions as benign (Table 3). General practitioners were also more likely to diagnose a lesion as a mole when it was not — six out of 12 moles sent to a histopathology laboratory in general practice were actually lesions (50%) versus two out of 28 in hospital (7%) (odds ratio 13.00; 95% confidence interval 1.67 to 127.50; $P < 0.01$).

Waiting time for treatment

All 88 general practice patients were treated within 12 weeks of consulting their doctor, with a median waiting time of one week. The 105 hospital patients waited up to 70 weeks from referral to treatment with a median waiting time of eight weeks. Twelve hospital patients (11%) waited for more than six months.

Patient satisfaction and convenience

Although a high percentage of hospital patients were satisfied with their treatment, a significantly higher percentage of general practice patients were satisfied (Table 4). General practice patients also spent less time and money attending for treatment and were more likely to be able to walk to the place of treatment.

NHS costs

The total estimated cost of an excision for one patient is £45.54 in hospital compared with £33.53 in general practice (Table 5). The hospital setting was more costly mainly as a result of the initial outpatient visit, and the higher cost of follow up. The costs of the treatment itself were similar in the two settings because the average time spent by doctors performing the procedure was similar in each setting (approximately 20 minutes), and because the higher costs of the hospital setting from nursing and overheads were offset by the costs of providing surgical packs to general practitioners (£5.96). Allowing for the higher percentage of patients returning to their doctor in general practice (12.5% versus 3.9%), sensitivity analysis revealed an increase in the total cost in general practice of £3.02. A sensitivity analysis was also undertaken on the estimates for overheads and the cost difference was found to be insensitive to large changes in assumptions regarding the estimates. Removing them altogether reduced hospital costs to £36.14 and those in general practice to £30.55.

The cost of a single cryotherapy treatment was £3.22 in hospital and £3.00 in general practice.

Discussion

NHS costs

The finding that undertaking excisions in general practice is considerably cheaper than in hospital confirms the results of other studies.^{4,6,7} This cost advantage was not found to be offset by the higher percentage of patients returning to their doctor in general practice.

The uncertainty in the costs of histopathology tests does not alter the result since they are incurred equally in both settings. The cost of packs for general practice (£5.96) was probably an overestimate since they were larger than necessary. Smaller packs

Table 2. Outcomes reported by patients in postal questionnaire.

Outcome	% of respondents reporting outcome		Odds ratio	Mantel-Haenszel pooled estimate of the odds ratio (95% confidence interval)
	General practice	Hospital		
Wound infection ($n = 83/105$)	1.2	1.9	0.60	0.64 (0.02 to 9.09)
Other complications ^a ($n = 88/105$)	5.7	9.5	0.55	0.68 (0.17 to 2.44)
Return to doctor ($n = 88/102$)	12.5	3.9	3.57	3.57 (0.95 to 14.29)
Healing time >10 days ($n = 52/78$)	34.6	35.9	0.94	0.98 (0.42 to 2.27)
Unightly scarring ($n = 80/99$)	6.3	24.2	0.21	0.29 (0.09 to 0.78)*
Poor cosmetic result ($n = 74/99$)	13.5	28.3	0.40	0.48 (0.18 to 1.25)

n = total number of general practice/hospital respondents. ^aFor example, burst stitches. * $P < 0.05$.

Table 3. Outcome of histopathology tests on samples from the two settings.

Outcome	% of specimens		Odds ratio	Mantel-Haenszel odds ratio (95% confidence interval)	Probability
	General practice ($n = 41$)	Hospital ($n = 85$)			
Clinical diagnosis does not match histological diagnosis	43.9	22.4	2.70	Not valid ^a	$P < 0.05$
Malignant condition clinically diagnosed as benign	9.8	1.2	10.18	9.58 (0.85 to 445.07)	$P < 0.05^b$
Not adequately excised	4.9	0.0	—	—	NS ^b

n = total number of specimens sent to a histopathology laboratory. ^aOdds ratio not constant across strata. ^bFisher's exact test. NS = not significant at 5% level.

Table 4. Patient satisfaction with treatment and convenience of treatment in the two settings.

	General practice (n = 88)	Hospital (n = 105)	Odds ratio (95% confidence interval)	Probab- ility
% of patients satisfied with service	92.0	79.0	3.07 (1.16 to 8.40)	P<0.05
% of patients walking to place of treatment	23.9	6.7	4.39 (1.65 to 12.11)	P<0.01
Median distance to place of treatment (miles)	2	4	—	P<0.01
Median cost of return journey for treatment (£)	0.18	0.72	—	P<0.01
Median time spent attending for treatment (hours)	1	2	—	P<0.01

n = total number of respondents.

Table 5. Costs of minor surgery for one patient in the two settings.

	Costs (£) ^a	
	General practice	Hospital
<i>Excision</i>		
Initial outpatient visit	—	8.28
Treatment	17.78	16.62
Histopathology test	14.68	14.68
Follow-up visit	1.07	5.96
Total	33.53	45.54
<i>Cryotherapy</i>		
One treatment	3.00	3.22

^aExcludes initial attendance at general practice.

would have been less expensive to buy and sterilize and their use would increase the cost difference.

The estimate of overheads is the most important area of uncertainty. It is an estimate of the opportunity cost of the release of facilities which could be used for a variety of other purposes. Indeed, it could be argued that in some circumstances there may be no alternative use of such facilities. However, it was found that removing the overheads from the analysis entirely did not alter the direction of the difference in the costs in the two settings.

The cost advantage of carrying out cryotherapy treatment in general practice is less than 10% which is probably not of importance.

Costs to general practitioners

Non-fund holding general practitioners do not pay for histopathology services, and therefore the estimated cost of an excision to a general practitioner is £18.55. However, the actual cost incurred by a general practitioner will depend on a number

of factors. The overall cost per procedure will depend on the balance of activity between excisions and less costly procedures such as cryotherapy. It will also depend on the extent to which a practice has spare capacity in terms of practice nurse time, treatment facilities and so on. Another important variable is the reimbursement of some of the expenses. The sterile packs were provided free of charge by the district health authority in Rotherham, but this is not the case in all areas. Other expenses such as practice nurses and treatment facilities, are also reimbursed in different ways by different family health services authorities.

The results of this study suggest that the reimbursement rate in the new contract of £100 per minor surgery session of five procedures should cover the costs incurred by most practices. However, there is no guarantee that it will be sufficient for all practices given differences in case mix, the availability of spare capacity and variations between areas in the levels of compensation for many of the expenses incurred.

Patient convenience

This study has confirmed that minor surgery in general practice reduces waiting times for patients and offers them a more convenient service. Indeed the costs to the patient in terms of time and money spent obtaining treatment in general practice is considerably less than for hospital treatment. These advantages are particularly beneficial for patients undergoing cryotherapy of warts who may have to return for treatment a number of times before the condition is cured.

Quality of care

Aspects of the quality of minor surgery which cause concern in some quarters have been addressed in this study. There was no evidence of an increased rate of wound infection in general practice, the rate being similar to rates found elsewhere.³ Other complications, such as burst stitches, occurred at a rate similar to the hospital setting, and the length of time taken for the wound to heal was similar in both settings. Only one of the patients treated in general practice reported requiring the attention of a hospital consultant (1%), a figure comparable with that found elsewhere.⁹

A smaller proportion of patients in general practice reported that their scarring was unsightly than in hospital. The analyses adjusted for the type of condition treated, but not for the severity of the condition, and this difference may be explained by general practitioners having less severe conditions to treat.

General practitioners sent a smaller proportion of excised lesions to a histopathology laboratory than hospital doctors. All lesions seen at the hospital, except warts and plantar warts, are clinically diagnosed by a consultant and therefore it is not surprising that general practitioners inaccurately diagnosed a larger proportion of lesions than hospital doctors, diagnosing significantly more malignancies as benign. It can be argued that the study is not comparing like with like by comparing hospital consultants with general practitioners who have recently joined a minor surgery scheme. However, it should be noted that the majority of general practitioners in the scheme had been undertaking minor surgery in their practices prior to the scheme.

Some doctors¹⁰ are adamant that all lesions should be sent to a histopathology laboratory, but others do not agree.¹¹ There is a risk that a general practitioner might inadequately excise a malignancy and not send it to a histopathology laboratory. This study has shown that this could occur in one in 500 excisions (39% of lesions were not sent to the laboratory, 10% of those sent were malignant and 5% were inadequately excised). There is also the possibility that if the lesion was excised adequately and not sent to a histopathology laboratory a malignancy

might be missed which would have management implications for the patient. One solution might be to ensure that all lesions are sent to a histopathology laboratory as a requirement for remuneration. However this is an expensive option, given that the cost of a histopathology test is nearly half of the overall cost of minor surgery for lesions in general practice. Clearly the types of lesions which general practitioners should send to a histopathology laboratory need to be clarified, with the recognition that the general practitioner's ability to make an accurate diagnosis is not as good as that of a hospital doctor. The judgement of which lesions to send should be made by weighing the costs of histopathology against the health risk from an occasional missed malignancy. Individual general practitioners can also improve their diagnostic abilities by auditing their histopathology reports.

Conclusion

There are a number of points to consider when attempting to generalize from this study. Clinical outcomes were measured by patients completing a postal questionnaire six weeks after treatment, and only 73% of patients undergoing minor surgery returned a questionnaire. This method is by no means perfect in that patients suffering in the long term from treatment would not be picked up. However, the method has the power to address many other problems which cause concern; the response rate was adequate and a similar proportion of patients in each setting who were sent the questionnaire responded to it.

In addition, only some hospital departments were included in this study and the practices of other departments, for example accident and emergency, in terms of use of histopathology and diagnostic ability have not been assessed. Finally, general practitioners in the study were not randomly selected; they were motivated to undertake minor surgery prior to the 1990 contract and were not required to apply to join a family health services authority minor surgery list. However, given that 77% of general practitioners have applied to join a list and 88% of applicants have been successful,¹² the general practitioners in this study should be representative of all general practitioners undertaking minor surgery.

In conclusion, the findings of this study suggest that general practice is a cost-effective setting for many types of minor surgery, provided due regard is given to the appropriate use of histopathology tests. This conclusion applies only if minor surgery in general practice is a substitute for that undertaken in hospital. One consequence of encouraging general practitioners to undertake minor surgery could be an overall expansion of activity. The costs and benefits of this development require a separate evaluation.

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