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Paper

The true cost of gallstone disease

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ABSTRACT

Introduction: Gallstone related disease accounts for a large expenditure in the NHS. The aim of this study was to review the events and costs of the patient journey to treatment, and propose guidelines to provide an efficient streamlined service.

Patients and Methods: All cholecystectomies performed in one unit in 2009 were reviewed. The cost of all investigations and procedures performed was obtained from the Department of Health website. The individual cost was calculated for each patient. Results were expressed as mean (±SD) and compared using ANOVA.

Results: 132 patients (31 male) were reviewed with an overall age was 45.3 years (±15.1). Overall cost from referral to discharge was £4697 (±2007) per patient, ranging from £3406 to £12011. The largest proportion was contributed by surgery at £2849 (±414), followed by inpatient costs at £1527 (±1322). Pre-operative outpatient consultations were £174 (±144), supplemented by at least one ultrasound (£81±29). Additional imaging was required for only a minority. All blood tests involved in overall care contributed little to the total at £27 (±26). Patients who initially presented as an inpatient had an overall larger cost (£6112±1888 vs. £5097±1607; p=0.004). This difference was largely due to inpatient costs (£2611±1629 vs. £1194±1009; p<0.0001) and not the cost of surgery (p=0.29). Patients who were imaged in primary care prior to referral also had a lower overall cost (£4636±1343 vs. £5697±1804; p=0.0005). This was also due to inpatient costs (£1076±876 vs. £1740±1459; p=0.004) and not the actual surgery costs (p=0.36). Only 39 were reviewed post-operatively, adding £38±69 to the overall cohort costs.

Conclusion: Emergency presentation and repeat admissions result in higher inpatient costs and should be avoided. Reduced delay to elective surgery through active participation by primary care needs to be encouraged.

Key words: Gallstones, investigation, costs

INTRODUCTION

Gallstone related disease accounts for a large expenditure within the UK National Health Service (NHS), with approximately 60,000 cholecystectomies performed each year[1]. Laparoscopic cholecystectomy is standard surgery for gallstone disease in the elective setting, with reduced length of hospital stay and fewer complications compared to open cholecystectomy.[2]

However, there are no guidelines currently available within UK practice for the surgical treatment of acute gallstone disease. Traditionally surgeons have opted for treating acute cholecystitis by interval cholecystectomy some weeks after the initial admission in an attempt to reduce rates of conversion and the associated patient morbidity.[3] Recent studies have challenged this view confirming that early laparoscopic cholecystectomy is safe with no increase in the rate of conversion or complication compared to delayed laparoscopic cholecystectomy and is therefore more cost effective.[4,5,6] However, between 11 and 20% of surgeons in the UK currently perform laparoscopic cholecystectomy for acute cholecystitis.[7,8]

An analysis of surgical practice in England found that 15% of patients had their definitive surgery on their index admission.[3] They also found that there was no difference between conversion rates in operations performed on day 3 or at one week of an acute admission, although the risk was increased compared to elective laparoscopic cholecystectomy. The same study showed a further increased risk of conversion to open cholecystectomy and other complications if the patient was readmitted in the interval period following an episode of acute gallstone disease, thus adding to inpatient costs and morbidity.

The study therefore aimed to review the events and costs of the patient journey from referral to definitive management for all benign gallstone related disease and to formulate guidelines for a cost effective, safe service for patients.

PATIENTS AND METHODS

All patients who underwent cholecystectomy, from 1st January to 31st December 2009 inclusive, in a single district general hospital were identified from the electronic theatre logbooks. The medical records were reviewed to obtain all relevant details. These included all pre-operative assessment and investigations, encompassing blood tests and non-invasive and invasive imaging as deemed necessary by the responsible clinician. The mode of presentation, as elective or emergency

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was used to sub-categorise the patients, as was the relevant investigations arranged by the primary care physician prior to referral. The details of admission were recorded, such as the dates of admission, operation and discharge. In addition, the type of operation and any complications requiring treatment were recorded. All review or treatment subsequent to hospital discharge were included in overall analysis.

The cost of each investigation and procedure was determined by data accessed from the Department of Health website. The cost of each investigation and procedure, from the time of initial referral or diagnosis, until discharge for routine review, which was relevant to the treatment of the gallstones was obtained. These prices were either at a regional basis, or if possible specific to the hospital. The individual prices are detailed in Table 1.[9] In addition to an overall cost analysis, the patients who required ERCP were then excluded, since choledocholithasis follows a very different management pathway. A comparison of costs was then performed between the patients who had acute cholecystectomy, interval cholecystectomy and those presenting at outpatients with an ultrasound already done in primary care.

TABLE 1:

Summary of costs

Procedure	Cost (£)
Outpatient appointment	102
Hospital stay for one day	320
Haematology test	3
Biochemistry test	1
Ultrasound of abdomen	71
OGD	815
MRCP	274
ERCP	1827
CT of abdomen / pelvis	266
Laparoscopic cholecystectomy	2685
Open cholecystectomy	3888

The average values were expressed as mean (± standard deviation) and comparison made by Analysis of Variance (ANOVA). Proportions were compared using Chi-squared test and a p value <0.05 was taken as statistically significant for all tests.

RESULTS

132 patients (31 male) were included in the study cohort. Overall age was 45.3 years (± 15.1), with males (52.8 years ± 16.0) older than females (45.3 years ± 15.1; p=0.01). Most patients (n=101) presented via outpatient clinic as a result of referral from primary care, with 1.7 (± 1.4) pre-operative consultations. Forty-eight patients had an ultrasound arranged by the primary care physician prior to referral. 31 patients presented acutely as an inpatient.

The average time from referral to surgery was 160.4 days (± 122.9), ranging from 1 to 606 days (Figure 1). The distribution of pre-operative investigations are outlined in Table 2. A higher proportion of inpatients (n=10; 32.2%) required a MRCP compared to out-patients (n=17; 16.8%; p=0.11). 23 of the OGDs performed were normal and no new management altering diagnoses were made. Patients presenting initially in the outpatient clinic with an ultrasound already performed (n=11; 22.9%) were less likely to have an OGD before surgery compared to the remainder of the group (n=26; 49.1%; p=0.006). Thirty-three patients required one

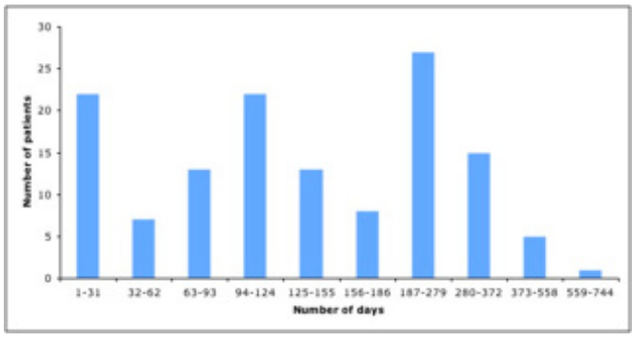

Fig 1. Number of days from referral to definitive treatment

or more extra pre-operative admissions for symptom control (Figure 2).

Of those patients who presented acutely as an inpatient, 15 (48.4%) patients had definitive surgical intervention on the first admission. In this sub-group the mean length of hospital stay was 6.5 days (± 2.6), while those who presented acutely with more than one admission had a mean hospital stay of 9.7 days (± 6.3). On reviewing those who had early acute cholecystectomy, the 2 longest admissions of 10 and 13 days were complicated by deranged liver function tests (LFTs) and required an MRCP prior to surgical intervention. 73.3% (n=11) had a laparoscopic cholecystectomy, while 2 (13.3%) were converted to open and 2 (13.3%) were performed as open procedures.

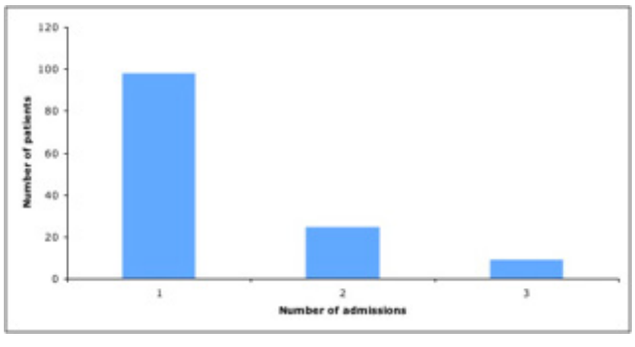

Fig 2. Number of admissions per patient

Overall, 114 cholecystectomies were performed laparoscopically, 13 were converted to open, while the remaining 5 were planned open cholecystectomies. The rate of conversion to open surgery or planned open cholecystectomy was higher for in-patients (n=6; 19.4%) compared to out-patients (n=12; 11.9%; p=0.45). The total bed days was 4.7 (± 4.1), ranging from 1 to 25. This differed according to the surgery (lap 4.3 ± 4.0; converted 7.3 ± 4.2; open 8.4 ± 3.4; p=0.006). Patients imaged prior to referral were discharged quicker (3.4 ± 2.7 vs. 5.4 ± 4.6; p=0.005). Post-operatively, 14 developed minor complications. 93 were not reviewed after discharge, while 33 were seen once. Review was highest in the conversion group (46%), compared to the open (20%) and laparoscopic (28%) groups.

COST

Overall cost from referral to discharge was £4697 (± 2006) per patient, ranging from £3406 to £12011. The largest proportion was contributed by surgery at £2849 (± 414),

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followed inpatient costs at £1527 (± 1322). Pre-operative outpatient consultations were £174 (± 144), supplemented by at least one ultrasound (£81 ± 29). Additional imaging was required for only a minority. All blood tests involved in overall care contributed little to the total at £27 (± 26). Patients who initially presented as an inpatient had an overall

Table 2:

Number of patients requiring various pre-operative investigations

Pre-operative investigation	Total number of patients
Ultrasound scan	132
Magnetic Resonance Cholangiopancreatography (MRCP)	27
Endoscopic Retrograde Cholangiopancreatography (ERCP)	8
Computerised Tomography (CT)	3
Oesphagogastroduodenoscopy (OGD)	40

larger cost (£6322 ± 2548 vs. £4934 ± 1961; p=0.004). This difference was largely due to inpatient costs (£2611 ± 1629 vs. £1194 ± 1009; p<0.0001) and not the cost of surgery (p=0.29). Patients who were imaged in primary care prior to referral also had a lower overall cost (£4498 ± 1486 vs. £5623 ± 2374; p=0.0005). This was also due to inpatient costs (£1076 ± 876 vs. £1740 ± 1459; p=0.004) and not the actual surgery costs (p=0.36). Only 39 were reviewed post-operatively, adding £38 ± 69 to the overall cohort costs.

After exclusion of patients who required ERCP, the cost of management between the three subgroups was significantly different (acute: £5255 ±1045; interval £6017 ± 2051; £4238 ± 999; p<0.0001). The significance was not between the acute and interval cholecystectomy groups (p=0.22), but rather between the acute cholecystectomy and primary care USS group (p=0.001) and also between the interval cholecystectomy and primary care USS group (p<0.0001).

Fig 3. Proposed guidelines for the management of acute cholecystitis

DISCUSSION

This review of current practice in a district general hospital reveals the treatment pathway and the main sources of cost in the management of gallstones. Analysis demonstrated that the main costs were accrued as a result of the duration of the hospital stay, and the cost of surgery. Surgical costs are not amenable to reduction, but changes in practice can reduce the number of bed days, and therefore overall expenditure.

There is an increasing acceptance for performing acute cholecystectomy. The present study found that 16 of the 31 patients who presented acutely required more than one admission prior to cholecystectomy. These re-admissions would be avoided by acute cholecystectomy performed on index admission, and thus reduce hospital stay and overall cost (Figure 3). A recent meta-analysis comparing early with delayed laparoscopic cholecystectomy for acute cholecystitis found there was no significant difference in bile duct injuries or conversion to open surgery between the 2 groups, with an overall shorter hospital stay of 4 days in the early group. In the delayed group, 17.5% underwent emergency surgery during the waiting period, with an associated high rate of conversion to open surgery.[4] A prospective randomised controlled trial of 72 patients comparing early and delayed laparoscopic cholecystectomy revealed the overall cost in both groups was similar (p=0.928), with the overall costs of care being less in the early group.[10] Another more recent cost analysis revealed that early surgery for acute cholecystitis was less expensive with enhanced quality of life.[6]

Interestingly, those who had an ultrasound scan of abdomen performed prior to outpatient assessment were noted to have a shorter hospital stay. Therefore, the primary care team, prior to referral, should request an ultrasound scan of upper abdomen to hasten the time from outpatient appointment to definitive surgical intervention, thereby providing a cost effective service (Figure 4). In patients who presented with right upper quadrant pain as an outpatient, an OGD delayed definitive surgery and did not alter management in any case. This is in contradiction of other published data, which suggests that pre-operative OGD is of benefit, reducing persistent symptoms post-operatively.[11] A recent study of 700 patients however noted that a pre-operative OGD only altered the management in 4 cases (0.6%).[12] In light of these reports and the results of the present study, it would be prudent to adopt a more selective approach to OGD provision in patients with right upper quadrant pain with proven gallstones.

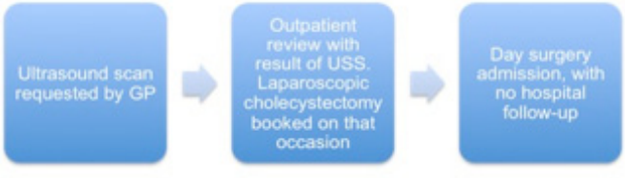

Fig 4. Proposed guidelines for the management of uncomplicated gallstones

It is not standard practice within our unit to perform day case laparoscopic cholecystectomy. As the number of bed days contributes substantially to the overall cost of gallstone related disease, this is an essential aspect of providing an efficient cost-effective service. Studies would suggest that it is both safe and cost-effective to perform day case surgery in selected patients, while acknowledging the potential for unplanned repeat admissions for post-operative nausea or pain.[13,14]

In conclusion, emergency presentation and repeat admissions result in higher inpatient costs and should be avoided. Reduced delay to elective surgery through active participation by primary care needs to be encouraged, along with early cholecystectomy in acute cholecystitis by the surgical team.

The authors have no conflict of interest

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