Early laparoscopic cholecystectomy service provision is feasible and safe in the current UK National Health Service

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ABSTRACT

INTRODUCTION Despite increasing evidence of the benefits and safety of early laparoscopic cholecystectomy (LC) in acute gallstone disease, it is not widely practised in England. The Royal College of Surgeons of England support the separation of emergency and elective surgical care. The aim of this prospective study was to examine the impact of the implementation of 'Surgeon of the Week (SoW)' model on the number of early LCs performed and the efficiency of the emergency theatre activity in our hospital. This study also looked into its implications on specialist registrar training for early LC, and the financial impact to the hospital.

PATIENTS AND METHODS Between January 2007 and May 2008, demographic data, admission and discharge dates, complications, conversions to an open operation and deaths were collected for all patients who underwent early laparoscopic cholecystectomies. For ease of comparison, patients were divided into Group A representing before introduction of SoW (1 January 2007 to 30 August 2007) and Group B representing after introduction of SoW (1 October 2007 to 31 May 2008). The total numbers of operations performed in the emergency theatre list in the two groups were also calculated.

RESULTS A total of 1361 emergency operations were performed on the emergency theatre list in Group A, of which 951 were general surgical procedures. In Group B, the numbers of emergency procedures were 1537, of which 1138 were general surgical operations. There was a significant increase in the number of general surgical operations after introduction of SoW ($P = 0.013$). Before introduction of the SoW rota, 45 early LCs were performed. This increased to 118 after SoW which was significant ($P < 0.001$). In Group A, the number of early LCs performed by surgical trainees was 10 (22%). In Group B, the number of LCs performed by surgical trainees was 35 (30%; not significant).

CONCLUSIONS This study has demonstrated an increase in the efficiency of the emergency theatre with an increase in the number of early LCs on their index admission without extra morbidity following implementation of the SOW model in our hospital. We recommend the introduction of a suitable emergency surgical consultant on-call model separating emergency and elective surgical care depending on local circumstances. This can lead to significant cost savings and reduce re-admissions with gallstone-related complications.

KEYWORDS

Cholelithiasis – Acute cholecystitis – Laparoscopic cholecystectomy – Health care costs – Gallstones – Emergency surgery

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Acute biliary disease secondary to gallstones is a frequent cause for acute surgical admission. Recent literature review suggests that early (within 7 days of onset of symptoms) laparoscopic cholecystectomy (LC) for acute gallstone disease is safe¹ and cost-effective.² Early LC has also been shown to improve quality of life.³ Few hospitals in the UK routinely perform early LC for acute gallstone diseases due to lack of manpower and resources.⁴ Time restrictions on emergency theatre lists often means that patients are discharged after an index emergency admission with plans for

re-admission for a delayed-interval cholecystectomy. This often leads to multiple interim re-admissions as an emergency with gallstone-related complications.⁵

In 2007, The Royal College of Surgeons of England⁶ supported the separation of emergency and elective workloads to maintain and improve standards in surgical care. Creating a dedicated 'emergency team', linked with a 'Surgeon of the Week' provide both continuity of care for patients and improved training for surgeons and supporting staff. University Hospital of North Staffordshire (UHNS)

introduced a rota in September 2007 where one named consultant surgeon becomes the 'Surgeon of the Week (SoW)' for six out of seven days during the daytime (8am – 6pm); other consultant colleagues cover the on-call duties overnight (6pm – 8am next day) and the planned emergency list the following morning (9am – 1pm). The aim of this study was to examine the impact of the implementation of the SoW model on the number of early LCs performed and the efficiency of the emergency theatre activity in our hospital. This study also looked into its implications on specialist registrar training for early LC, and the financial impact to the hospital.

Patients and Methods

This prospective study was carried out at UHNS, Stoke-on-Trent, UK, a hospital serving a population of 550,000. Ten consultant general surgeons (five upper gastrointestinal, one breast/colorectal and four colorectal) take part in the on-call rota for general surgery. In addition, three vascular/general consultant surgeons also participate in the on-call rota for general surgery. Before September 2007, each consultant surgeon was on call for 24 h, often also having elective responsibilities at the same time. The SoW rota

(Table 1) was introduced in September 2007. Each consultant gastrointestinal/general surgeon is 'SoW' every tenth week and is on call for six out of seven days during the daytime from Friday 8am until Thursday 8am. The SoW has responsibilities for the emergency theatres during this week, but a different colleague is allocated to each morning emergency session to enable the SoW to carry out a full ward-round of all emergency admissions. The vascular consultant surgeon does 24 h only from 8am on Thursday till 8am on Friday including emergency theatre list on Thursday from 1pm till 6pm every third week. Each of the ten consultants has a separate night on-call rota, which also covers weekends. Any patient requiring emergency surgery overnight (*i.e.* those with life- or limb-threatening conditions) are handed back to the SoW consultant the following morning.

Demographic data, admission and discharge dates, complications, conversions to an open operation and deaths were collected for all patients who underwent early laparoscopic cholecystectomies between 1 January 2007 and 31 May 2008 (excluding the month of September 2007). The month of September was excluded as the SoW rota was being introduced in that month and may not have represented true work carried out in the hospital. For ease of comparison, patients were divided into Group A represent-

Table 1 The 'Surgeon of the Week (SoW)' model at University Hospital of North Staffordshire, Stoke-on-Trent

	8am – 1pm		1pm – 6pm	6pm – 8am (next day)
	On-call round (+ surgical emergencies)	Emergency OT list	Emergency OT list (+ surgical emergencies)	Emergency OT list (+ surgical emergencies)
Friday	Handover from previous + start of new SoW consultant	Vascular consultant	SoW consultant	Consultant surgeon – not the same as SoW consultant;
Saturday	SoW consultant	SoW consultant	SoW consultant	Mon–Thurs nights, one
Sunday	SoW consultant	SoW consultant	SoW consultant	consultant surgeon covering
Monday	SoW consultant	Consultant surgeon – different colleague	SoW consultant	each night;
Tuesday	SoW consultant	Consultant surgeon – different colleague	SoW consultant	Fri–Sun nights, one
Wednesday	SoW consultant	Consultant surgeon – different colleague	SoW consultant	consultant surgeon
Thursday	SoW consultant – end of take but patients remain under him till Fri am handover	Consultant surgeon – different colleague	Vascular consultant	covering weekend nights
	Vascular consultant starts take at 8am for 24 h for surgical emergencies			Vascular consultant

Table 2 The emergency OT activity

	Group A (before SoW)	Group B (after SoW)	P-value
Total operations	1361	1537	
General surgery	951	1138	0.013
(early LC)	(45)	(118)	(< 0.001)
Other specialties	410	399	
Gynaecology	163	158	
Plastic surgery	84	83	
ENT	65	64	
Maxillofacial surgery	68	55	
Urology	30	38	
Orthopaedic surgery	0	1	

ing before introduction of SoW (1 January 2007 to 30 August 2007) and Group B representing after introduction of SoW (1 October 2007 to 31 May 2008). The total numbers of operations performed in the emergency theatre list in the two groups were also calculated.

Statistical analysis

The chi-square test was used to compare the data in both the tables. SPSS v.16.0 statistical software (SPSS, Chicago, IL, USA) was used. Significance was defined as a P-value less than 0.05.

Results

Impact on emergency theatre activity

A total of 1361 emergency operations were performed on the emergency theatre list in the 8 months prior to the introduction of SoW (Group A), of which 951 were general surgical procedures (Table 2). After SoW (Group B), the numbers of emergency procedures were 1537, of which 1138 were general surgical operations. There was an increase of 187 general surgical operations after introduction of SoW which was significant ($P = 0.013$; Table 2). The number of emergency operations performed for other surgical specialties were almost equal (410 vs 399) in the two groups.

Impact on early laparoscopic cholecystectomy service

Before introduction of the SoW rota, 45 early LCs were performed. This increased to 118 after SoW which was significant ($P < 0.001$; Table 2). Median age in group A was 44 years (range, 23–79 years) and that in group B was 47 years (range, 18–94 years). There was no significant difference in age or sex distribution in the two groups. In group A, one patient required conversion, with no postoperative complications. In group B, two patients developed superficial port-site infection, two had an intra-abdominal collection, one required conversion and one underwent re-operation for small bowel obstruction. There were no bile duct injuries or deaths in either group. The median interval between emergency admission and surgery were equal in the two groups. Postoperative and total hospital stays were similar with no significant difference in the two groups. Table 3 summarises the results in the two groups.

Table 3 Results for early LC before and after SoW

	Group A (before SoW)	Group B (after SoW)	P-value
Total number:	45	118	
Age (years) median (range)	44 (23–79)	47 (18–94)	n.s.
Sex distribution	37 F, 8 M	93 F, 25 M	n.s.
Conversion to open	1	1	n.s.
Complications	0	5	n.s.
Mortality	0	0	n.s.
Interval between emergency admission and surgery (days)			
median (range)	2 (1–7)	2 (1–9)	n.s.
Postoperative hospital stay (days) median (range)	2 (1–14)	1 (1–16)	n.s.
Total hospital stay (days) median (range)	4 (2–16)	3 (2–22)	n.s.
Trainees supervised operations	10 (22%)	35 (30%)	n.s.

n.s., not significant.

Impact on training

During the 8-month period prior to SOW rota (Group A), the number of early LCs performed by surgical trainees was 10 (22%). Following the introduction of SOW rota (Group B), the number of LCs performed by surgical trainees was 35 (30%; not significant; Table 3).

Discussion

Early laparoscopic cholecystectomy for acute gallstone disease is recommended on the basis of randomized clinical trials (RCTs)^{7–10} and several meta-analyses.^{1,2,11} A further potential benefit of early laparoscopic cholecystectomy is the avoidance of failed conservative treatment, which often leads to multiple interim re-admissions. In Taunton,⁵ 28.5% of patients were re-admitted as emergencies with gallstone-related complications, whilst on a waiting list for surgery after having had an admission with acute cholecystitis. The authors concluded that all patients admitted as an emergency with symptomatic gallstones should be offered early cholecystectomy. This has also been recommended by the NHS Institute for Innovation and Improvement.¹²

Despite increasing evidence of the benefits and safety of early LC in acute gallstone disease, it is not widely practised in England. Hospital Episode Statistics (HES) data shows that only 15% of patients underwent cholecystectomy during the first emergency admission with acute gallbladder disease between April 2003 and March 2004.¹⁵ Although this may be due to a lack of emergency theatre time, there may also have been a shortage of experienced laparoscopic biliary surgeons in the past. There is also a perceived view among some theatre staff and anaesthetists that LC should be regarded as a routine procedure. With increased awareness, education and training, the percentage of patients undergoing cholecystectomy during the first emergency admission with acute gallbladder disease can be increased. On the other hand, there are potential issues of availability of operating time in the emergency theatres as more urgent life- and limb-threatening operations taking priority over early cholecystectomy leading to repeated cancellations.

The Royal College of Surgeons of England⁶ supports the separation of emergency and elective work-loads to maintain and improve standards in surgical care. There are a number of models proposed for separating emergency and elective surgical care. There is no universal solution and local circumstances will dictate the best method of service delivery. In UHNS, the SoW system assures faster access to senior surgical opinion for the assessment and treatment of surgical emergencies. Shift pattern working of junior doctors because of the European Working Time Directive (EWTd) has the potential for interrupting continuity of care, delaying the treatment of the patient and introducing errors of communication. The SoW model also provides bet-

ter continuity of care for patients through a consultant-led emergency team.

We acknowledge that even with increased numbers of early LCs, there are still patients who are unable to have early surgery. Patients with resolving acute cholecystitis take a lower clinical priority on the emergency list and may incur long periods of delay. All patients are fully informed of this before booking for surgery. Anyone not willing to wait were discharged after conservative management and readmitted for delayed-interval cholecystectomy.

It has been suggested in an earlier study¹⁴ that a 12-h urgent theatre facility can be seen as analogous to the 'trauma' theatre where semi-emergency urgent cases, such as patients with acute cholecystitis and biliary pancreatitis can be dealt with. The introduction of a specialist team specialising in the management of acute gallbladder disease in Portsmouth^{15,16} lead to an increase in the early cholecystectomy rate at index admission. However, in our study, only separating emergency from elective surgical care with introduction of SOW made a significant difference in the number of early LC performed safely.

Financial impact

The NHS Institute for Innovation and Improvement¹² showed that up to £190 per patient can be saved if acute biliary patients had early LC, based on an acute trust performing 300 laparoscopic cholecystectomies per year. Based on these estimates, our trust potentially saved £30,970 during the total period with almost tripling of the savings after introduction of the SOW.

Conclusions

This study has demonstrated an increase in the efficiency of the emergency theatre following implementation of the SoW model in our hospital. It is possible to carry out early LC in an increased proportion of patients on their index admission without extra morbidity. We recommend the introduction of a suitable emergency surgical consultant on-call model separating emergency and elective surgical care depending on local circumstances. This can lead to significant cost savings and reduce re-admissions with recurrent morbidity.

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