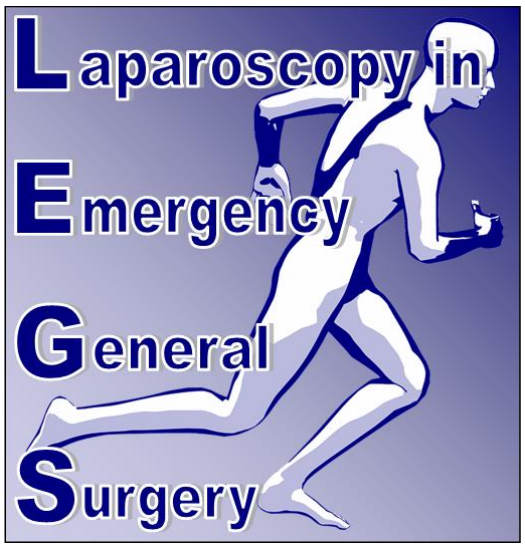

Laparoscopy in Emergency General Surgery

A Questionnaire Survey Assessing Current UK Practice

Protocol Version 5

October 2017

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as part of the North West Research Collaborative

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Table of Contents

PAGE

1.0 Lay Summary

Emergency general surgical operations on the abdomen (laparotomy) can be performed either through traditional open surgery or by a more minimally invasive keyhole approach (laparoscopic surgery). Many factors affect the decision as to which method is chosen.

A number of studies have compared the results of keyhole surgery with open surgery in planned general surgical operations; for example in surgery to treat gallstones, reflux and cancer. There have been fewer studies that have reviewed the results in emergency surgery.

Since 2013, hospitals across the UK have been required to submit data relating to the performing of emergency abdominal operations into a national database as part of the National Emergency Laparotomy Audit (NELA). In this time, two yearly reports have been generated from a prospectively maintained database. The use of a keyhole approach to emergency abdominal surgery is increasing, however the variation it's use has yet to be explored from this dataset of over 23,000 patients per year.

This study aims to review the existing data within the NELA database to look at the UK-wide variation in practice for the use of open and keyhole emergency surgery.

2.0 Background

Laparoscopy has greatly improved surgical outcomes in many areas of abdominal surgery. In many elective procedures, such as cholecystectomy and anti-reflux surgery, the laparoscopic approach is seen as gold standard[1].

In Emergency General Surgery, studies as early as the 1990s suggested laparoscopy was safe and effective in selected patients[2]. Laparoscopy in the emergency setting has many benefits: it is able to provide a better view of the entire abdominal cavity with minimal trauma, allows precise diagnosis and definitive treatment simultaneously, reduces post-operative pain, reduced post-operative surgical site infection, reduces incisional hernia rates, and reduces the inflammatory response in an already septic patient by inflecting less surgical trauma[3-5].
The uptake of Laparoscopy in Emergency General Surgery, however, is variable and still seen as a challenging and controversial field.

In the United Kingdom, the National Emergency Laparotomy Audit (NELA) has shown that use of laparoscopy is minimal with no increase in temporal uptake. In Year 1 of data collection, 13% of emergency cases submitted started as laparoscopy and 7% were completed using this approach. In the second year, this marginally improved to 14% and 8% respectively[6]. A number of reasons have been suggested to explain this: a steep learning curve, uncertainty about the procedures effectiveness, long operative times and lack of tactile feedback[7-10].

The European Association for Endoscopic Surgery (EAES) published a consensus status update in 2012 regarding those emergency conditions where laparoscopic surgery was recommended (they had previously published this in 2006)[11]. This has been confirmed by similar recommendations from the World Society of Emergency Surgery (WSES) who published guidelines for the management of intra-abdominal infections (2013)[12]. Both publications suggest there is strong evidence to support its use in appendicitis, cholecystitis, perforated gastro-duodenal ulcer, diverticulitis, small bowel obstruction, non-specific abdominal pain and specific cases of abdominal trauma. The EAES Group subsequently looked at the current status of uptake of these guidelines in Italy. This study took the form of an online survey in two sections: the first looked at unit specific data, such as staff experience, safety and

feasibility, and access to laparoscopic techniques in their units. The second asked them specific questions relating to those conditions set out in the consensus status. Out of 610 surgical units approached, 435 (return rate of 66%) responded to the survey[13].

Acute Appendicitis

Patients with symptoms and diagnostic findings suggestive of acute appendicitis should undergo diagnostic laparoscopy and, if confirmed, a subsequent laparoscopic appendendicectomy[11]. There is evidence to suggest that preoperative ultrasound and clinical examination coupled with computed tomography in equivocal cases lowers the negative appendicectomy rate and missed perforations[14,15]. It should be the gold standard in pre-menopausal women[16], elderly patients[17] and obese patients[18], but in young, fit men there may be no advantage over a traditional open approach[19]. In Italy, 75% of emergency appendicectomies for acute appendicitis were performed laparoscopically[13].

Acute Cholecystitis

Acute cholecystitis should be managed with laparoscopic cholecystectomy[20-22] and severe cholecystitis (gangrenous)[23] or advanced age[24,25] do not preclude the indication for laparoscopic cholecystectomy. They suggest surgery should be performed in the index admission[26]. In Italy, 70% of units performed a laparoscopic cholecystectomy for acute cholecystitis in the index admission. The conversion rate was less than 25% in 85% of the units surveyed[13].

Perforated gastro-duodenal ulcer

Laparoscopy should be used as a diagnostic tool when preoperative findings are not conclusive in a patient with a perforated viscus. Laparoscopic repair of a perforated duodenal-ulcer should then be attempted if feasible. Computed tomography only localises the site of visceral perforation in 86% of cases[27-29]. There is evidence to suggest that Boey's shock score on admission is the best tool to aid decision making in who would benefit from Laparoscopic repair compared to an open approach[30,31]. Those with a score of zero are deemed safe to undergo laparoscopic treatment[32]. There is evidence to suggest, however, that re-operation

rates after laparoscopic repair are higher than open approaches: 3.7% vs 1.6%[33]. In the Italian study, 53% of units used a laparoscopic approach to repair gastro-duodenal perforations[13].

Acute Diverticulitis

Complex diverticular disease is classified according to the modified Hinchey classification Stage I is the presence of pericolic abscess, with IIa indicating an abscess amenable to percutaneous drainage. IIb is where there is the presence of a complex abscess with or without a fistula. III indicates diffuse purulent peritonitis and IV indicates feculent peritonitis.

Hinchey I and IIa are usually treated with medical therapy or percutaneous drainage. In Hinchey IIa disease not amenable to percutaneous drainage or IIb there is a role for laparoscopic lavage to reduce the morbidity of a major bowel resection [34,35]. Recent studies have also shown that laparoscopic lavage is effective in Hinchey III disease with shorter hospital stay and similar morbidty to resection[36] however laparoscopic lavage only in this group is associated with a significantly higher risk of reoperation[37]. In a selection of patients with Hinchey III and IV (as well as Hinchey IIb when lavage and drainage is not suitable) a laparoscopic colonic resection can be performed (Hartmann's procedure or primary anastomosis), subject to surgeon experience[38-40].

In the Italian study, 84% of surgeons use laparoscopy for Hinchey IIb disease and 75% in Hinchey III. In Hinchey IV disease, 65% of those surveyed went straight to an open approach[13].

Small Bowel Obstruction (Adhesional)

Laparoscopic treatment of small bowel obstruction was recommended in selected patients. Given adhesions are the leading cause of small bowel obstruction (75%)[41], it is recommended that a laparoscopy first approach is taken to increase the rate of those patients being successfully managed with laparoscopic adhesiolysis. Complete laparoscopic treatment has been shown to be possible in up to 60% of patients[42,43]. It is recommended, however, that clear work up with computed tomography is performed to aid in diagnosis and a diagnostic laparoscopy should not be used blindly to reduce iatrogenic injury. Small bowel loops with a diameter <4cm, more than one previous abdominal operation, operation >24 hours after

presentation and dense adhesions are statistically significantly more likely to increase the conversion to open. A single band adhesion is seen as the ideal condition for complete laparoscopic treatment[44-48]. In the Italian study, 13% of units attempted laparoscopic treatment of small bowel obstruction[13].

Non-specific Abdominal Pain

Diagnostic laparoscopy is useful when other methods of diagnostic work-up have failed. It is recommended in those with abdominal pain lasting more than 7 days for which the diagnosis remains uncertain even after repeated examination and imaging, including ultrasound and computed tomography[49,50]. It is useful, with a diagnostic accuracy of between 90-100% and a morbidity rate of between 0-8%[51].

Trauma

After penetrating trauma of the abdomen, laparoscopy may be useful in the haemodynamically stable patients with documented penetration of the anterior fascia[52-54]. In blunt trauma, it should be considered in haemodynamically stable patients with a suspected intra-abdominal injury and equivocal findings on computed tomography[55]. In the Italian surgery, 80% of surgeons used a laparoscopic approach in trauma <25% of the time[13].

Laparoscopy in the Elderly Population

Cocurullo et el (2016), another Italian Group, specifically looked at the role of laparoscopy in the management abdominal emergencies in the elderly population. In a single unit case-control study of 159 patients aged over 70 over a one-year period from 2013-14, they looked at average operating time, conversion rate, Clavien-Dindo scores of 3-4 and mortality rates between those managed laparoscopically or open initially. They found no difference between the groups in small bowel obstruction, appendicitis, diverticulitis, acute ventral hernia and gastro-duodenal perforation, but found better outcomes for the laparoscopic cholecystectomy group. They therefore conclude that emergency laparoscopic surgery is feasible and safe in the elderly population, and suggest a larger powered, pragmatic, randomised control study looking at this particular population is undertaken[56].

Conclusion

There are clear consensus guidelines and recommendations for when laparoscopic approaches may be useful, safe and feasible in the management of the acute abdomen. European surveys have found this to be variable, and it appears that the uptake in the United Kingdom may be lower than our European colleagues.

A review of the data from the National Emergency Laparotomy Audit would allow comparison of outcomes between open and laparoscopic emergency general surgery and may assist in the identification of factors associated with the varying uptake of laparoscopy. A UK Nationwide Survey would complement these findings by further establishing current practice and in determining factors affecting the variable practice of emergency general surgical laparoscopy.

3.0 Aims & Objectives

3.1 Aims

The aim of this service evaluation project is to explore the variation in practice for the use of laparoscopy in emergency general surgery. This will be assessed using a questionnaire survey of surgeons in the UK who perform emergency general surgery to identify the factors which affect the decisions to use keyhole surgery in general surgical emergencies.

3.2 Outcome Measures

Demographic data and data relating to surgeon experience of laparoscopic surgery will be collected. Their current practice will be evaluated through a series of procedure based questions and case scenarios reflecting common conditions encountered by surgeons who participate on the emergency general surgery rota.

4.0 Study Design

This is a national prospective cross-sectional questionnaire survey of currently practicing general surgical consultants.

The questionnaire will include basic demographic information, number of operations performed and laparoscopic experience. Further questions will use a likert scale to determine the likelihood of using laparoscopy for different emergency presentations and will be supplemented by scenario based questions. After an initial pilot of 10 surgeons, the questionnaire will be distributed nationally via research collaborative networks.

5.0 Methodology

The questionnaire survey has been designed and reviewed by the LEGS steering committee. The questions intend to ascertain the following:

- Basic demographic data
- Training history
- Laparoscopic experience
- Laparoscopic case volume
- Scope of current laparoscopic practice
- Reporting practice of laparoscopic emergency operations to NELA
- Factors affecting the decision to perform emergency surgery laparoscopically

The questionnaire will initially be piloted at hospital trusts within the North Western deanery. Members of the LEGS steering committee will complete the questionnaire face-to-face with consultants working in these trusts and then upload the data into a pilot database.

The responses and the questionnaire will be reviewed by the LEGS steering committee and statistician. The need for any amendments based on the pilot findings will then be discussed.

The final version of the questionnaire will be disseminated throughout other regions of the UK by means of communication between locally established trainee-led research collaboratives. A local regional lead will be named for each collaborative. Each collaborative will aim to recruit responses from all trusts within their region.

Data from completed questionnaires will be entered into a secure web-based database using REDCap hosted by the North West Surgical Trials Centre.

The data will be analysed by a statistician based at the North West Surgical Trials Centre.

6.0 Data Management and Statistical Analysis

6.1 Data Management

All data collected as part of the LEGS study will be maintained in a secure NHS database based at University Hospital South Manchester. No patient identifiable data will be included.

The data will be accessible only to the LEGS steering committee, the North West Surgical Trials Centre statisticians and the REDCap administration team.

6.2 Statistical Analysis

Analysis of the data obtained from the questionnaire surveys will be performed by the LEGS steering committee, using any appropriate statistical software such as Stata V12, SAS V9.3, R V3.4, etc. or newer.

7.0 Governance

7.1 Quality Assurance

The LEGS protocol has been formulated and reviewed by the LEGS Steering Committee as part of the North West Research Collaborative.

7.2 Ethics

The study design was reviewed against the HRA framework and it was determined that ethical approval is not required.

There are no apparent ethical concerns raised as there is no use of research participants, patient-specific data or changes to routine patient care.

7.3 Collaboration with other institutions

The LEGS study will be carried out by the LEGS steering committee on behalf of the North West Research Collaborative in collaboration with:

- **The North West Surgical Trials Centre**

  The LEGS Steering Committee are supported by the local Surgical Trials Centre.

7.4 Expected Outcomes

It is expected that the questionnaire survey will provide an overview of current practice in the use of laparoscopy in emergency general surgery in the UK and an insight into the most important factors influencing surgeons in their decision as to when to use laparoscopy.

7.5 Dissemination of Results and Publication Policy

The findings from this study will be presented at a national or international surgical conference.

Manuscript(s) will be prepared for submission to a peer-reviewed journal. Authorship will be in line with the North West Research Collaborative authorship policy, acknowledging the Steering Committee, the North West Research Collaborative and other supporting institutions. Local collaborators for the questionnaire study will be listed a named contributors where a minimum of five questionnaire surveys have been returned.

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Appendix A – Pilot Questionnaire Survey

LEGS: Laparoscopy in Emergency General Surgery

A UK Survey - Version 5

North West Research Collaborative

INSTRUCTIONS FOR COMPLETION
Please print out this questionnaire and complete ALL questions Once completed, the designated trainee for your site will input the data into the REDCap database **PLEASE NOTE: IT IS NOT POSSIBLE TO ENTER A QUESTIONNAIRE INTO THE DATABASE IF ANY DATA FIELDS ARE LEFT BLANK** Thank you very much for your time

Appendix A – Pilot Questionnaire Survey

Section A

This section seeks to evaluate details about your training and experience of elective laparoscopic surgery.

1. In which year did you attain your primary medical qualification? (e.g. MBBS/MBChB)

2. In which year did you begin your first consultant post?

3. In which subspecialty do you work?

4. In which region did you complete your training?

Eastern		Oxford	
Kent, Surrey & Sussex		Scotland	
Leicestershire, Northamptonshire & Rutland		South Western	
London		South Yorkshire and South Humber	
Mersey		Wales	
Northern		West Midlands	
Northern Ireland		Wessex	
North West		Yorkshire	
Trent			

5. Did you complete a fellowship as part of your training? If yes, please provide details of nature of fellowship and duration.

Yes	No

Appendix A – Pilot Questionnaire Survey

6. Which region do you currently work in?

Eastern		Oxford	
Kent, Surrey & Sussex		Scotland	
Leicestershire, Northamptonshire & Rutland		South Western	
London		South Yorkshire and South Humber	
Mersey		Wales	
Northern		West Midlands	
Northern Ireland		Wessex	
North West		Yorkshire	
Trent			

7. Are you aware that all laparoscopic emergency cases (excluding appendix and gallbladder surgery) should be entered into the National Emergency Laparotomy Audit (NELA) database?

Yes	No

8. Do you routinely include emergency laparoscopic emergency cases in your NELA data?

Yes	No

9A. In the year from 1st January 2016 to 31st December 2016, how many of the following procedures did you perform laparoscopically?

Procedure	Quantity				
	0	1-10	11-20	21-30	>30
Cholecystectomy					
Inguinal Hernia					
Other abdominal hernia					
Gastrectomy					
Oesophagectomy					
Hepatic resection					
Pancreaticoduodenectomy					
Nissen's Fundoplication					
Right Hemicolectomy					
Anterior Resection					
Abdominoperineal Resection					
Subtotal Colectomy					

Appendix A – Pilot Questionnaire Survey

9B. If there are any other procedures you perform laparoscopically, please could you list them below and indicate the approximate number you have performed.

Procedure	Quantity

Please add free text comments in the box below:

Appendix A – Pilot Questionnaire Survey

Section B

This section seeks to evaluate which emergency procedures you perform laparoscopically.

How often would you initially approach the following procedures laparoscopically? Please enter any comments at the end.

1. Appendicectomy

Never	Rarely	Sometimes	Frequently	Always

2. Cholecystectomy

Never	Rarely	Sometimes	Frequently	Always

3. Perforated duodenal or gastric ulcer

Never	Rarely	Sometimes	Frequently	Always

4. Perforated diverticulum (Hinchey Grade 3)

Never	Rarely	Sometimes	Frequently	Always

5. Perforated diverticulum (Hinchey Grade 4)

Never	Rarely	Sometimes	Frequently	Always

6. Small bowel perforation

Never	Rarely	Sometimes	Frequently	Always

7. Colonic cancer causing bowel obstruction

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

8. Adhesional small bowel obstruction

Never	Rarely	Sometimes	Frequently	Always

9. Small bowel obstruction due to a small bowel lesion

Never	Rarely	Sometimes	Frequently	Always

10. Incarcerated inguinal hernia

Never	Rarely	Sometimes	Frequently	Always

11. Strangulated inguinal hernia

Never	Rarely	Sometimes	Frequently	Always

12. Ischaemic bowel (colon/small bowel)

Never	Rarely	Sometimes	Frequently	Always
1	2	3	4	5

13. Subtotal colectomy for refractory colitis

Never	Rarely	Sometimes	Frequently	Always
1	2	3	4	5

Please add free text comments in the box below:

Appendix A – Pilot Questionnaire Survey

Section C

This section seeks to examine factors affecting your decision to perform laparoscopic surgery.

Please select your level of agreement with the following statements:

1. I am less likely to perform emergency laparoscopic procedures in patients with higher BMIs

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

2. I am less likely to perform emergency laparoscopic surgery in the elderly

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

3. I am less likely to perform emergency laparoscopic procedures in patients who have had previous abdominal surgery

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

4. I am less likely to perform emergency laparoscopic procedures in patients who have poorer performance statuses

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

Appendix A – Pilot Questionnaire Survey

5. I am less likely to perform emergency laparoscopic procedures in patients who have high ASA grades

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

6. I am less likely to perform emergency laparoscopic procedures in frail patients

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

7. I am less likely to perform emergency laparoscopic procedures in patients who are returning to theatre for management of complications from a recent operation

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

8. I am less likely to perform emergency laparoscopic procedures during the hours of 8pm-8am

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

9. I am less likely to perform emergency laparoscopic procedures at weekends

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
Comments				

Appendix A – Pilot Questionnaire Survey

Are there any other factors that you take into consideration on deciding your approach?
Please add free text comments in the box below.

Appendix A – Pilot Questionnaire Survey

Section D

This section seeks to evaluate your surgical practice in a number of different emergency scenarios. Please choose *how often you would approach the procedure laparoscopically* for each scenario.

Question 1 – A patient with suspected appendicitis. They have no significant comorbidities. You decide to operate. How likely are you to approach this laparoscopically?

a) 6 year old female

Never	Rarely	Sometimes	Frequently	Always

b) 12 year old male

Never	Rarely	Sometimes	Frequently	Always

c) 25 year old female

Never	Rarely	Sometimes	Frequently	Always

d) 65 year old male

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

Question 2 - A 50 year male with a CT diagnosed perforated duodenal ulcer. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) Previous abdominal surgery

Never	Rarely	Sometimes	Frequently	Always

e) Evidence of small bowel dilatation on CT scan

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

Question 3 - A 60 year old female with Hinchey grade 3 diverticulitis diagnosed on CT scan. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) Previous abdominal surgery

Never	Rarely	Sometimes	Frequently	Always

e) Evidence of small bowel dilatation on CT scan

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

Question 4 - A 60 year old female with Hinchey grade 4 diverticulitis diagnosed on CT scan. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) Previous abdominal surgery

Never	Rarely	Sometimes	Frequently	Always

e) Evidence of small bowel dilatation on CT scan

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

Question 5 – You have performed a laparoscopic repair of a perforated duodenal ulcer. Two days later the patient deteriorates on the ward. A CT scan shows a large amount of free fluid and free air. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) 50 year old male

Never	Rarely	Sometimes	Frequently	Always

e) 80 year old male

Never	Rarely	Sometimes	Frequently	Always

Appendix A – Pilot Questionnaire Survey

Question 6 – A patient has had a laparoscopic anterior resection 4 days ago (primary anastomosis and NOT defunctioned). Today they have deteriorated and a CT scan shows a probable leak at the anastomosis. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) 50 year old male

Never	Rarely	Sometimes	Frequently	Always

e) 80 year old male

Never	Rarely	Sometimes	Frequently	Always

If you have any comments on the above sections, please enter them here:

Appendix A – Pilot Questionnaire Survey

Question 7 – A patient presents with small bowel obstruction confirmed on a CT scan. They have had no previous surgery and the radiologist reports an abrupt transition point in the pelvis. You decide to operate. How likely are you to approach this laparoscopically?

a) No significant co-morbidities

Never	Rarely	Sometimes	Frequently	Always

b) ASA grade 3

Never	Rarely	Sometimes	Frequently	Always

c) BMI 42

Never	Rarely	Sometimes	Frequently	Always

d) 50 year old male

Never	Rarely	Sometimes	Frequently	Always

e) 80 year old male

Never	Rarely	Sometimes	Frequently	Always

f) A patient who has had previous open abdominal surgery

Never	Rarely	Sometimes	Frequently	Always

If you have any comments on the above sections, please enter them here:
