PATIENT MONITORING

Key points

In 27% of cases patient monitoring was deficient.

In 20% of cases ECG monitoring was indicated where it was not used.

In 14% of cases automatic blood pressure monitoring was indicated where it was not used.

Table 22. Critical events during the procedure (answers may be multiple)

Critical event	Total *n = 1,688*
Cardiac arrest	8
Respiratory arrest	5
Hypoxaemia (SpO_2< 90%)	68
Pulmonary aspiration	1
Hypotension (less than or equal to 100mm Hg systolic)	68
Tachycardia (greater than or equal to 100 beats/minute)	86
Local haemorrhage	41
Viscus perforation	5
Other	24
Total	**306**
None	1,493
Not answered	130

93% (1,688/1,818) responded to the question relating to critical events. From the review of cases it is likely that these were under-reported (Table 22) or undiagnosed, possibly reflecting a deficiency in monitoring. Nevertheless, from the questionnaires, 4% (68/1,688) of patients suffered from hypoxaemia during the procedure.

The type of monitoring used should be determined by the procedure and physical status of the patient. Respondents were asked to state the monitoring used during the procedure. This question was answered in 94% (1,701/1,818) of cases. There should always be a record of monitoring used during endoscopy, particularly when sedation is used.
A summary of monitoring is presented in Table 23.

Table 23. Monitoring during the procedure (answers may be multiple)

Monitors used	Total *n = 1,701*
Pulse oximetry	1,668
ECG	384
Automatic BP	729
Total	**2,781**
Not answered	117

NCEPOD advisors were asked to provide an opinion on deficiencies in monitoring in cases where there was sufficient information for them to assess. Monitoring of the patient during the procedure was considered deficient in 27% (377/1,398) of cases.

Pulse oximetry

The question on patient monitors used during the procedure was completed in 1,701 cases. Monitoring by pulse oximetry was performed during endoscopy in 98% (1,668/1,701) of patients. On review, the advisors thought monitoring pulse oximetry was specifically indicated in a further 27 cases. The BSG guidelines on the provision of endoscopy services recommend that pulse oximetry should be available in all rooms[6]. Pulse oximetry is a simple, non-invasive monitor and evidence from this report suggests that it is widely available for endoscopy patients; the chapter entitled organisational issues reports that 99% of hospitals had access to pulse oximetry in every room in their endoscopy unit. It was used with relatively few exceptions, but it should be used for all therapeutic and diagnostic endoscopies.

Electrocardiography (ECG)

In this sample, 23% (384/1,701) of patients received continuous ECG monitoring during the procedure. This was considered low in a sample where 38% (639/1,701) of patients had known cardiac disease and 86% (1,458/1,701) were ASA 3 or poorer. On review, the advisors thought ECG monitoring was indicated in a further 345 cases where it was not used.

Case Study

A patient was admitted with an acute inferior myocardial infarction. Four weeks later the patient suffered a large haematemesis, became hypotensive and their haemoglobin decreased by 2.5gm/dl. A CVP line was inserted to monitor resuscitation. The next day an endoscopy was performed and adrenaline was injected into two large gastric ulcers. Pulse oximetry and automatic blood pressure were monitored, but ECG was not.

Why was ECG monitoring not used?

There is evidence that despite endoscopy being, in general, a minor low risk procedure it can affect cardiac function. In a study of patients with stable coronary heart disease undergoing gastroscopy 42% developed Holter monitoring, evidence of silent myocardial ischaemia[7] and in another study of patients with heart disease aged 80 years or older, upper GI endoscopy induced an increased number of ventricular ectopics[8]. ECG monitoring enables the detection of life threatening arrhythmia and ST segment changes and the

person responsible for monitoring the patient must be sufficiently trained to detect such abnormalities. The factors that should be considered when deciding on ECG monitoring are cardiovascular disease, ASA status and the potential for haemodynamic instability. The guidelines of the Academy of Medical Royal Colleges[1] state that monitoring of blood pressure and ECG may not be necessary in young healthy patients, but is essential in older patients, especially if there are any cardiovascular problems. However, an ECG monitor should be available in all endoscopy rooms and any patient with a history of cardiac problems or haemorrhage must receive ECG monitoring.

Automatic blood pressure monitoring

Automatic blood pressure monitoring was used in 43% (729/1,701) of patients during the procedure. On review, the advisors thought automatic blood pressure monitoring was indicated in a further 231 cases where it was not used. Although it is not an invasive monitor, many patients find automatic blood pressure monitoring unpleasant, particularly when it is first applied when the inflation pressure is high.

Case Study

A patient was admitted with pain from bilateral loosened hip prostheses. Their medical history included atrial fibrillation, congestive cardiac failure and a NSAID induced GI bleed. Nevertheless diclofenac was prescribed. Six days later the patient became acutely short of breath due to a chest infection and left ventricular failure. The patient then suffered an upper GI bleed, following which they developed hypotension, tachycardia and acute renal failure. When the patient had their gastroscopy they were described as "very poorly" and were treated with inotropes. No ECG or blood pressure monitoring was used in the endoscopy suite, either before, during, or after the procedure.

All endoscopy rooms should have an automatic blood pressure machine. Automatic blood pressure monitoring should be used in any patient whose condition including comorbidities makes hypotension likely. This includes haemodynamic instability and a recent severe GI bleed.

Supplemental oxygen

Oxygen should be given during all endoscopies[2] as it dramatically reduces the incidence of hypoxaemia[9]. Table 24 gives details of oxygen administered in the sample.

Table 24. Oxygen administered during the procedure		
	Total	*(%)*
Administered	1,584	*(95)*
Not administered	88	*(5)*
Sub-total	**1,672**	
Not answered	146	*(8)*
Total	**1,818**	

Hypoxaemia can occur during upper GI endoscopy with or without sedation, particularly in those with pre-existing respiratory disease, hepatic cirrhosis, obesity, advanced age or undergoing an emergency procedure[9 10 11 12]. It can also occur during colonoscopy with sedation[13]. Moreover hypoxaemia is common. For example, in a study of non-sedated patients undergoing upper GI endoscopy, 24% had a SpO_2 of 90% to 94% and a further 6.5% had a SpO_2< 90%[10]. When sedation is used, the incidence of hypoxaemia is higher. In a study of patients undergoing sedated upper GI endoscopy, SpO_2<94% was detected in 47%[9] and in a study of patients undergoing sedated colonoscopy, hypoxaemia was detected in 45% (8/18)[13]. However, even with supplemental oxygen, patients can become hypoxic and therefore pulse oximetry should still be used.