Management of bleeding gastroduodenal ulcers

Stig Borbjerg Laursen, Henrik Stig Jørgensen & Ove B. Schaffalitzky de Muckadell

Abstract
Description: A multidisciplinary group of Danish experts developed this guideline on management of bleeding gastroduodenal ulcers. Sources of data included published studies up to March 2011. Quality of evidence and strength of recommendations have been graded. The guideline was approved by the Danish Society of Gastroenterology and Hepatology September 4, 2011.

Recommendations: Recommendations emphasize the importance of early and efficient resuscitation. Endoscopy should generally be performed within 24 hours, reducing operation rate, rebleeding rate and duration of in-patient stay. When serious ulcer bleeding is suspected and blood found in gastric aspirate, endoscopy within 12 hours will result in faster discharge and reduced need for transfusions. Endoscopic hemostasis remains indicated for high-risk lesions. Clips, thermocoagulation, and epinephrine injection are effective in achieving endoscopic hemostasis. Use of endoscopic monotherapy with epinephrine injection is not recommended. Intravenous high-dose proton pump inhibitor (PPI) therapy for 72 hours after successful endoscopic hemostasis is recommended as it decreases both rebleeding rate and mortality in patients with high-risk stigmata. Although selected patients can be discharged promptly after endoscopy, high-risk patients should be hospitalized for at least 3 days after endoscopic hemostasis. Patients with peptic ulcer bleeding who require secondary cardiovascular prophylaxis should start receiving acetylsalicylic acid (ASA) again as soon as cardiovascular risks outweigh gastrointestinal risks. Patients in need of continued treatment with ASA or a nonsteroidal anti-inflammatory drug should be put on prophylactic treatment with PPI at standard dosage. The combination of 75mg ASA and PPI should be preferred to monotherapy with clopidogrel in patients needing anti-platelet therapy on the basis of indications other than coronary stents.

Introduction
This guideline is prepared on the basis of the report “Final proposal for interdisciplinary national clinical guideline for bleeding gastroduodenal ulcers”[1] from the Danish National Indicator Project and has been approved by the Danish Society for Gastroenterology and Hepatology September 4, 2011.

Subject-area delimitation
The guideline deals with the treatment of patients bleeding from chronic peptic ulcerations located to the stomach and/or duodenum and provides recommendations based on best practice in the assessment and management of peptic ulcer bleeding of a severity that leads to admission to hospital.

Background
Bleeding gastroduodenal ulcers are frequent and are the cause of some 2000 admissions annually in Denmark. Despite the development of more potent acid-inhibiting drugs and improved endoscopic techniques, mortality has remained unchanged at about 10% for a great many years. This is presumably a consequence of increasing age and an increased frequency of competing illness in.

Definitions
Bleeding peptic ulcer is defined as the occurrence of haematemesis and/or melaena and/or an unexplained drop in B-haemoglobin in a patient in whom a subsequent endoscopy documents that the source of bleeding is a chronic peptic ulcer. Chronic ulcerations are defined as ulcers with a visible loss of substance that penetrate the...
muscular layer of tunica mucosa and the proper mucous membrane; these ulcers should not be confused with acute erosions.

**Review of included topics**

1. **Admission and circulatory restoration**

Initial assessment and treatment of patients with suspected ulcer bleeding is based on the ABCDE principles: Airway, Breathing, Circulation, Disability and Exposure/Environment.[2] Staff should be competent in the recognition of airway problems, use of basic airway manoeuvres, and when to call upon staff trained in advanced airway therapy.

Unobstructed airways and sufficient respiration is secured. Peripheral oxygen saturation should be measured and be ≥ 93%. Oxygen (10-15L/min) should be administered to patients with haemodynamic disturbance in order to secure adequate delivery of oxygen and avoiding global hypoperfusion and tissue hypoxia.[3]

Treatment of circulatory insufficiency is the cornerstone of the initial management. A minimum of two large peripheral IV lines are established and kept open with isotonic NaCl. If the patient is haemodynamically unstable, 1,000-2,000 ml isotonic NaCl or Ringer acetate is rapidly infused to ensure tissue perfusion. A Cochrane review comparing crystalloid and colloid fluid restoration demonstrated no significant statistical difference,[4] and as colloids may interfere with haemostasis, crystalloids are recommended.

In accordance with the guidelines from the National Board of Health, Denmark,[5] balanced blood component therapy in the ratio:

- Erythrocytes 3 : fresh frozen plasma 3 : platelets 1

is initiated in life threatening bleeding. O rhesus negative blood can be used until compatible blood becomes available. Platelets are administered from the beginning simultaneously with infusion of fresh frozen plasma and erythrocytes in separate IV lines. The need of volume replacement should be assessed by monitoring blood pressure, heart rate, peripheral perfusion and oxygen saturation.

Care should be taken to avoid overloading, especially in patients with heart failure, and in risk of development of pulmonary oedema.

In patients with circulatory distress, insertion of a gastric tube can be instrumental in establishing the cause of circulatory failure as a result of upper gastrointestinal bleeding. Conversely, clear gastric aspirate cannot rule out even severe bleeding and must not be used as an argument for postponing upper endoscopy. Gastric tube insertion should not be done as a matter of routine.

The following blood samples are to be taken initially: B-Haemoglobin, B-Platelets, INR, P-Na, P-K, P-Albumin, P-Creatinine, P-Urea, Blood-type, BAC test and ECG.

Prognostic factors from case histories include a description of the occurrence of coffee-ground coloured/red haematemesis, melaena/haematochezia and syncope in conjunction with the aforementioned symptoms. Intake of NSAID/ASA, other platelet-inhibiting drugs, vitamin K antagonists and SSRI is recorded. Details, or clinical suspicion, of co-morbidity (particularly heart, liver, kidney and pancreas) and previous aortic surgery are important for prognostic reasons, and also of significance for optimal resuscitation and evaluation of the possibility of variceal bleeding, aortoenteric fistula or pancreatic pseudocyst haemorrhage.

2. **Monitoring**

Patients with upper GI bleeding should be admitted, assessed and managed in a dedicated bleeding unit, which in a cohort study was shown to reduce mortality.[6]

Only a sparse number of studies are available on optimal observation in connection with ulcer bleeding, for which reason the recommendations below are based on consensus.[1]

The vital parameters: Heart rate, blood pressure, oxygen saturation, respiratory rate, diuresis and level of consciousness are monitored every 15 minutes until the patient has stabilized, then once an hour. Fluid balance should be documented on specific charts.

In conjunction with endoscopy the level of consciousness is observed continuously, as are respiratory rate, blood pressure, heart rate and oxygen saturation. Continuous ECG monitoring may be useful. Supplementary monitoring with invasive arterial/venous pressure measurements and hourly urinary output should be considered in patients in haemodynamic distress.

Following a haemostatic procedure, respiratory rate, heart rate, blood pressure, level of consciousness and oxygen saturation should be recorded at regular intervals with an eye to early identification of rebleeding. Until four hours after haemostasis is achieved, it is recommended checking parameters every half an hour, from 5-12 hours once an hour, from 13-24 hours every four hours and then a minimum of three times a day.

Rebleeding occurs in 14%[7] and must be suspected where haematemesis, fresh melaena/haematochezia, syncope,
arterial hypotension, tachycardia, falling B-Haemoglobin and lack of normalization of P-Urea is observed.

3. Timing of endoscopy
Patients with suspected ulcer bleeding should generally be endoscoped within 24 hours of being hospitalized, thereby reducing the need for surgical haemostasis, the rebleeding rate and in-patient stay.[8]

On suspicion of serious ulcer bleeding and occurrence of bloody gastric aspirate, endoscopy should be endeavoured within twelve hours. A randomized study has shown that this achieves earlier discharge and reduces the need for transfusion.[9]

Endoscopy within 6-8 hours generally entails an increased risk of poor overview conditions, greater risk of aspiration and an increased therapy rate, and no improvement of prognosis.[8]

If, circulatory stabilization, despite intensive resuscitation, is not possible, upper endoscopy should be performed immediately on vital indication.

4. Endoscopic treatment
4.1 Indication and purpose
Endoscopic treatment is indicated in Forrest I-IIb ulcers. In addition to primary haemostasis, endoscopic treatment of Forrest I-IIa ulcers will result in a lower rebleeding rate, rate of surgery and mortality.[10] Endoscopic treatment of ulcers with an adherent clot - i.e. coagulum that cannot be removed by vigorous irrigation or suction – is a subject of controversy.[11] A meta-analysis has shown that endoscopic treatment for this type of ulcer does reduce the rate of rebleeding and operation, but mortality remained unchanged.[12] However, the available studies are, as far as treatment is concerned, methodologically heterogeneous. The most frequently used treatment modality is injection therapy followed by removal of the clot and treatment of any underlying bleeding stigmata with a secondary treatment modality.

4.2 Modalities of therapy
4.2.1 Adrenaline-saline injection
In most instances, treatment with adrenaline-saline injection (1:10,000) is the technique of choice as the first modality, since the method is good for achieving haemostasis[13-16] and creating an overview of the source of bleeding. Three randomized studies have shown a clear correlation between the volume of adrenaline-saline injected and the rebleeding rate.[17-19] The rebleeding rate is halved if the injected volume is increased from 5-10 ml to 13-20 ml.[17] For the purpose of reducing the rebleeding rate, therefore, it is recommended always to inject a total volume of at least 10 ml adrenaline-saline, irrespective of already obtained haemostasis. Injecting a total volume greater than 30 ml increases the risk of developing protracted abdominal pains as well as perforation, and should therefore be avoided.[18]

4.2.2 Contact thermal probe
Treatment with contact thermal probes includes use of heater probe and multipolar electrocoagulation. Both types of thermal probes are effective.[20-22] The mechanism of action is coaptive coagulation. This is achieved by compression of the vessel with a steady pressure, and subsequent congealing by supplying heat.

4.2.3 Hemoclip
The aim of treatment with Hemoclips is to achieve mechanical haemostasis. Hemoclips are particularly well suited to a visible vessel. However, application of a hemoclip can be technically challenging, especially in retroflexion and in the case of ulcers located to the posterior wall of the duodenal bulb. The evidence for the effectiveness of hemoclips as compared with a thermal probe is scanty and in several cases contradictory.[23-25] Overall, the methods seem to be of equal value.[26]

4.2.4 Injection with sclerosing drugs
Injection of a sclerosing drug such as polydocanol (Aethoxysclerol) and ethanol used to be employed frequently to obtain haemostasis. However, due to reports on subsequent fatal necrotization[27-28] and the emergence of better alternatives, injection treatment with sclerosing drugs can no longer be recommended as the first choice.

4.2.5 Argon plasma coagulation
The evidence for efficacy of argon plasma coagulation in the treatment of ulcer bleeding is modest.[29-31] The effectiveness of this method is limited due to a modest depth effect and lack of coaptive coagulation. Treating ulcer bleeding with argon plasma coagulation cannot be recommended, therefore.

4.3 Mono versus dual therapy
There are numerous studies, including a number of meta-analyses, comparing different forms of endoscopic therapy. An important aspect in this regard is whether monotherapy with a particular form of therapy is associated with the same outcome as dual therapy. Unfortunately, there is divergence between the studies in several areas.

Use of adrenaline-saline injection as monotherapy is associated with a rebleeding rate of just under 20%.[32] A Cochrane analysis has shown that by adding a secondary treatment modality it is possible to reduce both rebleeding rate, the rate of surgery and mortality.[32] Adrenaline-saline injection should always be supplemented with a secondary form of therapy, therefore. A meta-analysis from 2007 concluded that monotherapy with a thermal probe was as effective as combination ther-
apy with adrenaline.[33] The validity of this conclusion is questionable, however.[34-36] A subsequent meta-analysis from 2009 opted, in relation to the aforementioned meta-analysis, to exclude two studies.[37] The rationale behind this was that one study used injection of a placebo solution in the treatment arm with thermal monotherapy, which could have had a therapeutic effect. The second study was excluded because the probe used was unipolar. After excluding the aforementioned studies, the rebleeding rate was found to be lower with combination therapy. Treatment with a thermal probe should always be supplemented with a form of secondary therapy, therefore.

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5. Invasive procedures

5.1 Transcatheter arterial embolization

If endoscopic haemostasis cannot be achieved, the patient should have transcatheter arterial embolization (TAE) performed without delay. TAE and surgery are of equal efficacy in terms of rebleeding, need for further surgical intervention and mortality.[38] According to a recent retrospective study, TAE seems to be associated with a lower complication rate than surgical haemostasis.[39]

If no active bleeding can be identified by angiography in connection with embolization, “blind embolization” can be undertaken on the basis of knowledge of the ulcer’s anatomic location.[40] A Hemoclip should be placed in the edge of the ulcer during the preceding endoscopy, thus facilitating identification of the bleeding vessel if attempts to access the bleeding arteries via the femoral arteries are unsuccessful access via brachial arteries can be used instead.

5.2 Surgical haemostasis

If endoscopic haemostasis cannot be achieved and TAE is not feasible, an emergency operation must be performed. It is recommended undertaking transfixion of the ulcer and the bleeding vessel with or without concurrent vagotomy rather than gastric resection. Mortality after both interventions is identical,[41-42] for which reason the most simple operation should be used. Access to gastric ulcers is most easily obtained through a transverse gastrotomy. With duodenal ulcers at the posterior wall of the duodenal bulb, the gastroduodenal artery is often involved. Here a longitudinal gastrotomy is performed in the anterior wall, sparing the pylorus wherever possible. The artery can then be transfixed above and below the bleeding site with a 2-0, 0 or 1 monofilament slowly absorbable suture. It is recommended to use a 5/8 27 mm round needle, as larger needles increases the risk of choledochal lesion.[43] Gastro

6. Rebleeding

At the first episode of rebleeding, therapeutic endoscopy is repeated if considered technically possible. Repeated endoscopic treatment is less effective than surgery with regard to achieving haemostasis, but equal in terms of survival and associated with fewer complications.[44] In the event of repeated rebleeding, treatment with re-endoscopy, TAE or operation must be considered on the basis of a case-by-case judgement and local expertise.

6. Medical treatment

6.1 Proton pump inhibitors (PPI)

A Cochrane analysis has shown that, overall, treatment with PPI reduces the rebleeding rate and the need for surgical haemostasis as compared with treatment with placebo or histamine-2 receptor antagonists.[45] For endoscopically treated ulcers with active bleeding or a visible vessel, it was found that infusing high-dose PPI (80mg bolus followed by 8mg/hour) in addition resulted in reduced mortality. Treatment with a lower dose of PPI (intravenous or oral) reduced the rebleeding rate, but not the mortality.[11] Direct comparison of intravenous versus oral treatment with PPI has only been investigated in a few studies, which generally bear the mark of insufficient power.[46-48] A Cochrane analysis has shown that treatment with PPI prior to endoscopy reduces the proportion of patients in whom endoscopic treatment is indicated. However, this is followed neither by a lower rebleeding rate, rate of surgery nor mortality.[49] Furthermore treatment with PPI impedes the diagnosis of Helicobacter pylori infection. Treatment with PPI prior to endoscopy cannot be recommended and must not delay the timing of upper endoscopy.

All patients with ulcer bleeding should be placed on treatment with proton pump inhibitors. Low-risk ulcers (Forrest IIc-III) are treated with oral PPI at a dose equipotent to 20 mg omeprazole daily. In the case of ulcers requiring endoscopic treatment, high-dose infusion treatment for three days is recommended before switching to oral treatment. Treatment equipotent to 80 mg omeprazole as bolus followed by 8 mg/hour for 72 hours is recommended.
6.2 Pausing treatment with ASA, clopidogrel, AK, NSAID and SSRI
When discontinuing well-indicated ASA treatment, the risk of developing arterial thrombosis is almost doubled.[50] Premature withdrawal of anti-platelet therapy is thus the most significant risk factor for stent thrombosis among patients with coronary stents. Patients developing ulcer bleeding on low-dose ASA treatment and receiving high-dose intravenous PPI after endoscopic treatment have lower mortality, but no statistically significant increase in rebleeding rate, assuming continued low-dose ASA treatment.[51] The platelet function in normal subjects is inhibited for up to five days after withdrawal of clopidogrel or aspirin, but presumably for a shorter time in bleeding patients. Consequently, both drugs can be paused for 24 hours until the bleeding has stopped and the situation is stabilized.

It is recommended pausing ASA, clopidogrel, AK, NSAID and SSRI in the presence of ulcer bleeding. Low-dose ASA can be resumed after 24 hours if there is no sign of bleeding in progress and high-dose IV PPI is given. Treatment with clopidogrel or other thienopyridines in patients with coronary stents can be resumed after three days. In case of doubt it is recommended to consult a cardiologist. Unnecessary NSAID intake should be discontinued. Treatment with AK and SSRI can be resumed after five days.

6.3 Tranexamic acid
A systematic view and meta-analysis has found that treatment with tranexamic acid can possibly reduce mortality, but the included studies were characterized by heterogeneity, inclusion of bleeding sources other than ulcer disease and inconsistent endoscopic therapy.[52] Furthermore rebleeding and need of surgical treatment was not reduced. Therefore, there is insufficient evidence to recommend the use of tranexamic acid for ulcer bleeding.

6.4 Thrombosis prophylaxis
Deep vein thrombosis (DVT) is a frequent complication following abdominal surgery (7-45%).[53] A Cochrane analysis has shown that extended treatment with low-molecular heparins (LMH) following major abdominal operations reduces the risk of developing venous thromboembolism without increasing the risk of postoperative bleeding.[54] Supplementary mechanical treatment with graduated compression stockings and early mobilization further reduces the occurrence of thromboembolic events.[55]

Following surgery for bleeding ulcer patients should be treated with LMH and compression stockings postoperatively. The treatment can beneficially be continued for four weeks.

7. Nutrition
There are few data only on the importance of nutrition for ulcer bleeding. A randomized study found that resuming oral intake one to two days after endoscopic therapy reduced in-patient stay without affecting the outcome.[56]

It is recommended that patients with endoscopic/endovascular/surgically treated bleeding ulcer disease are allowed oral intake of clear liquids for the first 24 hours after the procedure and then a normal diet. Patients with low-risk ulcer disease (Forrest IIc-III) without clinical suspicion of significant bleeding can be given a normal diet once the effect of the pharyngeal analgesia has worn off.

8. Discharge
Several studies have shown that patients at low risk of rebleeding or mortality can be discharged early on the course.[57-59] Thus patients with low-risk ulcers (Forrest IIc-III) without circulatory distress, or serious competing illness, can often be discharged within 24 hours of endoscopy. Following endoscopy, the Rockall score can be used to select low-risk patients.[59]

Among patients requiring endoscopic treatment who rebleed within a month, the majority (60-76%) rebleed within 72 hours.[60-62] It is therefore recommended not to discharge patients requiring endoscopic treatment for bleeding peptic ulcer earlier than after 72 hours’ PPI infusion.

9. Aftercare
9.1 Helicobacter pylori infection
All patients with ulcer disease must have the Helicobacter pylori status established and helicobacter-positive patients should receive eradication therapy in order to reduce the recurrence rate.[63] Reference is made to the DSGH guideline on the diagnosis and treatment of Helicobacter pylori infection.

9.2 Monitoring gastric ulcers
If a satisfactory number of biopsies (5-7) has not been taken from patients with gastric ulcers or the experienced endoscopist is in doubt the possibility of malignancy, follow-up gastroscopy must be performed after 6-8 weeks.[64]

9.3 PPI prophylaxis
ASA/NSAID intake is associated with an increased relative risk of ulcer complication of 4-7.[65] During ASA treatment, recurrence of ulcer bleeding is prevented just as effectively with omeprazole 20 mg and HP eradication, while only PPI prevents recurrence of ulcer bleeding on NSAID treatment.[66] In patients with previous ulcer bleeding, long-term treatment with clopidogrel 75 mg produces 8 times more bleeding recurrences than the combination of ASA 80-100 mg and PPI.[67,68] A combination of PPI and ASA
seems safer in terms of bleeding than a combination of PPI and clopidogrel.[69] It is controversial whether pantoprazole should be preferred to other types of PPI in patients being treated with clopidogrel.[70] The significance of any PPI-clopidogrel interaction is not clarified.

It is recommended that patients with a need for continued ASA or NSAID treatment are given prophylactic treatment with PPI at standard dosage. The combination of 75 mg ASA and PPI should be given preference over monotherapy with clopidogrel in patients needing platelet-inhibiting treatment on the basis of indications other than coronary stents.

**Levels of evidence for clinical recommendations**

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<td>Following successful endoscopic therapy, PPI treatment should be given as an intravenous bolus followed by continuous infusion, reducing rebleed-</td>
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ing rate and mortality

PPI should not be used prior to endoscopy in patients presenting with upper gastrointestinal bleeding

Pause ASA, clopidogrel, anti-coagulation (AC) therapy, NSAID and SSRI

In the case of Forrest I-IIb ulcers without rebleeding, low-dose ASA can be resumed after 24 hours, during simultaneous high-dose PPI infusion

**Nutrition**

Patients with Forrest IIc-III ulcers are allowed a normal diet after endoscopy

Patients who have been treated endoscopically are allowed a liquid diet for the first 24 hours after the procedure and then an unrestricted diet

**Discharge**

Patients with Forrest IIc-III ulcers and no haemodynamic disturbance or serious comorbidity can often be discharged within a day of completing endoscopy

Patients with ulcers requiring endoscopic treatment are discharged on the basis of case-by-case judgement, but generally after 72 hours’ PPI infusion at the earliest

**Aftercare**

All patients with peptic ulcer should be tested for Helicobacter pylori

If a satisfactory number of biopsies (5-7) has not been taken from patients with gastric ulcers or the experienced endoscopist is in doubt about possible malignancy, control gastroscopy must be carried out

Patients in need of continued ASA or NSAID treatment should be put on prophylactic treatment with PPI at standard dosage

The combination of 75mg ASA and PPI should be preferred to monotherapy

| Evidence Ia | with clopidogrel in patients needing anti-platelet therapy on the basis of indications other than coronary stents |
| Evidence III |  |
| Evidence Ib |  |
| Evidence IV |  |

**Quick guide**

**Admission and initial resuscitation**

- Patients are assessed and managed in accordance with the ABCDE principles
- A minimum of two large peripheral IV lines are established
- In the event of shock, patients are treated with rapid infusion of 1,000-2,000 ml isotonic NaCl
- In the event of life-threatening bleeding, balanced blood component therapy in the proportions erythrocytes 3 : fresh frozen plasma 3 : platelets 1 is initiated as quickly as possible.
- In medical history, information about haematemesis, melaena, haematochezia, syncope, NSAID/ASA/vitamin K antagonists/SSRI intake, comorbidity or previous intervention on abdominal aorta should be obtained

**Initial monitoring**

- Heart rate, blood pressure, saturation, respiratory rate, diuresis and level of consciousness should be monitored every 15 min until the patient has stabilized and then once hourly
- Administration of fluids and blood should be documented on a dedicated chart
- Patients should be assessed and managed in a dedicated unit with specially trained staff

**Timing of endoscopy**

- Should generally be undertaken within 24 hours
- If severe bleeding is suspected, endoscopy within 12 hours is recommended
- If the patient’s circulation cannot be stabilized, urgent endoscopy is performed on vital indication

**Endoscopic treatment**

- Forrest type I-IIb ulcers should be treated endoscopically.
- In most situations injection of 10-25 ml adrenaline-saline is recommended as the first modality in order to facilitate inspection of the bleeding site
- Endoscopic injection of adrenaline-saline should always be supplemented with a secondary therapeutic modality, usually in the form of a contact thermal probe or hemoclip

**Invasive procedures**

- If primary haemostasis cannot be achieved endoscopically, immediate transcatheter arterial embolization (TAE) is recommended
• If TAE is unavailable, immediate laparotomy, transfusion and ligation of the bleeding vessel is performed.

Rebleeding

• Rebleeding should initially be treated by repeat endoscopy, if technically possible.
• In the event of further rebleeding, TAE, surgery or repeated endoscopic treatment is considered.

Initial pharmacological treatment

• Pause any ASA, NSAID, clopidogrel, vitamin K antagonist and SSRI treatment.
• Low-risk ulcers (Forrest Ic-III) are treated with oral standard-dosage PPI. Ulcers requiring endoscopic treatment are treated with high-dose PPI given intravenously as bolus followed by continuous infusion for 72 hours.
• Helicobacter pylori positive patients are given eradication therapy.
• Patients who have had surgical haemostasis performed must be treated with low-molecular heparin and compression stockings postoperatively.

References

43. Saunders WB. Core Topics in general and emergency surgery. 2 ed. 2001.
47. Jang J, Song D, Jung J et al. High-dose oral proton pump inhibitor is as effective as intravenous administration in the aspect of increasing pH and reducing rebleeding after endoscopic treatment of

Appendix

Members of the working group of the Danish National Indicator Project for acute gastrointestinal surgery:
Jørgen Bendix
Daniel Buck
Ellen-Margrethe Jacobsen
Anders Gadegaard Jensen