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# MSAC Application 1150

*Final*

Decision Analytic  
Protocol (DAP) to  
guide the assessment  
of the insertion of  
colonic stents for the  
management of  
malignant bowel  
obstructions

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## MSAC and PASC

The Medical Services Advisory Committee (MSAC) is an independent expert committee appointed by the Australian Government Health Minister to strengthen the role of evidence in health financing decisions in Australia. MSAC advises the Commonwealth Minister for Health and Ageing on the evidence relating to the safety, effectiveness, and cost-effectiveness of new and existing medical technologies and procedures and under what circumstances public funding should be supported.

The Protocol Advisory Sub-Committee (PASC) is a standing sub-committee of MSAC. Its primary objective is the determination of protocols to guide clinical and economic assessments of medical interventions proposed for public funding.

## Purpose of this document

This document is intended to provide a draft decision analytic protocol that will be used to guide the assessment of an intervention for a particular population of patients. This protocol will be finalised after inviting relevant stakeholders to provide input to the protocol. The final protocol will provide the basis for the assessment of the intervention.

The protocol guiding the assessment of the health intervention has been developed using the widely accepted “PICO” approach. The PICO approach involves a clear articulation of the following aspects of the question(s) for public funding that the assessment is intended to answer:

**P**atients – specification of the characteristics of the patients in whom the intervention is to be considered for use;

**I**ntervention – specification of the proposed intervention

**C**omparator – specification of the therapy most likely to be replaced by the proposed intervention

**O**utcomes – specification of the health outcomes and the healthcare resources likely to be affected by the introduction of the proposed intervention

## Purpose of application

A proposal for an application requesting MBS listing of colonic stents for the management of malignant large bowel obstruction was received from the Colorectal Surgical Society of Australia and New Zealand by the Department of Health and Ageing in October 2010.

## Intervention

### Description

Colorectal cancer (ICD-10:C18 – C20), which is also known as large bowel cancer, is one of the most common cancers in the world. The large bowel consists of the ascending colon, transverse colon, descending colon, sigmoid colon and the rectum. In the UK, colorectal cancer is the third most common cause for cancer deaths and the Association of Colo-Proctology of Great Britain and Ireland states that approximately 100 new cases are diagnosed each day in the UK (ACPGBI, 2007). According to the National Institute for Health and Clinical Excellence in the UK the five year survival rate after diagnosis of colorectal cancer is about 45% and the remaining 50 - 60 % of patients eventually develop metastases (NICE, 2004, pp. 9; NCCN, 2011).

In Australia, colorectal cancer is the second most common cancer. In 2007, prostate cancer was the most common cancer reported with 19,403 new cases, followed by bowel cancer (14,234 new cases) and breast cancer (12,670 new cases) (AIHW, 2010, pp.19). In the same year lung cancer was the most common cause of death from cancer in Australia causing 7,626 deaths, while colorectal cancer took the lives of 4,047 Australians. The incidence of colorectal cancer was noted as 13.1% (males – 12.6%, female – 13.9%) of overall cancer incidences in 2007. According to the Australian Institute of Health and Welfare, the incidence rate of colorectal cancer in males increased from 67 to 75 cases per 100,000 and in females from 50 to 55 cases per 100,000 during the period from 1982 to 2007 (AIHW, 2010). The Interactive National Hospital Morbidity Data confirms the utilization of 12,919 patient days of malignant neoplasm of the colon during 1998/99, which annually increased up to 19,037 patient days by 2007/08 (data accessed through <http://www.aihw.gov.au/> on 15 March 2011).

Intestinal obstruction is a common complication and related medical emergency among patients who suffer from colorectal cancer. Cancer is the second most common cause of intestinal obstruction in adults following adhesions secondary to prior laparotomy, while colorectal and ovarian cancers are the most common causes of malignant colorectal obstructions (Davis & Nouneh, 2001; Watt et al, 2007). Intestinal obstructions may also be caused by other non-malignant conditions such as Crohn disease and diverticulitis. The incidence of intestinal obstructions due to primary intestinal malignancies ranges from 10 – 28% (Davis & Nouneh, 2001; Tilney et al, 2007). Mandava et al (1996) stated that about 30% of colon cancer patients

and 10% of rectal cancer patients present as emergencies and 80% of such complications were related to colorectal obstruction. Xinopoulos et al (2004) cited that 10-20% of colorectal cancer patients develop partial colonic obstruction while 8-29% lead to complete obstruction. The majority, 75% of such obstructions, have been located in the left side of the colon, descending colon and the recto-sigmoid region making them accessible by colonoscopic means (data provided in the application).

Colonic stents in managing colorectal obstruction have been used since the last decade. Self-expanding metallic stents (SEMS) are the most common colonic stents. Absorbable stents are starting to be used for colonic indications. These have the benefit of reduced migration due to the fact that they are absorbed within approximately one month.

SEMS are expandable metallic tubes that are adopted for the relief of malignant colorectal obstruction, as a minimally invasive alternative procedure to open surgical techniques (Watt, 2007). Placement of a stent at the obstructed part of the colon allows management of the emergency and time to plan elective surgery, serving as a 'bridge to surgery'. In addition the stenting procedure can be used for palliative management of bowel obstruction among patients who suffer from incurable metastatic diseases and in whom major resections are not appropriate. The stenting technique can also be used to treat benign obstructions caused by conditions such as diverticular and Crohn disease, but SEMS are not listed on the ARTG for these conditions.

Colonic stents could be classified as metallic or non-metallic. In Australia in general only metallic stents are used; these can be 'covered' or 'uncovered'. Covered SEMS can be fully or partially covered, while the majority of stents used in Australia are of the uncovered type. Different types of metals or alloys can be used; all stents have a mesh design. They are deployed over a delivery catheter and self-expand once they are deployed due to radial force.

Stent migration, obstruction, tissue ingrowth and bowel perforation are adverse events which may be associated with stent deployment. According to expert clinician input, uncovered SEMS may reduce post-operative complications such as tissue reactions, hence minimising the risk of stent migration; while granulation tissue/tumour ingrowth may be less common with covered SEMS.

The metallic stents approved for use in Australia follow in Table 1(Watt et al, 2007). The stent which has been named as part of the application is ARTG 119517, which is estimated to have 85% of Australian market share. Expert clinical opinion suggests that there is little clinical difference between the stents currently available in the Australian market. However, while some of the listed stents may be used for obstruction caused by unspecified malignancy (ARTG numbers 119517, 157191), other stents are restricted to use in the case of obstructions caused specifically by colorectal cancer (ARTG numbers 139317, 144564, 167223). Duodenal stents are

also listed on the ARTG; however, expert input has confirmed that these would not be appropriate to use in the treatment of colorectal obstructions.

<b>ARTG No</b>	<b>Manufacture / Importer / Sponsor</b>	<b>Device name</b>	<b>GMDN</b>	<b>Intended purpose</b>
119517	*Boston Scientific Pty Ltd	Ultraflex™ Precision Colonic Stent System	38442 Unclassified	Palliative treatment of gastro-duodenal obstructions and colonic strictures produced by malignancy.
119517	*Boston Scientific Pty Ltd	Wallstent® Enteral colonic Endoprosthesis		
119517	*Boston Scientific Pty Ltd	WallFlex® Colonic Stents		
157191	William A. Cook Australia Pty Ltd	Cook Colonic Z-Stent® with induction system	37847 Colonic Stent	Palliative treatment for colonic, duodenal or gastric obstruction or strictures caused by malignant neoplasm, and to relieve large bowel obstruction prior to colectomy in patients with malignant strictures.
139317	William A. Cook Australia Pty Ltd		37847 Colonic Stent	Maintain patency of malignant colonic strictures.
144564	Endotherapeutics Pty Ltd.		37847 Colonic Stent	Palliative treatment of colonic strictures caused by malignant neoplasm in the rectum, sigmoid colon and descending colon.
167223	Device Technologies Australia Pty Ltd.		37847 Colonic Stent	Implanted for pre-operative obstruction relief prior to removal of colo-rectal carcinoma, designed to maintain the patency of colorectal strictures caused by malignant tumour.

\* Boston Scientific Pty Ltd WallFlex® Colonic Stents are new generation stents and account for 85% of Australian market share Ultraflex™ and Wallstent® are first generation stents

## **Administration, dose, frequency of administration, duration of treatment**

The colonic stents used in managing colorectal obstruction have been in use since the last decade. Placement of a stent at the obstructed part of the colon allows clinicians to manage an emergency situation and to plan an elective surgery. Emergency resection could lead to serious complications, if performed in patients who are already frail and suffering from significant comorbidities (NICE, 2004). In addition to using the stenting procedure as a ‘bridge to surgery’, it is also a palliative alternative for bowel obstruction among patients who suffer from incurable metastatic diseases or are medically unfit for major resections (for example patients who are unable to receive anaesthesia) (ACPGBI, 2007). A stent obviates the need for stoma or resection, and is usually effective for over a year and can often provide palliation until death.

Stenting of malignant colonic strictures is a minimally invasive endoscopic procedure requiring no incision. It is usual for colorectal stenting to be carried out under conscious sedation without general anaesthesia (Watt et al, 2007). The procedure takes between 30 – 90 minutes. Stent insertion would not be suitable for obstructions of the most proximal large bowel; deployment of the stent in the remaining parts of the colon is performed usually at hospitals equipped with resources in managing bowel obstructions. Thus, facilities with appropriately trained endoscopists, operating theatres, anaesthetists and radiology services would be necessary. The procedure is undertaken by a colorectal surgeon or gastroenterologist appropriately trained in

this procedure and certified by the Conjoint Committee for Recognition of Training in Gastrointestinal Endoscopy (CCRTGE). The deployment system consists of a wire or catheter. SEMS require an obstruction to hold them in place; if the obstruction becomes reduced as a result of medical management then the stent is likely to simply fall out.

Re-stenting (the placement of a second stent over the first stent) may occur in instances where tumour overgrowth occurs. Re-stenting would be also necessary in case of migration of a deployed stent. According to expert clinical input, re-stenting usually would be attempted up to two times, and is unlikely to be attempted a third time if the initial two attempts are unsuccessful.

## **Co-administered interventions**

A clinical diagnosis of bowel obstruction is to be confirmed by either CT scan or an abdominal radiograph. Excluding pseudo-obstruction is also an important step of the procedure and contrast enema (Gastrografin enema) or endoscopy (sigmoidoscopy) may be useful in this.

Once clinical diagnosis is confirmed, the stent can be deployed under fluoroscopic control, colonoscopic control or by the use of both techniques (Lieberman et al, 2000; Camunez et al, 2000; Saida, 1996). Abdominal radiography may be used at intervals in the first few days after stent placement to ascertain that the stent has remained correctly placed and that the obstructing lesion is patent.

Patients are likely to receive ongoing active medical management following the deployment of a stent. The medical management consists of chemotherapy, radiotherapy or a combination of these with either curative or palliative intent. According to expert clinical opinion, the exact type or combination of medical management received depends on the patients' status and is individually based.

The majority of stents used in Australia are uncovered SEMS due to the reduced incidence of post-operative complications such as tissue reactions, hence minimizing chances of stent migration. In case of migration, a migrated stent would be removed, and a new stent would be deployed across the obstructed part of the bowel. Placing one stent over another is also possible, if the initial stent becomes obstructed by granulation tissue or tumour.

## **Background**

### **Current arrangements for public reimbursement**

Surgical resection is the standard treatment for managing colorectal obstruction at present. Acute obstruction secondary to colorectal cancer is considered as a surgical emergency, and is associated with a higher risk than comparable elective surgery (McArdle & Hole, 2004).

Xinopoulos et al (2004) state that about 50% of patients presenting with malignant colorectal obstruction are eligible for curative resective surgery.

Table 2 shows current MBS item numbers related to resection and management of colorectal obstruction. Table 3 shows the number of services claimed for each item. Colostomy is the standard procedure for bowel obstruction caused by non-resectable cancers, even though stoma creation has a poor impact on patients' psychological wellbeing and could be a burden to carers, as well as the patient, during the final months of life (Karadag et al, 2003).

<b>MBS item no</b>	<b>Type of resection procedure</b>	<b>Fee (as of April 2011)</b>	<b>Benefit (as of April 2011)</b>
30375	Category no: 3 Therapeutic Procedures	\$501.50	75% = \$376.15
	MBS description: Caecostomy, Enterostomy, Colostomy, Enterotomy, Colotomy, Cholecystostomy, Gastrostomy, Gastrotomy, Reduction of intussusception, Removal of Meckel's diverticulum, Suture of perforated peptic ulcer, Simple repair of ruptured viscus, Reduction of volvulus, Pyloroplasty (adult) or Drainage of pancreas		
32024	Category no: 3 Therapeutic procedures	\$1,312.90	75% = \$984.70
	MBS description: RECTUM, HIGH RESTORATIVE ANTERIOR RESECTION WITH INTRAPERITONEAL ANASTOMOSIS (of the rectum) greater than 10 centimetres from the anal verge excluding resection of sigmoid colon alone not being a service associated with a service to which item 32103, 32104 or 32106 applies		
32033	Category no: 3 Therapeutic Procedures	\$1,450.30	75% = \$1,087.75
	MBS description: RESTORATION OF BOWEL following Hartmann's or similar operation, including dismantling of the stoma		
32009	Subtotal or total abdominal colectomy	\$1,312.90	75% = \$984.70
	Category no: 3 Therapeutic Procedures		
	MBS description: TOTAL COLECTOMY AND ILEOSTOMY		
32025	Category no: 3 Therapeutic procedures	\$1,756.15	75% = \$1,317.15
	MBS description: RECTUM, LOW RESTORATIVE ANTERIOR RESECTION WITH EXTRAPERITONEAL ANASTOMOSIS (of the rectum) less than 10 centimetres from the anal verge, with or without covering stoma not being a service associated with a service to which item 32103, 32104 or 32106 applies		
32026	Category no: 3 Therapeutic procedures	\$1,891.20	75% = \$1,418.40
	MBS description: RECTUM, ULTRA LOW RESTORATIVE RESECTION, with or without covering stoma, where the anastomosis is sited in the anorectal region and is 6cm or less from the anal verge		
32003	Category no: 3 Therapeutic procedures	\$1,037.95	75% = \$778.50
	MBS description: LARGE INTESTINE, resection of, with anastomosis, including right hemicolectomy		

The respective number of services utilized for each item number is shown in Table 3. Figures show a clear increment of demand and utilization from 1997 to 2010. However the above MBS item numbers could also be used to manage other indications including diverticular diseases, pelvic abscesses, Crohn disease and trauma in addition to malignant bowel obstructions. The application indicates that the vast majority of bowel resections performed are in the setting of non-obstructing elective resection of bowel cancer. As the same item numbers are used in the emergency setting, there is no way to determine from these figures the frequency with which resection is performed for colorectal obstruction. Use of each item could also depend on the level and cause of the obstruction, the patient's condition and severity of disease, as well as the surgeon's preference and expertise.

Financial year	30375	32024	32033	32009	32025	32026	32003	Total
2009/10	2,316	1,698	324	128	1,032	821	3,701	10,020
2008/09	2,196	1,717	332	129	995	808	3,544	9,721
2007/08	2,073	1,793	329	107	1,005	885	3,542	9,734
2006/07	1,987	1,714	291	119	988	828	3,358	9,285
2005/06	1,902	1,692	310	108	949	753	3,365	9,079
2004/05	1,931	1,624	298	113	964	719	3,135	8,784
2003/04	1,882	1,541	267	110	890	668	3,003	8,361
2002/03	1,934	1,559	281	90	879	665	3,125	8,533
2001/02	1,969	1,502	283	98	852	641	2,869	8,214
2000/01	2,041	1,378	220	97	836	597	2,832	8,001
1999/2000	2,032	1,300	233	64	686	459	2,579	7,353
1998/99	1,948	1,249	237	80	650	516	2,443	7,123
1997/98	1,981	1,152	286	84	687	434	2,420	7,044

## Regulatory status

Relevant colonic stents are listed on the ARTG (Table 1.).

## Patient population

Insertion of colonic stents is proposed for treatment of large bowel obstruction, stricture or stenosis in the following patient populations:

1. Patients diagnosed with colorectal cancer or cancer of an organ adjacent to the bowel:
  - a. Stent as a palliative measure for patients with incurable malignant large bowel obstruction with either chronic or acute co-morbidities, with or without metastasis.
  - b. Stent as a bridge-to-surgery, in case the patient's condition improves after insertion of a stent/s and subsequent surgical management is then indicated.
  
2. Patients presenting with large bowel obstruction of unknown diagnosis. This group of patients may not always be known to have cancer at the time of the bowel obstruction. Patients with non-malignant causes of obstruction such as Crohn disease and diverticulitis may also be part of this population:
  - a. Stent as a palliative measure for patients with incurable malignant or non-malignant obstruction with either chronic or acute co-morbidities, with or without metastasis.
  - b. Stent as a bridge-to-surgery, in case the patient's condition improves after insertion of a stent/s and subsequent surgical management is then indicated.

The subsequent surgical management of any stented patient may be any type of surgical intervention including curative surgery or non-curative surgery, single-stage resection or a multi-stage procedure.

For the purposes of the assessment, patients who can receive single stage colorectal resection should receive this option where appropriate; therefore the use of stents is not indicated in this population.

## **Proposed MBS listing**

Table 4 shows the proposed MBS item descriptor.

The 2010 proposed fee for the insertion of a colonic stent is \$650. The fee utilised for the assessment report needs to be indexed by 2011 and 2012 Wage Cost Index (WCI5) rate. According to the application, this fee includes the fee for colonoscopy to the point of obstruction, passage of a guide-wire across the obstruction under fluoroscopy and deployment of a colonic stent. The technical difficulty of this procedure exceeds that for deployment of an oesophageal or biliary stent. The relief of obstruction is accompanied by immediate and often dramatic passage of stool which can be extremely unpleasant for the proceduralist and other team members. Procedural duration ranges from 30-90 minutes.

It is suggested that the MBS item descriptor should not limit repeat use of stents. It is unlikely that re-stenting would be attempted on more than three occasions – if there were two or more failures, an alternative approach would be taken. However, it may be that stents would need to be inserted in separate locations in the same individual.

**Table 4: Proposed MBS item descriptor for insertion of colonic stents for large bowel obstruction, stricture or stenosis**

Category 3 – Therapeutic procedures
<p>MBS [item number]</p> <p>[Item descriptor]</p> <p>Endoscopic insertion of stent or stents for large bowel obstruction, stricture or stenosis, where cause of the obstruction is due to :</p> <ul style="list-style-type: none"> <li>- a pre-diagnosed colorectal cancer or cancer of an organ adjacent to the bowel.</li> <li>- an unknown diagnosis.</li> </ul> <p>(Anaes.)</p> <p>Fee: \$650</p> <p>[Relevant explanatory notes]</p> <p>*The fee for the insertion of a colonic stent covers the colonoscopy to the point of obstruction, stricture or stenosis, passage of a guide wire under fluoroscopy and deployment of a colonic stent.</p> <p>*Two colonic stents are listed on the ARTG for use in colonic obstruction caused by malignancy (ARTG numbers 119517, 157191). The remaining three colonic stents are listed for use in strictures caused by colorectal cancer (ARTG numbers 139317, 144564, 167223).</p> <p>* [REDACTED]</p> <p>* Anaes. item nos. 20810 and 23063 (or 23031, 23032, 23033, 23041, 23042, 23043, 23051, 23052, 23053, 23061, 23062) to be charged with the service accordingly.</p> <p>* The procedure is undertaken by a colorectal surgeon or gastroenterologist appropriately trained in this procedure and certified by the Conjoint Committee for Recognition of Training in Gastrointestinal Endoscopy (CCRTGE).</p>

According to departmental input, in the case of a failed attempt at stent insertion, there is a generic MBS item no (30001) to cover failed surgical interventions where 50% of the usual fee could be claimed.

If an obstruction or stenosis becomes reduced then a stent will likely simply fall out, as the stent required an obstruction to keep it in place. This may also occur in the case of stent migration. Therefore there is no need to have a specific MBS item number for stent removal.

## Clinical place for proposed intervention

Current clinical management of intestinal obstruction caused by colorectal cancer follows in Figure 1 and the proposed clinical management algorithm with the addition of stenting as an option follows in the Figure 2. In each case, the overall population with the relevant medical condition is divided into the colorectal obstruction (stricture or stenosis) due either to previously diagnosed cancer or of unknown diagnosis to make interpretation of the flowchart clinically meaningful. Although the structures of the clinical management algorithms appear similar across the two settings, this helps reflect differences in the proportions of patients suitable for each individual pathway across the two algorithms.

For the purposes of the flowchart, each population has then been further split into sub-populations – those medically fit for surgery and those medically unfit for surgery.

For those medically fit for surgery, there is a distinction between those patients for whom single stage surgery (resection) is intended to both cure them of their cancer and to remove the obstruction; and those patients for whom some other form of surgery is required. However, the figures include the possibility of movement to another form of surgery if the intended single-stage surgery needs to be changed for some reason during the procedure. In Figure 2, for patients who achieve cure through single stage surgery, insertion of a stent is not included as a relevant alternative option. Insertion of a stent is included as a relevant option for all other patients medically fit for surgery, whether colostomy or Hartmann's resection.

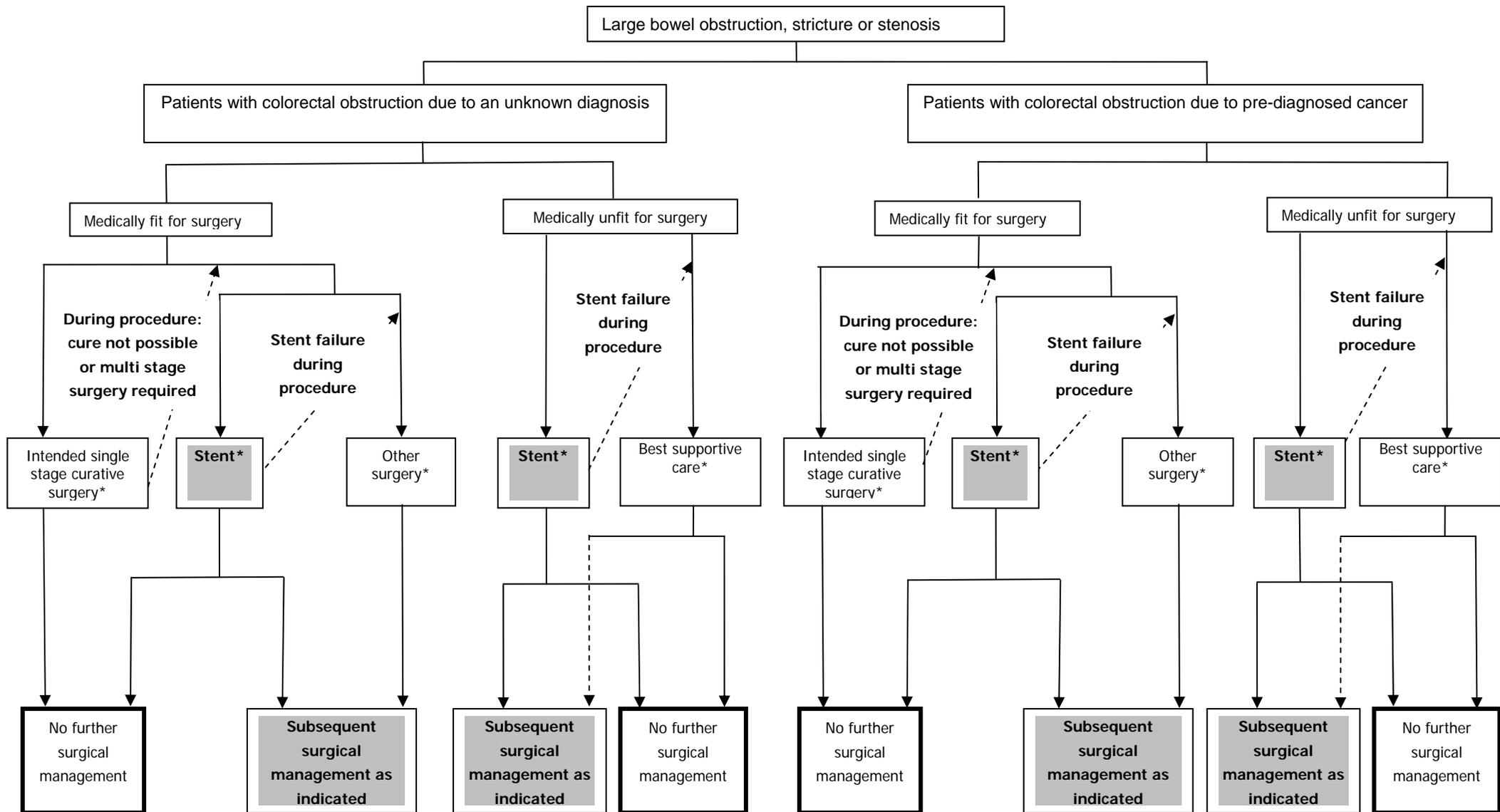
Colostomy is generally performed if the cancer is too advanced or patient is unfit due to comorbidities of the disease. Hartmann's resection is commonly performed in case of a less advanced cancer and when the patient is comparatively fitter.

For those patients medically unfit for any surgery, best supportive care (with any combination of chemotherapy, radiotherapy or palliation) currently provides the only option. In Figure 2, insertion of a stent would be a relevant alternative option to best supportive care. This group of patients still could improve due to ongoing active medical management.

Patients are likely to receive (or continue receiving) medical management following deployment of a stent. The medical management consists of chemotherapy, radiotherapy, palliation and/or combination of a few medical treatments. According to clinicians, the type of and combination of medical management received depends on each patient's status and is individually based.

Following an unsuccessful stent deployment, usually patients receive colostomy (majority) if they were to undergo surgery. In case of unsuccessful stent deployment due to bowel perforation, they would receive Hartmann's resection for correction according to expert clinical input. If the stent needs to be removed due to a complication, this would be also charged as a Hartmann's; alternatively if the stent migrates beyond the obstruction then it is likely to simply fall out.





Note

1. Other surgery: two and three staged resection techniques used in managing colorectal obstructions, strictures or stenosis. Hartmann's procedure and primary anastomosis could be performed by itself or together with staged surgical resections. Current MBS listed surgical resection techniques are listed in Table 2.
  2. Subsequent surgical management: any surgical intervention including single stage surgery and 'other' surgery.
  3. Best supportive care: conservative/clinical management of symptoms without surgical interventions.
- \* Patients would also receive chemotherapy, radiotherapy and/or palliation in addition to ongoing medical management. The type and combination of medical management received is individually based.

**Figure 2. Proposed clinical management algorithm**

## Comparator

### Surgical management

Surgical resection is the gold standard treatment in managing colorectal obstruction at present. It may be carried out as a one-stage, two-stage or even three-stage procedure. For right and left sided malignancies, a hemi-colectomy with anastomosis is preferably performed as a one-stage procedure: the diseased section of bowel is excised and removed, and the free ends of the bowel are re-joined during the same procedure to restore bowel function. According to clinical opinion, single stage resection and anastomosis is the preferred option for management of large bowel obstruction, but clearly not all patients or tumours are candidates for single stage surgery. This may relate to various factors including patient comorbidity, tumour stage or size, surgeon experience or expertise. Single stage surgery also requires greater surgical expertise (more than for elective surgery in general). In addition, due to its increased invasiveness, the morbidity of single stage surgery is potentially greater.

For distal left-sided malignancies, two-stage procedure may also be undertaken. A two-stage procedure involves resection of the bowel and the formation of a stoma, followed by a second operation to restore bowel continuity (Hartmann's procedure). Alternatively, the stoma may be closed during a third procedure (De Salvo et al, 2002). However, a significant proportion of patients receiving a staged procedure never undergo reversal of the colostomy (Mauro et al, 2000). Colostomy is generally performed if the cancer is too advanced or the patient is unfit due to comorbidities that may be unrelated to the cancer. Hartmann's resection is commonly performed in case of a less advanced cancer and when the patient is comparatively fitter. It is currently unclear whether a single or staged resection is safer or more effective, but it is clear that emergency surgery carries a higher risk than elective surgery (De Salvo et al, 2002; McArdle & Hole, 2004).

Currently MBS listed methods of resection are listed in Table 2 and Table 3 shows the number of services claimed for each item. Resection and anastomosis is the preferred practice for colonic cancers with obstruction, unless there is overwhelming sepsis with generalised peritonitis, or the patient is very frail and sick (CCA & ACN, 2005). Despite RCT data showing no significant benefit from the staged procedure, resection can be also performed by the Hartmann's technique with an end colostomy (De Salvo et al, 2002; CCA & ACN, 2005). Occasionally, a diverting loop ileostomy is used to protect the anastomosis after a segmental resection. NHMRC level of evidence III-2 studies suggest that primary anastomosis should be considered as a colectomy, with an ileocolic or ileorectal anastomosis. They also suggest primary anastomosis could be considered for left-sided obstruction and may need to be preceded by on-table colonic lavage. With primary anastomosis, the following options are available according to the Cancer Council Australia and Australian Cancer Network (2005):

- Appropriate resection and a primary anastomosis accompanied by on-table irrigation or a modified bowel preparation.
- Subtotal colectomy with ileorectal anastomosis.

### Best supportive care

While the majority of patients would be eligible for a type of curative or non-curative surgical resection, patients medically unfit for surgical management would receive best supportive care. The supportive care for cancer patients is the multi professional attention to the patient’s overall physical, social, psychosocial, spiritual and cultural needs, and should be available at all stages of the illness including death and into bereavement; for patients of all ages, and regardless of the current intention of any anti-cancer treatment. It helps the patient to maximize the benefits of treatment and to live as comfortably as possible (NICE, 2004; Ahmedzai et al, 2001). Best supportive care for patients who suffer from advanced gastrointestinal cancer should benefit both survival and quality of life by a combination of chemotherapy and supportive care (Ahmed et al, 2004). Therefore a patient who receives best supportive care could improve due to ongoing medical management.

### Other surgical management

In addition, the endoscopic ablation techniques such as cryotherapy, electrocoagulation, argon plasma coagulation and photodynamic therapy, Nd:YAG (Neodymium yttrium argon garnet) laser therapy have also been used in managing colorectal obstruction (Kimmey, 2004). Laser therapy could restore patency when used on its own; however, re-obstruction usually occurs quite rapidly. Balloon dilation and use of decompression tubes are other alternative treatments used in managing colorectal obstruction. According to clinical expert advice, these other surgical management techniques are rarely used in the Australian context, hence have not been considered as comparators in this review.

## Clinical claim

Table 5: Classification of an intervention for determination of economic evaluation to be presented

		Comparative effectiveness versus comparator					
		<u>Superior</u>		<u>Non-inferior</u>		<u>Inferior</u>	
Comparative safety versus comparator	<u>Superior</u>	CEA/CUA		<b>CEA/CUA</b>		<u>Net clinical benefit</u>	CEA/CUA
						<u>Neutral benefit</u>	CEA/CUA*
						<u>Net harms</u>	None^
	<u>Non-inferior</u>	CEA/CUA		CEA/CUA*		None^	
	<u>Inferior</u>	<u>Net clinical benefit</u>	CEA/CUA	None^		None^	
		<u>Neutral benefit</u>	CEA/CUA*				
<u>Net harms</u>		None^					

Abbreviations: CEA = cost-effectiveness analysis; CUA = cost-utility analysis

\* May be reduced to cost-minimisation analysis. Cost-minimisation analysis should only be presented when the proposed service has been indisputably demonstrated to be no worse than its main comparator(s) in terms of both effectiveness and safety, so the difference between the service and the appropriate comparator can be reduced to a comparison of costs. In most cases, there will be some uncertainty around such a conclusion (i.e., the conclusion is often not indisputable).

Therefore, when an assessment concludes that an intervention was no worse than a comparator, an assessment of the uncertainty around this conclusion should be provided by presentation of cost-effectiveness and/or cost-utility analyses.

^ No economic evaluation needs to be presented; MSAC is unlikely to recommend government subsidy of this intervention

## Outcomes and health care resources affected by introduction of the proposed intervention

### Outcomes

Stents will not cure cancer, which is the cause of obstruction, but they may reduce the frequency of obstructions or emergency resections. The following effectiveness and safety outcomes of the intervention have been identified.

### Effectiveness

#### Primary outcomes

- Quality of life, estimated overall as quality-adjusted life-years (QALY) gained

If a stent successfully deployed, patients would have higher quality of life compared to stoma creation, which has a poor impact on the patients' psychological wellbeing and could be a burden to carers, as well as the patient, during the final months of life (Karadag et al, 2003).

#### Secondary outcomes

- Technical and clinical success

Technical success of the stenting procedure can be defined as 'successful stent placement and deployment' whereas clinical success can be defined as 'colonic decompression within 96 hours without endoscopic or surgical reintervention after successful stent placement and deployment' (Khot et al, 2002). According to clinical expert advice technical success of this procedure is about 95%, while clinical success is approximately 90% in Australia.

A successful outcome from the comparative surgical resections, 'other surgery', could be defined as survival without medical or surgical complications according to the clinicians. An unsuccessful outcome of 'other surgery' is death or major complication as a result of such a surgical resection.

- Survival/mortality (eg. at 30 days)
- Temporary or permanent relief of obstruction
- Avoidance of multistage surgery
- Avoidance of emergency surgery
- Re-stenting
- Hospital and ICU stay
- Operating time

## Safety

- Procedure-related mortality

The procedure has a mortality risk of approximately 5%, according to the application.

- Morbidity
- Stent migration
- Bowel perforation
- Stent blockage, obstruction or re-obstruction
- Tumour ingrowth/overgrowth
- Haemorrhage
- Postoperative pain and/or discomfort
- Ulceration
- Fistula formation

Table 6 lists potential benefits of colonic stents according to the literature (Khot et al, 2002).

<b>Table 6. Potential benefits of colonic stent insertion</b>
- Reduce overall length of ICU and hospital stay
- Reduce postoperative morbidity and mortality
- Reduce risk of complications
- (Minimal or) no need for abdominal incisions, bowel resection or stoma formation
- Allow time for bowel preparation and elective surgery
- Temporary or permanent relief of obstruction.
- Able to eat immediately after the procedure
- Save number of resections in managing obstructions

## Health care resources

The application estimates annual stent deployment using data from the Australian Cancer Registry (AIHW, 2004). This has been adapted to reflect the latest Australian Cancer Registry (AIHW, 2010) data. Accordingly, out of 14,000 new cases of colorectal cancer, approximately 20% (about 2,800) are estimated to present with obstruction. Nearly 75% of these 2800 patients (approximately 2100) will have left sided malignancies amenable to endoscopic management. One third of these would have metastatic diseases (700) and another 20% (400) would be medically unfit for single stage surgery. Overall, approximately 1,100 patients per year would be suitable for stenting. Allowing for existing local variability in expertise and facilities, as well as individual surgeon or patient bias and preference, the assumption of an annual stent deployment rate of 575-625 as provided in the application appears to be a fair estimate.

According to the application, in 90% of cases, stenting will replace emergency abdominal surgery. Following stenting, in about 10% cases, patients will require surgery for failed stent placement. A further 10% will return for definitive surgery after initial decompression. Assuming 90% technical success, one would expect 550 fewer emergency abdominal procedures per year (either Hartmann's procedure, anterior resection with antegrade colonic lavage or laparotomy with formation of colostomy/ileostomy) performed for large bowel obstruction. Approximately 10% of stents currently used are deployed as a bridge to definitive surgery, and therefore patients will ultimately return for single stage resection. Previously the majority of these patients would have required two stage surgery (Hartmann's procedure and reversal of Hartmann's procedure).

Stenting of malignant colonic strictures is a minimally invasive endoscopic procedure requiring no incision. The procedure would take 30 – 90 minutes according to the application. Deployment of the stent at the obstructed part of the colon is usually performed in hospitals equipped with resources in managing bowel obstructions. Thus, facilities with appropriately trained endoscopists, operating theatres, anaesthetists and radiology services would be necessary. The procedure is undertaken by a colorectal surgeon or gastroenterologist appropriately trained in this procedure. Nursing staff with endoscopy training, radiography staff and equipment for fluoroscopy also would be necessary.

The proposed fee for the insertion of colonic stent is \$650 as for 2010. According to the application, this fee includes the fee for colonoscopy to the point of obstruction, passage of a guide-wire across the obstruction under fluoroscopy and deployment of a colonic stent. The technical difficulty of this procedure exceeds that for deployment of an oesophageal or biliary stent. The relief of obstruction is accompanied by immediate and often dramatic passage of stool which can be extremely unpleasant for the proceduralist and other team members.

Given that 10% of procedures will be unsuccessful, a separate fee may be appropriate where a guide-wire cannot be passed across the obstruction. However, according to the Department of Health And Ageing, a generic MBS item no (30001) is currently available to cover failed surgical interventions, such as failed insertion of colonic stents, where 50% of the usual fee could be paid. The attempt to pass a guide-wire may take up to 45 minutes before abandoning the attempt. The fee for flexible sigmoidoscopy (32084) does not adequately remunerate this attempt or the additional resources required to perform this procedure.

The above conclusions in relation to demand for colonic stents in the Australian context, effectiveness of the intervention and health care resources requirements are based on unreferenced data provided in the application. Clinician input has supported these assumptions and calculations; however, a systematic review of the literature would verify these data.

Table 7 shows the resources to be considered for the economic analysis. Note that all costs used shall be updated according to the time at which the economic modelling is undertaken, using actual data or indexation as available.

**Table 7: List of resources to be considered in the economic analysis** (Table to be completed during the assessment)

	Provider of resource	Setting in which resource is provided	Proportion of patients receiving resource	Number of units of resource per relevant time horizon per patient receiving resource	Disaggregated unit cost(\$)					
					MBS	Safety nets*	Other govt budget	Private health insurer	Patient	Total cost
<u>Resources provided to identify eligible population</u>										
- Colonoscopy										
- Radiology										
- Pathology										
<u>Resources provided to perform the surgery (MBS items)</u>										
- Laparotomy (30375)					501.50					
- Rectum, high anterior resection and antegrade colonic lavage (32024)					1,312.90					
- Hartmann's procedures (32033)					1,450.30					
- Total abdominal colectomy and ileostomy (32009)					1,312.90					
- Rectum, low restorative anterior resection with extra peritoneal anastomosis(32025)					1,756.15					
- Rectum, ultra-low restorative resection (32026)					1,891.20					
- Resection of large intestine (32003)					1,037.95					
<u>Resources provided in association with performing the surgery</u>										
- Surgeon										
- Assistant surgeon*										
- Anaesthetist										
- Initiation of management of anaesthesia (20840)					114.30					
- X to Y hours of anaesthesia (refer to 23063 or similar)					114.30					
- Nurses										
- Hospital stay (eg. 10 days)										
- Radiology										
<u>Resources provided to deliver best supportive care</u>										
- Hospital stay										
- Chemotherapy										
- Radiotherapy										
- Palliation										
<u>Resources provided in association with best supportive care</u>										
- Nurses										
<u>Resources provided to deliver proposed intervention</u>										

	Provider of resource	Setting in which resource is provided	Proportion of patients receiving resource	Number of units of resource per relevant time horizon per patient receiving resource	Disaggregated unit cost(\$)					
					MBS	Safety nets*	Other govt budget	Private health insurer	Patient	Total cost
<b>Staff</b>										
- Proceduralist (Colorectal surgeon or gastroenterologist)										
- Anaesthetist										
Initiation of management of anaesthesia (20810)					76.20					
1:26 to 1:30 hours of anaesthesia (23063)					114.30					
-Two nurses										
-Radiographer										
<b>Disposal equipment</b>										
- Colonic stent										2,500 - 3,000
- Guide wire										375
- Cannula/catheter										75
- Dye for injection/ Ultravist contrast										25
<b>Other</b>										
- Stenting procedure					650					
-Theatre facilities										
-Hospital stay (eg. 5 days)										
<b>Resources provided in association with proposed intervention</b>										
<b>Staff</b>										
-Endoscopist										
<b>Prerequisite equipment</b>										
-Image intensifier										
-Fluoroscopy /Colonoscopy & Tower										
* Expert clinical opinion noted that the Assistant Surgeons fee is usually 1/5 of the Surgeons fee.										

## Proposed structure of economic evaluation

**Table 8: Summary of extended PICO to define questions for public funding that assessment will investigate**

Patient population	Intervention	Comparator	Outcomes preferred for assessment	Healthcare resources to be considered
1. Management of patients with obstruction, stricture or stenosis due to unknown diagnosis, medically fit for surgery, for whom single-stage surgery (resection) is not appropriate or not successful	<p>Metallic stents*, particularly SEMS</p> <ul style="list-style-type: none"> <li>• Either as a bridge to surgery</li> <li>• Or as a definitive procedure (that is the stent is used as a palliative intervention)</li> </ul> <p>In all cases, stent migration may occur, or re-stenting may be required</p>	Other surgery (e.g. – colostomy or Hartmann’s resection) *	<p>Primary outcome: QALY</p> <p>Secondary outcomes: Mortality (eg at 30 days) Avoidance of multi-stage surgery Temporary or permanent relief of obstruction Technical success (stent insertion) Re-stenting All safety and complications, including stent migration. (adverse events)</p>	Refer Table 7.
2. Management of patients with obstruction, stricture or stenosis due to unknown diagnosis, medically unfit for surgery		Best supportive care *	<p>Primary outcome: QALY</p> <p>Secondary outcomes: Mortality (eg at 30 days) Also all other secondary outcomes as listed above</p>	
3. Management of patients with obstruction, stricture or stenosis caused by confirmed cancer, medically fit for surgery, for whom single-stage surgery (resection) is not appropriate or not successful		Other surgery (non-curative, e.g. colostomy or Hartmann’s resection) *	<p>Primary outcome: QALY</p> <p>Secondary outcomes: Mortality (eg at 30 days) Also all other secondary outcomes as listed above</p>	
4. Management for patients with obstruction, stricture or stenosis caused by confirmed cancer, medically unfit for surgery		Best supportive care *	<p>Primary outcome: QALY</p> <p>Secondary outcomes: Mortality (eg at 30 days) Also all other secondary outcomes as listed above</p>	
* Patients are also likely to receive ongoing medical management. The medical management consists of chemotherapy, radiotherapy, palliation and/or combination of a few medical treatments. According to expert clinical opinion, the type and combination of medical management received depends on each patient’s status and is individually based.				

The PICO for this assessment has been further refined from Figure 2 to four main groups of patients. For the purposes of the assessment, patients who can receive single stage colorectal resection should receive this curative option where appropriate; therefore the use of stents is not indicated in this population unless the plan to perform a single stage colorectal resection has to be changed during the procedure.

For healthcare resources to be considered please see Table 7.

## Questions for public funding

### Population 1

In the management of patients with colorectal obstruction, stricture or stenosis due to an **unknown diagnosis**, medically **fit** for surgery, what is the safety, effectiveness and cost-effectiveness of colonic stents with or without active medical management (eg chemotherapy) compared with **other surgery** with or without active medical management?

### Population 2

In the management of patients with colorectal obstruction, stricture or stenosis due to an **unknown diagnosis**, medically **unfit** for surgery, what is the safety, effectiveness and cost-effectiveness of stents with or without active medical management (eg chemotherapy) compared with **best supportive care** with or without active medical management.

### Population 3

In the management of colorectal obstruction, stricture or stenosis in patients with **confirmed cancer**, medically **fit** for surgery, what is the safety, effectiveness and cost-effectiveness of colonic stents with or without active medical management (eg chemotherapy) compared with **other surgery** with or without active medical management?

### Population 4

In the management of colorectal obstruction, stricture or stenosis in patients with **confirmed cancer**, medically **unfit** for surgery, what is the safety, effectiveness and cost-effectiveness of colonic stents with or without active medical management (eg chemotherapy) compared with **best supportive care** with or without active medical management?

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