# Systematic review report for question COLMNG5

## Clinical Question:

What are the benefits of stenting or colostomy vs. acute resection with primary anastomosis in acute obstruction due to left-sided colon or rectal carcinoma?

## PICO Question:

*In patients diagnosed with colorectal cancer and acute obstruction, does stenting or colostomy achieve equivalent or better outcomes compared to acute resection with primary anastomosis?*

| Population | Intervention | Comparator | Outcomes |
|---|---|---|---|
| Patients diagnosed with colorectal cancer and acute obstruction (due to left-side colon cancer or rectal cancer) | - Stenting, or<br>- Colostomy, or<br>- Hartmann's procedure | Acute surgical resection with primary anastomosis | - Perioperative mortality<br>- Perioperative morbidity<br>- 5 year survival<br>- Cancer specific survival<br>- Length of hospital stay<br>- Stoma rate (temporary or permanent)<br>- Quality of life<br>- Adverse events |

# 1. Methods

### 1.1. Guidelines

Relevant recent (2005 onwards) guidelines were identified by scanning the citations identified by the literature search and searching the National Guideline Clearinghouse (http://guideline.gov/) and the Guidelines Resource Centre (www.cancerview.ca).

To be considered for adoption guidelines had to meet the pre-specified criteria of scores of greater or equal to 70% for the domains rigour of development, clarity of presentation and editorial independence of the AGREE II instrument (http://www.agreetrust.org/resource-centre/agree-ii/).

### 1.2. Literature Search

Pubmed (01/01/2004 – 31/08/2016), Embase (01/01/2004 – 31/08/2016), CINAHL (01/01/2004 – 31/08/2016), PsycINFO (01/01/2004 – 31/08/2016), Cochrane Database of Systematic Reviews (01/01/2004 – 31/08/2016), Database of Abstracts of Reviews of Effects and Health Technology Assessment databases (up until August 2016) were searched using text terms and, where available, database specific subject headings. Each database was searched for articles dealing with colorectal cancer. In PubMed, Embase, CINAHL and PsycINFO databases the colorectal cancer search was coupled with a search for stents, colostomy, Hartmann's Procedure, obstruction and database specific filters for identifying randomised controlled trials/ systematic review and meta-analyses were then applied. To identify studies which considered Aboriginal and Torres Strait Islanders (ATSI) these searches were then coupled with search terms for ATSI. A complete list of the terms used for all search strategies are included as Appendix A. Reference lists of all relevant articles were checked for potential additional articles.

### 1.3. Inclusion and exclusion criteria

| Selection criteria | Inclusion criteria | Exclusion criteria |
|---|---|---|
| **Study type** | Intervention | |
| **Study design** | Systematic reviews of Level II evidence or randomised controlled trials | |
| **Population** | Patients diagnosed with colorectal cancer and acute obstruction (due to left-side colon cancer or rectal cancer) | Colorectal cancer patients without acute obstruction, metastatic and palliative patients |
| **Intervention** | - Stenting, or<br>- Colostomy, or<br>- Hartmann's procedure | |
| **Comparator** | Acute surgical resection with primary anastomosis | |
| **Outcomes** | - Perioperative mortality<br>- Perioperative morbidity<br>- 5 year survival<br>- Cancer specific survival<br>- Length of hospital stay<br>- Stoma rate (temporary or permanent)<br>- Quality of life<br>- Adverse events | |
| **Language** | English | |
| **Publication period** | From 1/01/2004 to 31/08/2016 | |

## 2. Results

### 2.1. Guidelines

A total of 9 potentially relevant guidelines were identified. However, all 9 were not included as they did not meet the pre-specified criteria. A complete list of guidelines excluded and why, are included in Appendix C.

### 2.2. Results of Literature Search

Figure 1 outlines the process of identifying relevant articles for the systematic review. The Embase search found 985 citations, the Pubmed search found 334 citations, the CINAHL search 94 citations and the search of the Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects and Health Technology Assessment database identified an additional 62 citations, resulting in a total of 1475 citations. There were no citations found in PsycINFO. Titles and abstracts were examined and 101 articles were retrieved for a more detailed evaluation. No additional potential citations were identified from the reference list of retrieved articles.

There were no studies of ATSI men that met the inclusion criteria.

The retrieved articles that were not included and the reason for their exclusion are documented in Appendix C. In summary, most articles were excluded because they had used an inappropriate study design (not of level II evidence or higher), included patients with palliative and metastatic diseases, included patients without obstruction and compared the intervention to an inappropriate comparator.

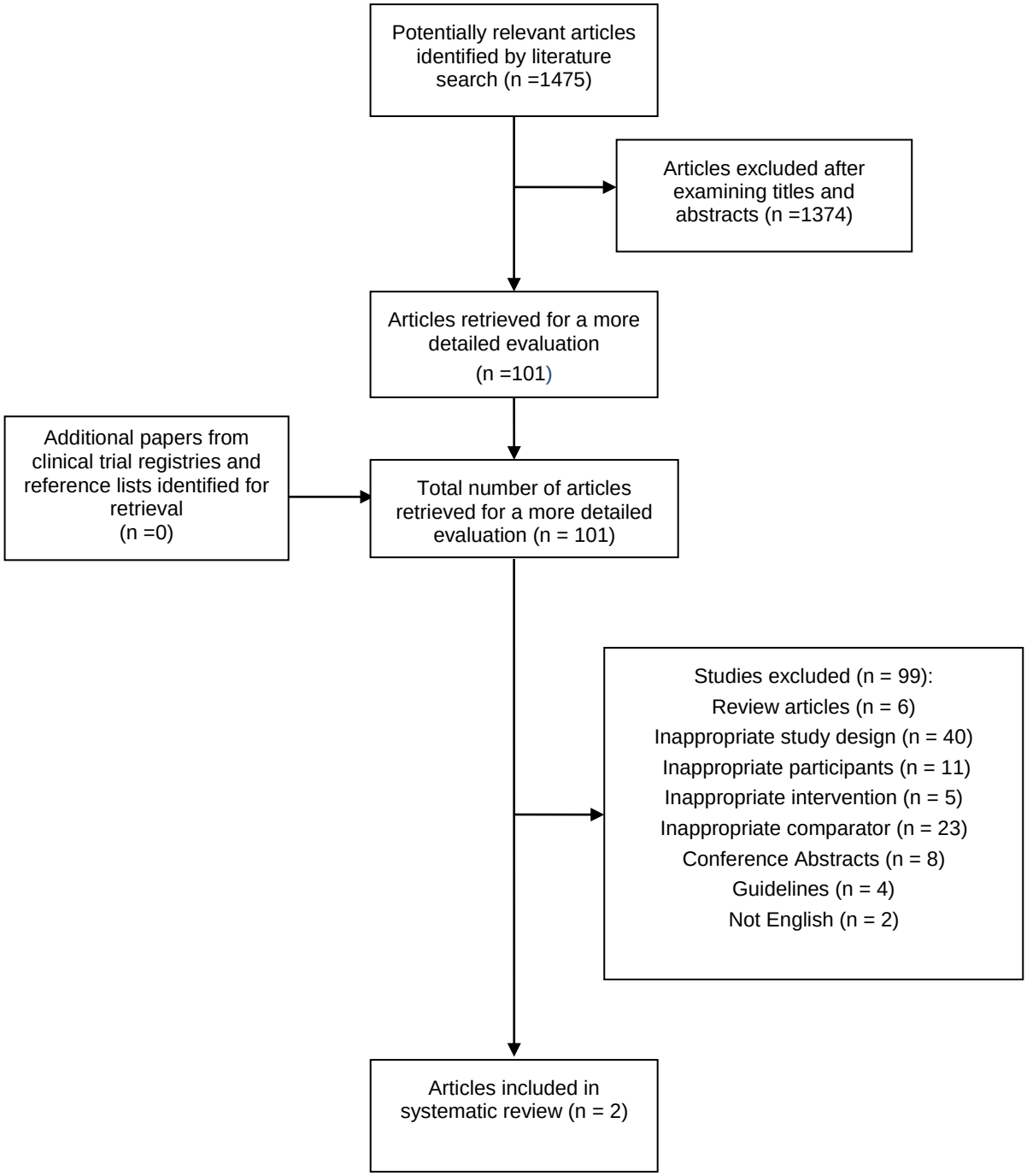


**Figure 1.** Process of inclusion and exclusion of studies

### 2.3. Study Characteristics

Characteristics of included studies are described below.

**Table 1:** Included studies examining stenting for improving outcomes in colorectal cancer patients with acute obstruction: study characteristics.

| Study | Participants | Design | Intervention | Comparison | Outcomes | Comments |
|---|---|---|---|---|---|---|
| **Ghazal 2013**<br><br>(Egypt) | Patients presenting with acute left colonic obstruction, confirmed via computed tomography<br><br>**Age:** 35-68 years<br>**Median age:** 44 years<br><br>**Female**: 37 (61.7%)<br>**Male**: 23 (38.3%)<br><br>**Median follow up** = 18 months<br><br>**Trial duration**: 3.4 years<br><br>**N = 60** | RCT | Emergency stenting followed by elective resection<br><br>**Age:** 37-68yrs<br>**Median age:** 52yrs<br><br>**Female:** 18 (60%)<br>**Male**: 12 (40%)<br><br>**TNM 1:** 6 (20%)<br>**TNM 2:** 19 (63.3%)<br>**TNM 3:** 5 (16.7%)<br><br>**N: 30** | Total abdominal colectomy and ileorectal anastomosis<br><br>**Age**: 35-66yrs<br>**Median age**: 51yrs<br><br>**Female**: 19 (63.3%)<br>**Male:** 11 (36.7%)<br><br>**TNM 1**: 7 (23.3%)<br>**TNM 2:** 19 (63.3%)<br>**TNM 3**: 4 (13.3%)<br><br>**N: 30** | **Primary:**<br>*Mean intraoperative blood loss, mean operative time (min), patients needing blood transfusions and fresh frozen plasma, bowel motion per day, median hospital stay, Adverse events: wound infection, anastomotic leakage, recurrent disease (local recurrence, organ metastases), chest infections.*<br><br>**Secondary:**<br>*Stent Success* | Patients were excluded from this study if they had distal rectal cancer less than 8cm from anal verge, patients with signs of peritonitis, presence of metastatic disease. |

*N = number of participants; RCT = randomised controlled trial; TNM = tumour, node, metastasis; min = minutes; yrs = years cm = centimetres*

**Table 2:** Included studies examining stenting for improving outcomes in colorectal cancer patients with acute obstruction: study characteristics.

| Study | Participants | Design | Intervention | Comparison | Outcomes | Comments |
|---|---|---|---|---|---|---|
| **Alcantara 2011**<br><br>(Spain) | Patients were included with obstructive left sided colonic cancer as confirmed by computed tomography and aged ≥18 years.<br><br>**Mean age:** ±71 years<br><br>**Female**: 22 (57%)<br>**Male**: 16 (43%)<br><br>**Mean follow up:** 37.6 months<br><br>**Trial duration:** 2.9 years<br><br>**N = 38** | RCT | Stent placement before elective surgery<br><br>**N = 15** | Emergency surgery with intraoperative colonic lavage and primary anastomosis<br><br>**N = 13** | **Primary:**<br>*Postoperative morbidity and mortality (In-hospital mortality, overall in hospital morbidity), anastomotic dehiscence, postoperative hospital stay, hospital stay overall, operation time, reoperations, surgical site infection, overall complications related to stent placement*<br><br>**Secondary:**<br>*Long term survival, disease free period, relapses, stent success* | 14% stage IV, with resectable hepatic metastases which were operated on as scheduled surgery during follow-up. Terminated early due to high complications in comparator group.<br><br>**Exclusion criteria:** unresectable lesion (intraoperative), severe ischemia or cecal perforation, fecal or advanced purulent peritonitis, hemodynamic instability during surgery, immunodepressed state, septic shock |

*N = number of participants; RCT = randomised controlled trial; TNM = tumour, node, metastasis; IV = intravenous*

### 2.4. Study risk of bias

**Table 3:** Methodological risk of bias of included randomised controlled trials (n = 2)

| Risk of bias categories | N (%) |
|---|---|
| I. Was the allocation sequence adequately generated? | |
| LOW = a random component in the sequence generation process | 1 (50%) |
| HIGH = a non-random component in the sequence generation process | 0 (0%) |
| UNCLEAR = Insufficient information about the sequence generation process | 1 (50%) |
| II. Was allocation adequately concealed? | |
| LOW = Participants and investigators could not foresee assignment | 2 (100%) |
| HIGH = Participants and investigators could possibly foresee assignments | 0 (0%) |
| UNCLEAR = Insufficient information to permit judgement | 0 (0%) |
| III. Was knowledge of the allocated interventions adequately prevented during the study? | |
| LOW = Blinding of participants and key study personnel ensured | 0 (0%) |
| HIGH = No blinding or incomplete blinding | 0 (0%) |
| UNCLEAR = Insufficient information to permit judgement | 2 (100%) |
| IV. Were incomplete outcome data adequately addressed? | |
| LOW = No missing outcome data (LOW) | 2 (100%) |
| HIGH = Reason for missing outcome data likely to be related to true outcome | 0 (0%) |
| UNCLEAR = Insufficient reporting of attrition/exclusions to permit judgement | 0 (0%) |
| V. Are reports of the study free of suggestion of selective outcome reporting? | |
| LOW = study protocol is available and all of the study's pre-specified outcome | 2 (100%) |
| HIGH = Not all of the study's pre-specified primary outcomes have been reported | 0 (0%) |
| UNCLEAR = Insufficient information to permit judgement | 0 (0%) |
| VI. Was the study apparently free of other problems that could put it at a risk of bias? | |
| LOW = study appears to be free of other sources of bias | 2 (100%) |
| HIGH = There is at least one important risk of bias | 0 (0%) |
| UNCLEAR = Insufficient information to assess | 0 (0%) |

**Table 4:** Risk of bias summary assessments of included randomised controlled trials (n = 2)

| Trial/article(s) | Outcome | Random sequence generation | Allocation concealment | Blinding | Incomplete outcome data | Selective outcome reporting | Other sources of bias | Overall risk of bias |
|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013** | Perioperative Morbidity | Low | Low | Unclear | Low | Low | Low | At risk |
| | Length of Hospital stay | Low | Low | Unclear | Low | Low | Low | At risk |
| | Overall Mortality | Low | Low | Unclear | Low | Low | Low | At risk |
| **Alcantara 2011** | Perioperative Morbidity | Unclear | Low | Unclear | Low | Low | Low | At risk |
| | Length of Hospital stay | Unclear | Low | Unclear | Low | Low | Low | At risk |
| | Overall Survival (59 months) | Unclear | Low | Unclear | Low | Low | Low | At risk |
| | Hospital Mortality | Unclear | Low | Unclear | Low | Low | Low | At risk |

**Key to overall risk of bias rating**
**Low risk of bias:** A study rated at low risk of bias for all domains
**At risk of bias:** A study rated at high or unclear risk of bias for one or more domains

### 2.5. Outcomes

As there were no papers found on the effects of colostomy or Hartmann's Procedure in comparison to acute resections with anastomosis, only outcomes of stenting interventions are described in Tables 5-9.

**Table 5:** Results of RCTs comparing stenting to acute resection with primary anastomosis in colorectal cancer patients with acute obstruction.

| Study | Outcome | N actual | Stenting % (n) | Acute resection with primary anastomosis % (n) | Size of effect | CI (95%) | p-value[a] | Follow up |
|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013** | **Perioperative mortality** Overall mortality | 59 | 0 (0) N = 29 | 0 (0) N = 30 | NR | NR | NR | 18 months (median) |
| **Alcantara 2011** | **Perioperative mortality** Hospital mortality | 28 | 0 (0) N = 15 | 8 (1) N = 13 | NR | NR | 0.464 | 37.6 months (mean) |

*N = number, NR = not reported, CI = confidence interval, [a]p-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**Table 6:** Results of RCTs comparing stenting to acute resection with primary anastomosis in colorectal cancer patients with acute obstruction.

| Study | Outcome | N actual | Stenting % (n) | Acute resection with primary anastomosis % (n) | Size of effect | CI (95%) | p-value[a] | Follow up |
|---|---|---|---|---|---|---|---|---|
| **Alcantara 2011** | **Survival at 59 months** | 28 | 58 (9) N = 15 | 70 (9) N = 13 | NR | NR | 0.843 | 59 months |

*N = number, NR = not reported, CI = confidence interval, SD = standard deviation, [a]p-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**Table 7:** Results of RCTs comparing stenting to acute resection with primary anastomosis in colorectal cancer patients with acute obstruction.

| Study | Outcome | N actual | Stenting % (n) | Acute resection with primary anastomosis % (n) | Size of effect | CI (95%) | p-value[a] | Follow up (median) |
|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013** | **Perioperative Morbidity**<br>Mean intraoperative blood loss ± SD | 59 | 250±75.6 ml<br>N = 29 | 500±95.5 ml<br>N = 30 | NR | NR | 0.010 | 18 months |
| | Patients needing blood transfusions | 59 | 45 (13)<br>N = 29 | 73 (22)<br>N = 30 | NR | NR | 0.035 | |
| | Patients needing fresh frozen plasma | 59 | 10 (3)<br>N = 29 | 83 (25)<br>N = 30 | NR | NR | 0.010 | |
| | Median bowel motions per day (range) | 59 | 2 (1-3)<br>N = 29 | 6 (3-11)<br>N = 30 | NR | NR | 0.013 | |
| | Wound infection | 59 | 10 (3)<br>N = 29 | 30 (9)<br>N = 30 | NR | NR | 0.022 | |
| | Anastomotic leakage | 59 | 0 (0)<br>N=29 | 3 (1)<br>N = 30 | NR | NR | 1 | |
| | Chest infection | 59 | 3 (1)<br>N = 29 | 17 (5)<br>N = 30 | NR | NR | 0.098 | |
| | Recurrent disease | 59 | 17 (5)<br>N = 29 | 13 (4)<br>N = 30 | NR | NS | 0.228 | |

*N = number, NR = not reported, CI = confidence interval, SD = standard deviation, ml = millilitre, [a]p-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**Table 8:** Results of RCTs comparing stenting to acute resection with primary anastomosis in colorectal cancer patients with acute obstruction.

| Study | Outcome | | N actual | Stenting % (n) | Acute resection with primary anastomosis % (n) | Size of effect | CI (95%) | p-value[a] | Follow up (mean) |
|---|---|---|---|---|---|---|---|---|---|
| **Alcantara 2011** | **Perioperative Morbidity**<br>Overall perioperative morbidity | | 28 | 13 (2)<br>N = 15 | 54 (7)<br>N = 13 | NR | NR | 0.042 | 37.6 months |
| | Global-surgical space infection (SSI) | | 28 | 13 (2)<br>N = 15 | 46 (6)<br>N = 13 | NR | NR | 0.096 | |
| | Global-surgical space infection | Superficial | 28 | 13 (2)<br>N = 15 | 15 (2)<br>N = 13 | NR | NR | 1 | |
| | | Deep | | 0 (0)<br>N = 15 | 0 (0)<br>N = 13 | NR | NR | 1 | |
| | | Organ space | | 0 (0)<br>N = 15 | 31 (4)<br>N = 13 | NR | NR | 0.035 | |
| | Anastomotic leakage | | 28 | 0 (0)<br>N = 15 | 31 (4)<br>N = 13 | NR | NR | 0.035 | |
| | Seroma | | 28 | 0 (0)<br>N = 15 | 8 (1)<br>N = 13 | NR | NR | 0.464 | |
| | Ileus | | 28 | 0 (0)<br>N = 15 | 15 (2)<br>N = 13 | NR | NR | 0.206 | |
| | Evisceration | | 28 | 0 (0)<br>N = 15 | 8 (1)<br>N = 13 | NR | NR | 0.464 | |
| | Reoperation | | 28 | 0 (0)<br>N = 15 | 31 (4)<br>N = 13 | NR | NR | 0.035 | |
| | Tumour reappearance | | 28 | 53 (8)<br>N = 15 | 15 (2)<br>N = 13 | NR | NR | 0.055 | |

*N = number, NR = not reported, CI = confidence interval, [a]p-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**Table 9:** Results of RCTs comparing stenting to acute resection with primary anastomosis in colorectal cancer patients with acute obstruction.

| Study | Outcome | N actual | Stenting (days) | Acute resection with primary anastomosis (days) | Size of effect | CI (95%) | p-value[a] | Follow up (mean) |
|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013** | **Length of hospital stay**<br>Median number of days in hospital | 59 | 13 days<br>N = 29 | 8 days<br>N = 30 | NR | NR | 0.102 | 18 months (median) |
| **Alcantara 2011** | **Length of hospital stay**<br>Overall median (IQR) number of days in hospital | 28 | 13 (3) days<br>N = 15 | 10 (10) days<br>N = 13 | NR | NR | 0.105 | 37.6 months |
| | **Postoperative hospital stay**<br>Postoperative median (IQR) number of days in hospital | 28 | 8 (3) days<br>N = 15 | 10 (10) days<br>N = 13 | NR | NR | 0.05 | 37.6 months |

*N = number, NR = not reported, CI = confidence interval, IQR = interquartile range, [a]p-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

## 2.6 Body of Evidence

As there were no papers found on the effects of colostomy or Hartmann's Procedure in comparison to acute resections with anastomosis, only effects of stenting interventions on outcomes are described in Tables 10-14.

### I Colorectal Cancer Perioperative Morbidity

**Table 10.** Body of evidence examining stenting on perioperative colorectal cancer morbidity in curative patients with obstructive tumours.

| Name of study | Study type | Level of evidence[a] | Risk of bias | N | Results summary | Size of effect rating[a] | p value[b] | CI (95%) | Relevance of evidence[a] |
|---|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013**<br><br>**Age:** 35-68yrs<br>**Median age:** 44yrs<br><br>**Female**: 37 (61.7%)<br>**Male**: 23 (38.3%)<br><br>**Median follow up**: 18 months<br><br>**Trial duration**: 3.4 years | RCT | II | At risk | 59 | **Mean intraoperative blood loss ± SD:**<br>S: 250±75.6 ml A: 500±95.5 ml | NR | 0.010 | NR | 2 |
| | | | | 59 | **Patients needing blood transfusions (%):**<br>S: 45 A: 73 | NR | 0.035 | NR | 2 |
| | | | | 59 | **Patients needing fresh frozen plasma (%):**<br>S: 10 A: 83 | NR | 0.010 | NR | 2 |
| | | | | 59 | **Median bowel motions per day:**<br>S: 2 A: 6 | NR | 0.013 | NR | 2 |
| | | | | 59 | **Anastomotic leakage (%):**<br>S: 0 A: 3 | NR | 1 | NR | 1 |
| | | | | 59 | **Wound infection (%):**<br>S: 10 A: 30 | NR | 0.022 | NR | 1 |
| | | | | 59 | **Recurrent Disease (%):**<br>S: 17 A: 13 | NR | 0.228 | NR | 1 |
| | | | | 59 | **Chest Infection (%):**<br>S: 3 A: 17 | NR | 0.098 | NR | 1 |

*S = stenting; A= anastomosis; NR = not reported; NS = not statistically significant; SD = standard deviation, ml = millilitre, RCT = randomized controlled trial;*
*[a]Refer to appendix B for detailed explanations of rating scores; [b] P-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**Table 11.** Body of evidence examining stenting on perioperative colorectal cancer morbidity in curative patients with obstructive tumours.

| Name of study | Study type | Level of evidence[a] | Risk of bias | N | Results summary | | Size of effect rating[a] | p value[b] | CI (95%) | Relevance of evidence[a] |
|---|---|---|---|---|---|---|---|---|---|---|
| **Alcantara 2011** | RCT | II | At risk | | **Overall morbidity (%):** | | | | | |
| | | | | 28 | S: 13 A: 54 | | NR | 0.042 | NR | 1 |
| **Mean age:** ±71 years | | | | | **Subgroup analysis:** | | | | | |
| | | | | 28 | Anastomotic Leakage | S: 0 A: 31 | NR | 0.035 | NR | 1 |
| **Female**: 22 (57%) | | | | 28 | Seroma | S: 0 A: 8 | NR | 0.464 | NR | 1 |
| **Male**: 16 (43%) | | | | 28 | Ileus | S: 0 A: 15 | NR | 0.206 | NR | 1 |
| | | | | 28 | Evisceration | S: 0 A: 8 | NR | 0.464 | NR | 1 |
| **Mean follow up:** | | | | 28 | Global-surgical space infection | S: 13 A: 46 | NR | 0.096 | NR | 1 |
| 37.6 months | | | | 28 | GSSI – Superficial | S: 13 A: 15 | NR | 1 | NR | 1 |
| | | | | 28 | GSSI – Deep | S: 0 A: 0 | NR | 1 | NR | 1 |
| **Trial duration:** | | | | 28 | GSSI - Organ space | S: 0 A: 31 | NR | 0.035 | NR | 1 |
| 2.9 years | | | | 28 | Tumor reappearance | S: 53 A: 15 | NR | 0.055 | NR | 1 |
| | | | | 28 | Reoperation | S: 0 A: 31 | NR | 0.035 | NR | 1 |

*S = stenting; A= anastomosis; NR = not reported; NS = not statistically significant; RCT = randomized controlled trial; CI = confidence interval; [a]Refer to appendix B for detailed explanations of rating scores; [b] P-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

## II Colorectal cancer perioperative mortality

**Table 12.** Body of evidence examining the effect of stenting in comparison to acute resections with anastomosis on perioperative colorectal cancer mortality in curative patients with obstructive tumours.

| Name of study | Study type | Level of evidence[a] | Risk of bias | N | Results summary (%) | Size of effect rating[a] | p value[b] | CI (95%) | Relevance of evidence[a] |
|---|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013**<br><br>**Age:** 35-68yrs<br>**Median age:** 44yrs<br><br>**Female**: 37 N (61.7%)<br>**Male**: 23 N (38.3%)<br><br>**Median follow up:** 18 months<br><br>**Trial duration**: 3.4 years | RCT | II | At risk | 59 | **Overall mortality**<br>S: 0 A: 0 | NR | NR | NR | 1 |
| **Alcantara 2011**<br><br>**Mean age:** ±71 years<br><br>**Female**: 22 N (57%)<br>**Male**: 16 N (43%)<br><br>**Mean follow up:** 37.6 months<br><br>**Trial duration:** 2.9 years | RCT | II | At risk | 28 | **Hospital mortality**<br>S: 0 A: 8 | NR | 0.464 | NR | 1 |

*S = stenting; A = anastomosis; N = number of participants; CI = confidence interval; NR = not reported; NS = not statistically significant; RCT = randomized controlled trial;*
*[a]Refer to appendix B for detailed explanations of rating scores; [b] P-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

## III Overall Survival at 59 Months

**Table 13.** Body of evidence examining the effect of stenting in comparison to acute resections with anastomosis on 5 year survival in curative patients with obstructive tumours.

| Name of study | Study type | Level of evidence[a] | Risk of bias | N | Results summary (%) | Size of effect rating[a] | p value[b] | CI (95%) | Relevance of evidence[a] |
|---|---|---|---|---|---|---|---|---|---|
| **Alcantara 2011**<br><br>**Mean age:** ±71 years<br><br>**Female**: 22 (57%)<br>**Male**: 16 (43%)<br><br>**Mean follow up:** 37.6 months<br><br>**Trial duration:** 2.9 years | RCT | II | At risk | 28 | **Overall Survival (59 months):**<br>S: 58 A: 70 | NR | 0.843 | NR | 1 |

*S = stenting; A= anastomosis; NR = not reported; NS = not statistically significant; RCT = randomized controlled trial; CI = confidence interval; [a]Refer to appendix B for detailed explanations of rating scores; [b] P-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

## IV Hospital Stay

**Table 14.** Body of evidence examining the effect of stenting in comparison to acute resections with anastomosis on duration of hospital stay (days) in curative patients with obstructive tumours.

| Name of study | Study type | Level of evidence[a] | Risk of bias | N | Results summary (IQR) | Size of effect rating[a] | p value[b] | (95% CI) | Relevance of evidence[a] |
|---|---|---|---|---|---|---|---|---|---|
| **Ghazal 2013**<br><br>**Age:** 35-68yrs<br>**Median age:** 44yrs<br><br>**Female**: 37 N (61.7%)<br>**Male**: 23 N (38.3%)<br><br>**Median follow up**: 18 months<br><br>**Trial duration**: 3.4 years | RCT | II | At risk | 59 | **Length of Hospital stay:**<br>S: 13 A: 8 | NR | 0.102 | NR | 1 |
| **Alcantara 2011**<br><br>**Mean age:** ±71 years<br><br>**Female**: 22 N (57%)<br>**Male**: 16 N (43%)<br><br>**Mean follow up:** 37.6 months<br><br>**Trial duration:** 2.9 years | RCT | II | At risk | 28 | **Median hospital stay overall**<br>S: 13 (3) A: 10 (10) | NR | 0.105 | NR | 1 |
| | | | | 28 | **Median postoperative stay**<br>S: 8 (3) A: 10 (10) | NR | 0.05 | NR | 2 |

*S= Stenting; A = anastomosis; N = number of participants; CI = confidence interval; IQR = interquartile range; NR = not reported; NS = not statistically significant; RCT = randomized controlled trial; [a]Refer to appendix B for detailed explanations of rating scores; [b] P-values derived from two-sided tests, p-value <0.05 was considered to be statistically significant.*

**References: Included studies**


1. Alcantara, M., Serra-Aracil, X., Falco, J., Mora, L., Bombardo, J., & Navarro, S. (2011). Prospective, controlled, randomized study of intraoperative colonic lavage versus stent placement in obstructive left-sided colonic cancer. World Journal of Surgery, 35(8), 1904-1910.

2. Ghazal, A. H., El-Shazly, W. G., Bessa, S. S., El-Riwini, M. T., & Hussein, A. M. (2013). Colonic endolumenal stenting devices and elective surgery versus emergency subtotal/total colectomy in the management of malignant obstructed left colon carcinoma. J Gastrointest Surg, 17(6), 1123-1129.

## APPENDICES

### Appendix A: Search strategies used

For PubMed database:

| # | Searches |
|---|---|
| 1 | (colorectal carcinoma* or colorectal cancer* or colorectal neoplasm* or colorectal tumor* or colonic cancer* or colonic neoplasm* or rectal cancer* or rectal neoplasm* or rectum cancer* or rectum neoplasm* or anus cancer* or anus neoplasm* or intestinal cancer* or intestinal neoplasm*)[MeSH Terms] |
| 2 | (colorect*[Title/Abstract] OR colon*[Title/Abstract] OR rectal*[Title/Abstract] OR rectum*[Title/Abstract] OR anal[Title/Abstract] OR anus[Title/Abstract] OR bowel*[Title/Abstract] OR intestin*[Title/Abstract]) AND (cancer*[Title/Abstract] OR neoplas*[Title/Abstract] OR oncolog*[Title/Abstract] OR oncogen*[Title/Abstract] OR malignan*[Title/Abstract] OR tumor*[Title/Abstract] OR tumour*[Title/Abstract] OR carcinoma*[Title/Abstract] OR adenocarcinoma*[Title/Abstract] OR adenoma*[Title/Abstract] OR carcinogen*[Title/Abstract]) |
| 3 | 1 or 2 |
| 4 | (colostomy[Title/Abstract] OR stent*[Title/Abstract] OR hartmann's[Title/Abstract) AND (obstruct*[Title/Abstract] OR anastomosis[Title/Abstract] OR resect*[Title/Abstract]) |
| 5 | (colostomy or stent*[MeSH Terms]) AND (intestinal obstruction* or anastomosis, surgical or surgical anastomosis[MeSH Terms]) |
| 6 | 4 or 5 |
| 7 | 3 and 6 |
| 8 | randomized controlled trial[pt] OR controlled clinical trial[pt] OR placebo[tiab] OR randomi?ed[tiab] OR randomly[tiab] OR trial[tiab] OR group[tiab] |
| 9 | 7 and 8 |
| 10 | English[la] AND 2004:3000[dp] and humans |

*Used the Cochrane sensitivity maximizing filters for identifying randomized controlled trials (http://handbook.cochrane.org, accessed 20/02/2013/ Centre for Reviews and Dissemination systematic review/ meta-analyses strategy 2.( Lee et al, (2012) An optimal search filter for retrieving systematic reviews and meta-analyses.* ***BMC Medical Research Methodology*** *12:51)*

*ATSI search terms used*

| # | Searches |
|---|---|
| 1 | Australia[mh] OR Australia*[tiab] |
| 2 | ancestry group, oceanic[mh] OR Australian aborigine[mh] OR Australian aborigines[mh] or aborigin*[tiab] OR indigenous[tiab] |
| 3 | 1 and 2 |
| 4 | Torres strait islander*[tiab] |
| 5 | 3 or 4 |
| 6 | (colorectal carcinoma* or colorectal cancer* or colorectal neoplasm* or colorectal tumor* or colonic cancer* or colonic neoplasm* or rectal cancer* or rectal neoplasm* or rectum cancer* or rectum neoplasm* or anus cancer* or anus neoplasm* or intestinal cancer* or intestinal neoplasm*)[MeSH Terms] |
| 7 | (colorect*[Title/Abstract] OR colon*[Title/Abstract] OR rectal*[Title/Abstract] OR rectum*[Title/Abstract] OR anal[Title/Abstract] OR anus[Title/Abstract] OR bowel*[Title/Abstract] OR intestin*[Title/Abstract]) AND (cancer*[Title/Abstract] OR neoplas*[Title/Abstract] OR oncolog*[Title/Abstract] OR oncogen*[Title/Abstract] OR malignan*[Title/Abstract] OR tumor*[Title/Abstract] OR tumour*[Title/Abstract] OR carcinoma*[Title/Abstract] OR adenocarcinoma*[Title/Abstract] OR adenoma*[Title/Abstract] OR carcinogen*[Title/Abstract]) |
| 8 | 1 or 2 |
| 9 | (colostomy[Title/Abstract] OR stent*[Title/Abstract]) AND (obstruct*[Title/Abstract] OR anastomosis[Title/Abstract] OR resect*[Title/Abstract]) |
| 10 | (colostomy or stent*[MeSH Terms]) AND (intestinal obstruction* or anastomosis, surgical or surgical anastomosis[MeSH Terms]) |
| 11 | 4 or 5 |
| 12 | 3 and 6 |
| 13 | randomized controlled trial[pt] OR controlled clinical trial[pt] OR placebo[tiab] OR randomi?ed[tiab] OR randomly[tiab] OR trial[tiab] OR group[tiab] |
| 14 | 7 and 8 |
| 15 | 5 and 14 |
| 16 | English[la] AND 2004:3000[dp] |
| 17 | 15 and 16 |

*From the Lowitja Institute at http://www.lowitja.org.au/litsearch-background-information accessed 30/09/2013*)

For Embase database and PsycINFO, DARE, HTA:

| # | Searches |
|---|---|
| 1 | (colo$ or bowel or rectal or rectum or anus or anal or intestin$).mp. |
| 2 | (cancer$ or neoplas$ or oncolog$ or malignan$ or tumo?r$ or carcino$ or adeno$).mp. |
| 3 | 1 and 2 |
| 4 | ((colostomy or stent$ or hartmann procedure) and (obstruct$ or anastomosis or resect$)).mp. |
| 5 | 3 and 4 |
| 6 | (metaanalys$ or (meta adj analy$) or (systematic adj review$)).mp. |
| 7 | clinical trial/ or randomi?ed controlled trial/ or randomi?ation/ or single blind procedure/ or double blind procedure/ or crossover procedure/ or placebo/ or randomi?ed controlled trail$.tw. or random allocation.tw. or randomly allocated.tw. or allocated randomly.tw. or (allocated adj2 randomly).tw. or single blind$.tw. or double blind$.tw. or ((treble or triple) adj blind$).tw. or placebo$.tw. or prospective study/ or controlled study/ |
| 8 | 6 or 7 |
| 9 | 5 and 8 |
| 10 | animals/ not humans/ |
| 11 | 9 not 10 |
| 12 | Limit 11 to english language |
| 13 | Limit 12 to yr="2004 -Current" |

*Used the SIGN filter for identifying randomized controlled trials (*www.sign.ac.uk/methodology/filters.html#systematic *accessed 20/02/2013)*

*ATSI search terms used:*

| # | Searches |
|---|---|
| 1 | Exp australia OR Australia*.ti,ab. |
| 2 | Oceanic ancestry group/ or exp aborigine OR aborigin$.ti,ab. OR indigenous.mp |
| 3 | Torres strait$ islander$.ti,ab |
| 4 | (#1 AND #2) OR #3 |
| 5 | (colo$ or bowel or rectal or rectum or anus or anal or intestin$).mp. |
| 6 | (cancer$ or neoplas$ or oncolog$ or malignan$ or tumo?r$ or carcino$ or adeno$).mp. |
| 7 | 5 and 6 |
| 8 | ((colostomy or stent$) and (obstruct$ or anastomosis or resect$)).mp. |
| 9 | 7 and 8 |
| 10 | (metaanalys$ or (meta adj analy$) or (systematic adj review$)).mp. |
| 11 | clinical trial/ or randomi?ed controlled trial/ or randomi?ation/ or single blind procedure/ or double blind procedure/ or crossover procedure/ or placebo/ or randomi?ed controlled trail$.tw. or random allocation.tw. or randomly allocated.tw. or allocated randomly.tw. or (allocated adj2 randomly).tw. or single blind$.tw. or double blind$.tw. or ((treble or triple) adj blind$).tw. or placebo$.tw. or prospective study/ or controlled study/ |
| 12 | 6 or 7 |
| 13 | 5 and 8 |
| 14 | animals/ not humans/ |
| 15 | 13 not 14 |
| 16 | 4 and 15 |
| 17 | Limit 16 to english language |
| 18 | Limit 17 to yr="2004 -Current" |

For Cochrane Database of Systematic Reviews, Database of Abstracts of Reviews of Effects and Health Technology Assessment database

| # | Searches |
|---|---|
| 1 | (colo$ or bowel or rectal or rectum or anus or anal or intestin$).mp. |
| 2 | (cancer$ or neoplas$ or oncolog$ or malignan$ or tumo?r$ or carcino$ or adeno$).mp. |
| 3 | 1 and 2 |
| 4 | ((colostomy or stent$) and (obstruct$ or anastomosis or resect$)).mp. |
| 5 | 3 and 4 |
| 6 | Limit 5 to yr="2004 -Current" |

For CINAHL database

| # | Searches |
|---|---|
| 1 | Colorectal (TX All Text) |
| 2 | Cancer (TX All Text) |
| 3 | Obstruction or obstructive or stent or colostomy or Hartmann's procedure (TX All Text) |
| 4 | 1 and 2 and 3 |
| 5 | Limit to 2004-2016 (Publication Date) |
| 6 | Limit to English |

**Appendix B:**

Level of Evidence rating criteria – Intervention studies

| Level | Study type |
|---|---|
| I | Meta-analysis or a systematic review of level II studies |
| II | Randomised controlled trial or a phase III/IV clinical trial |
| III-1 | Pseudo-randomised controlled trial or a meta-analysis/systematic review of level III-1 studies |
| III-2 | Comparative study with concurrent controls:<br>- Phase II clinical trial<br>- Non-randomised, experimental trial9<br>- Controlled pre test/post test study<br>- Adjusted indirect comparisons<br>- Interrupted time series with a control group<br>- Cohort study<br>- Case-control study<br>or a meta-analysis/systematic review of level III-2 studies |
| III-3 | A comparative study without concurrent controls:<br>- Phase I clinical trial<br>- Historical control study<br>- Two or more single arm study10<br>- Unadjusted indirect comparisons<br>- Interrupted time series without a parallel control group<br>or a meta-analysis/systematic review of level III-3 studies |
| IV | Case series with either post-test or pre-test/post-test outcomes or a meta-analysis/systematic review of level IV studies |

*According to the standards of the National Health and Medical Research Council*

**Level of Evidence rating criteria – Diagnostic accuracy studies**

| Level | Study type |
|---|---|
| I | Meta-analysis or a systematic review of level II studies |
| II | A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among consecutive persons with a defined clinical presentation |
| III-1 | A study of test accuracy with: an independent, blinded comparison with a valid reference standard, among non-consecutive persons with a defined clinical presentation |
| III-2 | A comparison with reference standard that does not meet the criteria required for level II and III-1 evidence |
| III-3 | Diagnostic case-control study |
| IV | Study of diagnostic yield (no reference standard) |

*According to the standards of the National Health and Medical Research Council*

**Level of Evidence rating criteria – Risk factor studies**

| Level | Study type |
|---|---|
| I | Meta-analysis or a systematic review of level II studies |
| II | Prospective cohort studies |
| III-1 | All or none |
| III-2 | Retrospective cohort studies |
| III-3 | Case-control studies |
| IV | Cross-sectional studies or case series |

*According to the standards of the National Health and Medical Research Council*

**Relevance of the evidence**

| Rating | Relevance |
|---|---|
| **1** | Evidence of an effect on patient-relevant clinical outcomes including benefits and harms, quality of life and survival. |
| **2** | Evidence of an effect on a surrogate outcome* that has been shown to be predictive of patient-relevant outcomes for the same intervention. |
| **3** | Evidence of an effect on proven surrogate outcomes but for a different intervention. |
| **4** | Evidence of an effect on proven surrogate outcomes but for a different intervention and population. |
| **5** | Evidence confined to unproven surrogate outcomes. |

**'surrogate outcome' refers to reasonable indicators of whether there has been some effect (e.g. blood pressure measurements or levels of serum cholesterol)*

Points for considering patient-relevant outcomes:
i) The goal of decision making in health care is to choose the intervention(s) (which may include doing nothing) that is (are) most likely to deliver the outcomes that patients find desirable.
ii) Surrogate outcomes (such as blood pressure measurements or levels of serum cholesterol) may be reasonable indicators of whether there has been some effect. However, they should not be the basis for clinical decisions unless they reliably predict an effect on the way the patient feels, otherwise they will not be of interest to the patient or their carers.
iii) All possible outcomes that are of most interest to patients (particularly harms) should be identified and evaluated.

*Adapted from table 1.10 of: National Health and Medical Research Council. How to use the evidence: assessment and application of scientific evidence. Canberra: NHMRC; 2000.*
*http://www.nhmrc.gov.au/_files_nhmrc/file/publications/synopses/cp69.pdf*

**Appendix C:**

Potentially relevant guidelines identified and reason why not adopted

| Year | Organisation | Title of Guideline | Reason why not adopted |
|---|---|---|---|
| 2005 | Cancer Council Australia | Clinical Practice Guidelines for the Prevention, Early Detection and Management of Colorectal Cancer | Outdated |
| 2008 | Integraal Kankercentrum Nederland | Colon cancer. Nation-wide guideline, Version 2.0 | Minimal content relevant to this PICO |
| 2011 | National Institute for Health and Care Excellence | Colorectal cancer: the diagnosis and management of colorectal cancer | Minimal content relevant to this PICO |
| 2011 | Ministry of Health, New Zealand Guidelines Group | Management of Early Colorectal Cancer | Minimal content relevant to this PICO |
| 2011 | Scottish Intercollegiate Guidelines Network (SIGN) | Diagnosis and management of colorectal cancer | Minimal content relevant to this PICO |
| 2014 | European Society of Gastrointestinal Endoscopy | Self-expandable Metal Stents for Obstructing Colonic and Extracolonic Cancer | Includes lower level evidence, focuses on metastatic stages. |
| 2014 | Belgian Health Care Knowledge Centre | Colon Cancer: Diagnosis, Treatment and Follow-Up | No relevant content to this PICO |
| 2014 | National Institute for Health and Care Excellence | Addendum to clinical guideline 131, Colorectal cancer | Minimal content relevant to this PICO |
| 2016 | Eastern Association for the Surgery of Trauma | Surgery or Stenting for Colonic Obstruction: A Practice Management Guideline | Minimal content relevant to this PICO |

## Excluded studies

| Study | Reason for Exclusion |
|---|---|
| Alcantara 2007 | Inappropriate study design |
| Amelung 2015 | Inappropriate study design |
| Arslan 2012 | Inappropriate study design |
| Baron 2004 | Inappropriate study design – inc evidence < II |
| Bauret 2008 | Inappropriate study design |
| Bonin 2010 | Inappropriate study design – inc evidence < II |
| Brehant 2009 | Inappropriate study design |
| Breitenstein 2007 | Inappropriate study design – inc evidence < II |
| Bugiantella 2014 | Inappropriate comparator |
| Bulow 2006 | Inappropriate patient population |
| Cennamo 2013 | Inappropriate comparator |
| Chen 2013 | Inappropriate comparator |
| Cheung 2012 | Inappropriate comparator |
| Chude 2008 | Inappropriate patient population – not obstructive |
| Cirrochi 2013 | Inappropriate comparator |
| Cools 2013 | Conference abstract |
| Costi 2014 | Inappropriate population - palliative |
| Currie 2013 | Conference abstract |
| Currie 2014 | Inappropriate study design – SR <II |
| De Ceglie 2013 | Inappropriate study design |
| De Salvo 2015 | Mixed comparator |
| DeAsis 2015 | Inappropriate intervention |
| Farrel 2007 | Inappropriate study design |
| Farrugia 2014 | Conference abstract |
| Ferrada 2016 | Guideline |
| Fiori 2013 | Inappropriate population – metastatic, stag IV disease |
| Frago 2014 | Inappropriate comparator |
| Gainant 2012 | Review article |
| Gianotti 2013 | Inappropriate study design |
| Grem 2013 | Inappropriate population - metastatic |
| Grundmann 2013 | Inappropriate study type |
| Han 2014 | Inappropriate study type |
| Helyer 2008 | Inappropriate study design |
| Ho 2012 | Inappropriate comparator |
| Holzer 2005 | Inappropriate study design |
| Huang 2013 | Conference abstract |
| Huang 2014 | Inappropriate comparator |
| Hubbard 2016 | Inappropriate study type |
| Im 2008 | Inappropriate study design |
| Inaba 2012 | Inappropriate study design |
| Karadag 2015 | Inappropriate study design |
| Kenderian 2014 | Inappropriate intervention |
| Khot 2002 | Inappropriate study design |
| Kim 2015 | Inappropriate study design |
| Kozol 2007 | Inappropriate study design |
| Lamazza 2015 | Inappropriate patient population |
| Laval 2014 | Guideline |
| Lee 2013 | Inappropriate study design |
| Lewis 2004 | Inappropriate study design – inc evidence <II |
| Li 2014 | Inappropriate comparator |
| Liang 2014 | Inappropriate study design |
| Liu 2014 | Inappropriate comparator |
| Luglio 2013 | Inappropriate comparator |
| Lynes 2014 | Conference abstract |
| Malgras 2015 | Inappropriate comparator |

| | |
|---|---|
| Manfredi 2014 | Review article |
| Markovic 2015 | Inappropriate study design |
| Masci 2008 | Inappropriate study design |
| Matsuda 2014 | Inappropriate comparator |
| Matthieson 2007 | Inappropriate patient population – not obstructive |
| Meyer 2004 | Inappropriate study design |
| Montedori 2010 | Inappropriate patient population – not obstructive |
| Mosli 2014 | Inappropriate population |
| Olson 2014 | Inappropriate population – metastatic palliative |
| Patel 2012 | Review article |
| Park 2010 | Review article |
| Parray 2014 | Inappropriate patient population – not obstructive |
| Popiela 2006 | Inappropriate study design |
| Porpiglia 2015 | Inappropriate intervention |
| Piemontese 2004 | Review article |
| Roeland 2009 | Inappropriate study design – inc evidence <II |
| Rossi 2006 | Abstract |
| Rutter 2015 | Guideline |
| Sebastien 2004 | Inappropriate study design |
| Shi 2013 | Inappropriate study design |
| Si 2013 | Inappropriate intervention |
| Sloothaak 2014 | Inappropriate comparator |
| Srinivasan 2014 | Inappropriate study design |
| Stimac 2010 | Review article |
| Tamburini 2015 | Conference abstract |
| Tan 2012 | Inappropriate comparator |
| Theodoropoulos 2013 | Inappropriate study design |
| Thompson 2014 | Inappropriate study type |
| Thosani 2012 | Abstract |
| Trompetas 2008 | Inappropriate study design – inc evidence < II |
| Tung 2013 | Inappropriate comparator |
| Ulrich 2010 | Not English |
| Van der pas 2013 | Inappropriate comparator |
| Van Halsema 2014 | Inappropriate comparator |
| Van Halsema 2015 | Inappropriate study design |
| Van Hooft 2014 | Guideline |
| Vermeer 2016 | Inappropriate study design |
| Wang 2015 | Inappropriate study design |
| Watt 2007 | Inappropriate comparator |
| Yau 2009 | Inappropriate intervention |
| Ye 2012 | Inappropriate comparator |
| Young 2015 | Inappropriate comparator |
| Zhang 2012 | Inappropriate comparator |
| Zhao 2012 | Not English |

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