solventum
Prevena™

Solventum™ Prevena™ 125 Therapy Unit and Solventum™ Prevena Plus™ 125 Therapy Unit

Clinical indications summary

Instructions for use Solventum™ Prevena™ 125 Therapy Unit

Solventum customer contact information is located in the back of this guide.

Product description

The Prevena 125 Therapy Unit, Solventum™ Prevena™ Canister, 45 mL and associated accessories are components of the Solventum™ Prevena™ Incision Management System, which can be used with either Solventum™ Prevena™ Peel and Place Dressings or Solventum™ Prevena Plus™ Customizable Dressing.

Indication for use and limitations

Prevena 125 and Solventum™ Prevena™ 125 Therapy Unit manage the environment of closed surgical incisions and remove fluid away from the surgical incision via the application of -125mmHg continuous negative pressure. When used with legally marketed compatible dressings, Prevena 125 and Prevena Plus 125 Therapy Units are intended to aid in reducing the incidence of seroma; and in patients at high risk for post-operative infections, aid in reducing the incidence of superficial surgical site infection in Class I and Class II wounds.

- The device is not intended to treat surgical site infection or seroma.
- Safety and effectiveness in pediatric population (<22 years old) have not been evaluated.
- Safety and effectiveness in Class III (Contaminated) and Class IV (Dirty/Infected) wounds have not been demonstrated. Furthermore, Class IV surgical wounds are not expected to be closed primarily, and the subject device should only be used on closed surgical incisions.
- The device has not been demonstrated to reduce deep incisional and organ space surgical site infections.
- The device has not been demonstrated to be effective in reducing the incidence of surgical site infection and seroma in all surgical procedures and patient populations; therefore, the device may not be recommended for routine use to reduce the incidence of surgical site infection and seroma.
- Please refer to the 'Summary of Clinical Information' section for the specific surgical procedures and patient populations included in the clinical studies. Surgeons should continue to follow the 'Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection'2 and the 'American College of Surgeons and Surgical Infection Society:

Surgical Site Infection Guidelines'[1] for best practices in preventing surgical site infection.

Clinical studies have been conducted on Solventum Negative Pressure Incision Management Systems.

Refer to the Summary of Clinical Information and the Bibliography of Published Studies in the back of this guide.

CAUTION: The Prevena Incision Management System should be applied and removed only by qualified physicians or nurses. As with any prescription medical device, failure to carefully read and follow all instructions and safety information prior to use may lead to improper product performance and could result in failure of the wound to heal. The Solventum™ Prevena™ Dressings, Solventum Prevena Canister, 45 mL and Solventum™ Prevena Plus™ Canister, 150 mL are disposable and are for single use only. Re-use of disposable components may result in wound contamination, infection and/or failure of the wound to heal.

Summary of clinical information

A systematic literature review and associated meta-analyses were used to support the safety and effectiveness of the Solventum™ Prevena™ Incision Management System over closed incisions in reducing the incidence of surgical site infections (SSIs) and seromas versus conventional wound dressings. The systematic literature search was performed using PubMed, The Cochrane Library, OVID, EMBASE, ScienceDirect, and alternative resources such as Google searches and QUOSA. Search terms included: ("negative pressure wound therapy" OR "negative pressure" OR "negative pressure therapy" OR "NPWT") AND ("Prevena" OR "ciNPT" OR "prophylactic NPWT" OR "preventative NPWT" OR "incision management" OR "incisional management" OR "closed incision negative pressure wound therapy" OR "closed incision negative pressure therapy").

Six (6) independent reviewers performed the study selection. Titles of manuscripts and abstracts that met the search criteria were logged and investigated for duplicates. The abstracts and manuscripts were assessed for inclusion and exclusion criteria (Table 1) by a subset of two (2) independent reviewers. When discordance was identified, the two reviewers deliberated until a consensus was reached.

Table 1. Inclusion and exclusion criteria for the systematic literature review

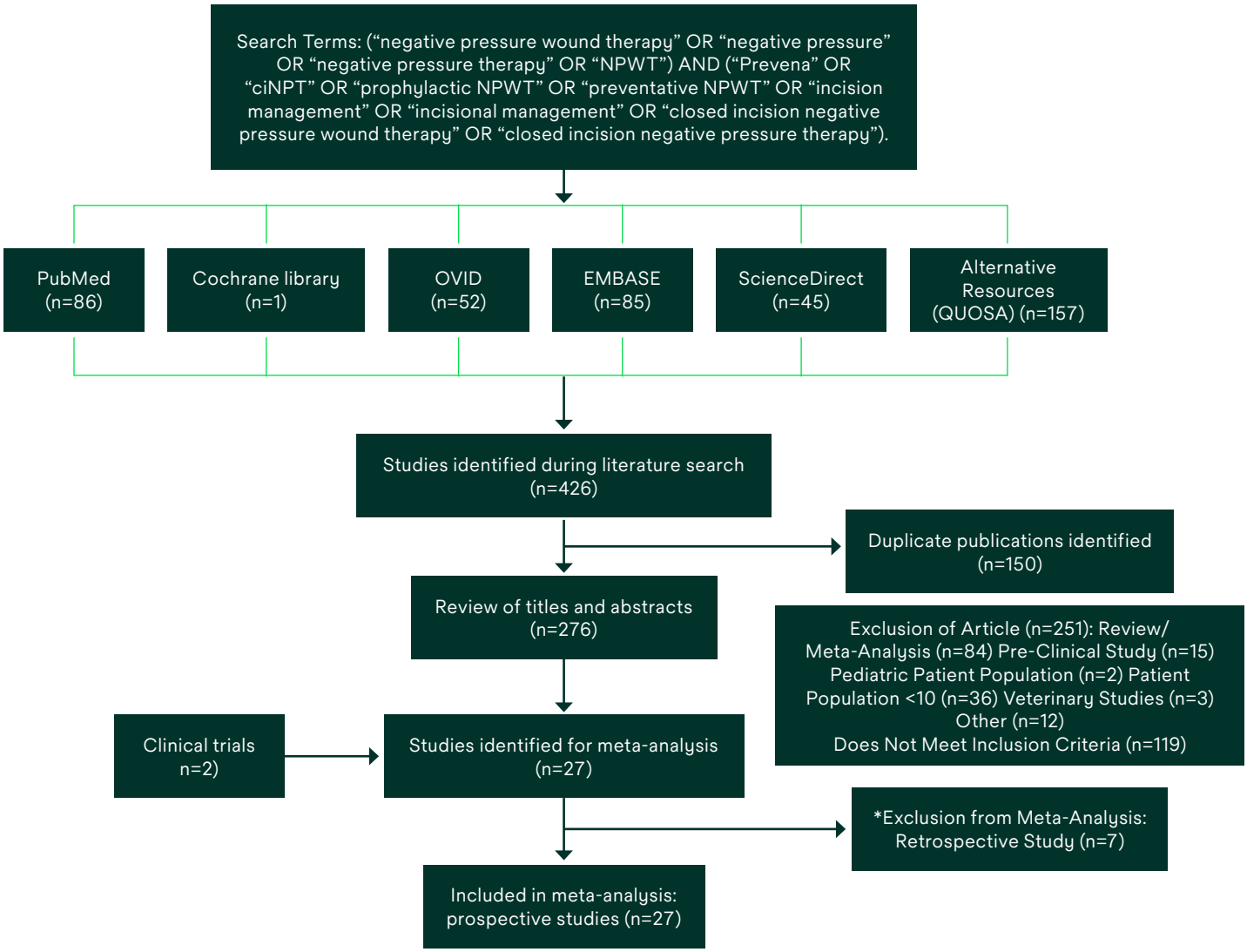
Inclusion criteria	Exclusion criteria
Abstract or manuscript written in English	Meta-analysis studies
Published or unpublished study	Pre-clinical studies (i.e., animal or bench science assessments)
Studies that compare the use of Solventum™ Prevena™ Incision Management System using -125 mmHg continuous pressure with legally marketed compatible dressing over closed incisions to conventional wound dressings (e.g., occlusive gauze dressing)	Studies on pediatric patients (age <18 years)
Contained an endpoint/outcome of surgical site infection (SSI), dehiscence, seroma, hematoma, or post-operative pain	Studies with less than 10 patients
Studies that followed the subjects/patients for a minimum of 30 days for the SSI endpoint	Veterinary studies
Studies that followed the subjects/patients for a minimum of 10 days for the seroma endpoint	

For abstracts and manuscripts that met all the inclusion criteria and none of the exclusion criteria, they were examined critically to:

i) assess whether containing reference of any other articles that meet the inclusion criteria and ii) extract study characteristics by at least two additional independent reviewers. Registered studies at ClinicalTrials.gov were also reviewed using the same search criteria for completed and terminated studies. The Cochrane Collaboration tool was used for assessing risk of bias.

A total of 426 studies resulted from the initial search. After 150 duplicate publications were removed, a total of 276 unique studies were assessed for inclusion. An additional 251 articles were excluded based on the pre-specified inclusion/exclusion criteria (Table 1), which was comprised of 64 review/meta-analysis, 15 pre-clinical studies, 2 pediatric patient populations, 3 veterinary studies, 12 other (protocol, technical report, subsequent study included in the meta-analysis, and comment), and 119 that did not meet all inclusion criteria. Lastly, seven (7) articles identified as retrospective studies were removed to minimize bias and ensure only the highest level of evidence for the meta-analyses.

Figure 1. Summary of study selection for the meta-analyses



Ultimately, twenty (20) prospective studies, including two (2) 3M sponsored, unpublished clinical studies from ClinicalTrials.gov, were included in the meta-analyses for SSI and seroma characterization. A total of up to 6,403 evaluable patients were included in these meta-analyses with 1,367 in the Solventum™ Prevena™ Incision Management System (treatment) group and 5,036 in the conventional wound dressing (control) group.

The two (2) Solventum-sponsored, unpublished clinical studies from ClinicalTrials.gov can be summarized as follows:

NCT01341444 was a randomized, single center, interventional trial evaluating the safety and effectiveness of Prevena Incision Management System on closed surgical incisions in subjects who had undergone open renal transplant surgery. Subjects were randomized 1:1 to receive either the Prevena Therapy (treatment group) or a silver-impregnated occlusive dressing (control group). The purpose of the study was to compare surgical site complications, which include incisional fluid accumulation, dehiscence, and surgical site infections, between the Prevena Therapy (treatment group) and conventional occlusive dressing (control group). The measurement outcome was the incidence of surgical site complications up to 30 days (+/- 2 days) post renal transplant surgery. Due to enrollment difficulties, Solventum decided to terminate the study after enrolling 63 of 88 subjects. There were a total 28 subjects in the treatment group with 0 surgical site infections (0%) and 30 subjects in the control group with 2 surgical site infections (6.7%). Adverse events were reported: 25 subjects in the treatment group reported at least 1 adverse event and 24 subjects in the control group reported at least 1 adverse event. In the treatment group, 11 subjects reported at least 1 serious adverse event, and in the control group, 13 subjects reported at least one serious adverse event. None of the reported adverse events were related to the Prevena Therapy or conventional wound dressings used.

NCT02195310 was a randomized, multi-center, open label, interventional trial evaluating the safety and effectiveness of Prevena Incision Management System (treatment group) on closed sternal midline incisions in patients at high risk for surgical site occurrences to a control group treated with conventional wound dressings, such as gauze with tape, pressure dressing with additional packing and tape, and silver-impregnated dressings. The purpose of the study was to assess the performance of Prevena Incision Management System versus conventional wound dressings on closed median sternal incisions in subjects undergoing cardiac surgery. The primary endpoint was the incidence of surgical site infections (SSI) within 30 days postoperatively per CDC guidelines21. Five hundred twenty subjects were expected to be randomized 1:1. An interim data review was conducted on 257 subjects (128 Prevena Therapy subjects, 129 control subjects). The conditional power from this analysis was below 60%. Since the calculated SSI rates from the interim data review were outside the ranges of the sample size assumptions, the study was terminated early due to the lack of evidence to support the objectives and assumptions of the study. A final analysis was conducted on 299 subjects; 145 subjects for the Prevena Therapy arm and 154 subjects for the control arm. The incidence rate of SSI in the Prevena Therapy arm was 9.0% (13 subjects) and in the SOC arm was 10.4% (16 subjects). There was a 1.5-fold higher rate of SSI in control subjects with a Body Mass Index (BMI) >35 kg/m2. In the treatment group, 6/68 subjects with a BMI >35 kg/m2 had an SSI (8.8%) and 10/75 control subjects with a BMI >35 kg/m2 had an SSI (13.3%). Adverse events were reported. See 'Safety' section below for more detail. There were 286 (83.6%) of subjects that experienced at least one adverse event. In the treatment group, 83.8% subjects experienced an adverse event, while 83.4% of the control group subjects experienced an adverse event. There were 18 subjects that experienced a treatment related adverse event. In the treatment group, 16 (9.2%) subjects experienced a treatment related adverse event, while 2 (1.2%) subjects in the control group experienced a treatment related adverse event. There were 118 serious adverse events. In the treatment group, 36.4% of subjects experienced a serious adverse event, while 32.5% of the control subjects experienced a serious adverse event. There were no device-related serious adverse events in either the treatment or control group.

Surgical site infection (SSI)

Sixteen (16) prospective studies were included in the meta-analyses for SSI, which are summarized in Table 2 below. Nine (9) studies are randomized controlled trials, which are considered level I evidence. The remaining seven (7) studies are consid-ered level II evidence, which include five (5) prospective treatment and historical controls studies and two (2) prospective observational studies that alternated patient assignment into either the treatment or control group (i.e., not randomized).

Table 2. Characteristics of studies included in the SSI meta-analyses

Study/level of evidence*	Study design	Surgical procedure	Subjects' risk factors	Study duration	Incisional dressings used	No. of subjects	Treatment duration (days)
Cantero 2016[3] Level II	Prospective & Historical Controlled	Diverting loop ileostomy reversal	NR	30 days	Solventum™ Prevena™ Incision Management System	17	5-7
					Conventional wound dressing	43	1-2, then daily
DiMuzio 2017[4] Level I	RCT	Elective vascular surgery†	BMI> 30kg/m^2, pannus, immunosuppressant disorder, reoperation, prosthetic graft, HbA1c>8	30 days	Solventum™ Prevena™ Incision Management System	59	NR
					Standard gauze dressing	60	NR
Grauhan 2013[6] Level II	Prospective Observational	Median sternotomy†	BMI Mean Treatment: 37 kg/m^2, Control: 36 kg/m^2; Diabetes; COPD; LVEF	90 days	Solventum™ Prevena™ Incision Management System	75	6-7
					Conventional wound dressing	75	1-2
Grauhan 2014[7] Level II	Prospective & Historical Controlled	Median sternotomy	NR	30 days	Solventum™ Prevena™ Incision Management System	237	6-7
					Conventional sterile wound tape dressing	3508	1-2
Gunatilake 2017[8] Level I	RCT	Cesarean delivery	BMI Mean Treatment: 46.3 kg/m^2, Control: 46.8 kg/m^2; Diabetes	42 ± 10 days	Solventum™ Prevena™ Incision Management System	39	5-7
					Solventum™ Steri-Strip™ Reinforced Adhesive Skin Closures, 3M™ Tegaderm™ Dressing	43	1-2
Lavryk 2016[10] Level II	Prospective Observational	Reoperative colorectal surgery†	Diabetes; Hx of Smoking	30 days	Solventum™ Prevena™ Incision Management System	55	7±2
					Standard gauze dressing	101	NR
Lee AJ 2016[11] Level I	RCT	CABG with harvesting of GSV†	Diabetes; Smoking; COPD; HTN; CHF; LVD; Aortic Stenosis; AF; CVD; Dyslipidemia; CKF; PVD; Hypothyroidism; Arthritis; Gout; Asthma	42 days	Solventum™ Prevena™ Incision Management System	33	Up to 7
					Conventional dry dressing	27	NR
Lee K 2017[12] Level I	RCT	Femoral to distal artery bypass; femoral endarterectomy; femoral artery crossover; other†	BMI Mean Treatment: 29 kg/m^2, control: 29 kg/m^2; Diabetes; Hx of Smoking/ COPD; CAD; LVD; HTN; CKD; Anticoagulation; Ischemic tissue loss	30 days and 90 days	Solventum™ Prevena™ Incision Management System	53	First day of discharge up to 8 days
					Standard gauze dressing	49	2

Solventum™ Prevena™ Incision Management System

Study/level of evidence*	Study design	Surgical procedure	Subjects' risk factors	Study duration	Incisional dressings used	No. of subjects	Treatment duration (days)
Matatov 2013[13] Level II	Prospective & Historical Controlled	Femoral cutdown for vascular procedures	BMI Mean Treatment: 26 kg/m^2, Control: 27 kg/m^2; Diabetes; Hx of Smoking/; COPD; CAD; CHF; HTN; renal insufficiency, anemia	30 days	Solventum™ Prevena™ Incision Management System	41 (52 wounds)	5-7
					Primapore or Dermabond Adhesive	49 (63 wounds)	3
NCT01341444 Level I	RCT	Renal transplant†	BMI Mean Treatment: 29.05 kg/m^2, Control: 28.73; Diabetes; Tobacco Use;	30 days	Solventum™ Prevena™ Incision Management System	28	5
					Standard incisional dressing	30	3
NCT02195310 Level I	RCT	Median sternotomy (elective cardiac surgery)†	BMI Mean Treatment: 35.64 kg/m^2, Control: 35.27 kg/m^2; Diabetes; Immunosuppressant Disorder; Hx of Smoking; Dialysis; Planned Bilateral Mamery Artery; Chronic Lung Disease; CKD; Previous Chest Wall Radiotherapy; Breast Size D Age > 75 years; LVEF< 30%;	30 days	Solventum™ Prevena™ Incision Management System	145	4-7
					Traditional sterile wound dressings (included gauze with tape, pressure dressings and silver impregnated dressings)	154	2-3
Newman 2017[14] Level I	RCT	Total hip or knee arthroplasty (elective revision) †	Blood thinners other than aspirin postoperatively, BMI≥ 35 kg/m^2; PVD; diabetes mellitus; current smoker; hx of prior joint infection; current use of corticosteroids or immunomodulators; hx or current cancer/hematological malignancy; inflammatory arthritis; renal failure or dialysis; malnutrition, liver disease; transplant status; HIV infection	84 days	Solventum™ Prevena™ Incision Management System	80	≥2
					Silver impregnated occlusive dressing	80	7
Redfern 2017[18] Level II	Prospective & Historical Controlled	Total hip or knee arthroplasty (elective revision) †	BMI Mean Treatment: 30.5 kg/m^2, Control: 30.9 kg/m^2; Diabetes; HTN; Hx of Cancer/ Tumor; Arthritis; Myocardial Infarction/Heart Disease; Tobacco use	60 days	Solventum™ Prevena™ Incision Management System	192	6-8
					Traditional gauze dressing	400	Standard
Ruhstaller 2017[19] Level I	RCT	Unscheduled cesarean delivery †	Gestational Diabetes; Tobacco Use; HTN;	28 days	Solventum™ Prevena™ Incision Management System	67	3
					Telfa bandage with gauze and surgical tape	69	1
Sabat 2016[20] Level I	RCT	Vascular surgery involving groin incision	NR	120 days	Solventum™ Prevena™ Incision Management System	30 wounds	5
					Gauze and Solventum™ Tegaderm™ Dressing	33 wounds	NR
Swift 2015[22] Level II	Prospective & Historical Controlled	Cesarean delivery†	BMI ≥ 30 kg/m^2; Diabetes; Chronic Hypertension; Preeclampsia; HELLP syndrome; rupture of membranes > 4 hours; chorioamnionitis, anticoagulation; multiple gestation	42 days	Solventum™ Prevena™ Incision Management System	110	3
					Standard sterile dressing	209	NR

†Population or Procedure identified as high-risk for wound complication

*Oxford Centre of Evidence-Based Medicine

RCT=Randomized Controlled Trial

NR=Not Reported

IMS=Incision Management System

ciNPWT=closed incision Negative Pressure Wound Therapy

BMI=Body Mass Index

HX=History

COPD=Chronic Obstructive Pulmonary Disorder

GERD=Gastroesophageal Reflux Disease

HTN=Hypertension

AF= Atrial Fibrillation

CVD=Cardiovascular disease

CKF=Chronic kidney failure

PVD=Peripheral vascular disease

LVD=Left ventricle dysfunction

CAD=Coronary artery disease

CKD=Chronic kidney disease

LVEF=Left ventricle ejection fraction

HIV=Human immunodeficiency virus

HELLP=Hemolysis, Elevated Liver enzymes, Low Platelet counts

Together, the sixteen (16) studies contained 1,264 evaluable patients receiving the Solventum™ Prevena™ Incision Management System therapy (treatment group) and 4,923 patients receiving conventional wound dressings (control group). The conventional wound dressings used in each study can be found in Table 3 above and range from occlusive gauze dressings to silver-im-pregnated dressings. The primary endpoint in the studies was the incidence of surgical site infection in the treatment group compared to the control group for at least four weeks following surgery.

The treatment effect for each study was summarized using odds ratio (OR), which was calculated using the following formula:OR=AD/BC, where

A=the number of subjects with SSI events for the treatment group

B=the number of subjects without SSI events for the treatment group

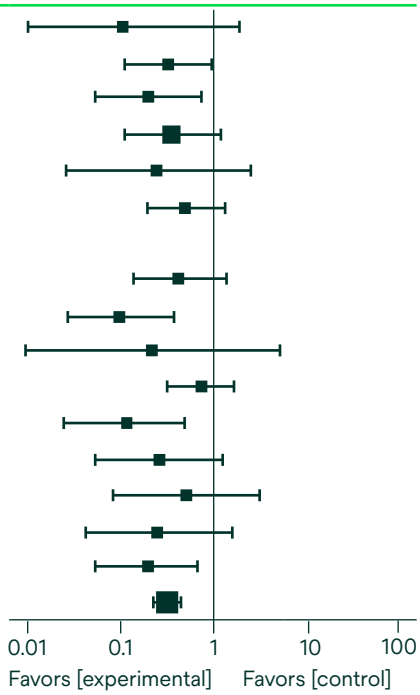
C=the number of subjects with SSI events for the control group

D=the number of subjects without SSI events for the control group

An OR of less than 1 suggests a favorable effect by the treatment in reducing SSI, whereas an OR greater than 1 suggests a favorable effect by the conventional wound dressings. The 95% confidence interval (95% CI) for the odds ratio is calculated based on the standard error of Log (OR). The individual study effects for SSI are summarized in Figure 2 below.

Figure 2. Characteristics of studies included in the SSI meta-analyses

	Treatment			Control			
Study/subgroup	Events	Total	%	Events	Total	%	Odds ratio, 95% CI
Cantero 2016	0	17	(0.0)	9	43	(20.9)	0.10 (0.01, 1.89)
Dimuzio P 2017	6	59	(10.2)	15	60	(25.0)	0.34 (0.12, 0.95)
Grauhan O 2013	3	75	(4.0)	12	75	(16.0)	0.22 (0.06, 0.81)
Grauhan O 2014	3	237	(1.3)	119	3508	(3.4)	0.37 (0.12, 1.16)
Gunatiliake RP 2017	1	39	(2.6)	4	43	(9.3)	0.26 (0.03, 2.40)
Lavryk O 2016	7	55	(12.7)	21	101	(20.8)	0.56 (0.22, 1.40)
Lee AJ 2016	0	27	(0.0)	0	17	(0.0)	Not estimable
Lee K 2017	6	53	(11.3)	9	49	(18.4)	0.57 (0.19, 1.73)
Matatov T 2013	3	52	(5.8)	19	63	(30.2)	0.14 (0.04, 0.51)
NCT01341444	0	28	(0.0)	2	30	(6.7)	0.20 (0.01, 4.35)
NCT02196310	13	145	(9.0)	16	154	(10.4)	0.85 (0.39, 1.83)
Newman JM 2017	2	80	(2.5)	12	80	(15.0)	0.15 (0.03, 0.67)
Redfern RE 2017	2	196	(1.0)	14	400	(3.5)	0.28 (0.06, 1.26)
Ruhstaller K 2017	2	61	(3.3)	4	58	(6.9)	0.46 (0.08, 2.60)
Sabat J 2016	2	3D	(6.7)	7	33	(21.2)	0.27 (0.05, 1.39)
Swift SH 2015	3	110	(2.7)	24	209	(11.5)	0.22 (0.06, 0.73)
Total		**1264**			**4923**		**0.37 (0.27, 0.52)**



Overall, there is an observable trend supporting a favorable effect by the Solventum™ Prevena™ Therapy System in reducing the incidence of SSI. The SSI rates ranged from 0% to 30.2% for the control group in the individual studies, and the SSI rates in the treatment group ranged from 0% to 12.7%. However, the benefit of the Prevena Incision Management System varies considerably across different studies, possibly due to many confounding factors such as different surgical procedures and patient risk factors, which are further explored in subgroup analyses below. Additionally, there are many inherent limitations associated with meta-analyses and biases with each individual study, which are discussed in the 'Limitations of the Clinical Evidence' section below. Because of these confounding factors and limitations of the studies, statistical significance cannot be reliably inferred for the treatment effect based on the combined results from the sixteen (16) studies.

Subgroup analyses were performed to elucidate potential confounding factors contributing to the heterogeneity in the treatment effect. The subgroup analyses conducted were based on: i) Wound classification, ii) Infection depth (i.e., superficial, deep, organ space), iii) Risk factors for surgical site infection.

i.) Wound classification

To analyze the effect of the Prevena Incision Management Systems on SSI in wounds of different degrees of contamination, a wound classification designation following the Center for Disease Control and Prevention (CDC) guidelines (Table 3) was assigned to each study based on the surgical procedure performed and CDC wound classification definitions. Each study was reviewed, and a CDC wound classification was assigned by two individuals with appropriate medical and clinical trials background. All the same wound types in each study were treated the same unless the publication (e.g., Newman et. al.14) specifically gave guidance that some wounds were more severe in a particular subgroup (e.g., septic revisions). If the publication provided a CDC wound classification, the provided classification was utilized. One study (Lavryk et. al.10) was excluded as only patients with wound classifications of II, III and IV were enrolled and could not be separated into the individual wound classification groups.

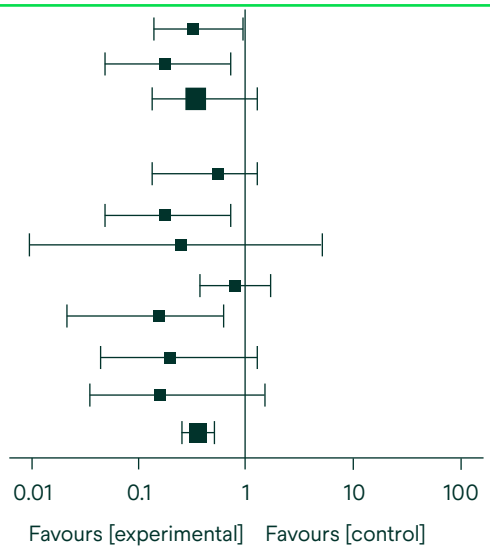
Table 3. Surgical wound classifications and definitions[21]

Surgical wound classification	Definition
Class I/Clean	An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tract is not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.
Class II/Clean-contaminated	An operative wound in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.
Class III/Contaminated	Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered are included in this category.
Class IV/Dirty-infected	Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

Eleven (11) of the sixteen (16) studies were determined to contain only Class I wounds, and these eleven (11) studies consist of approximately 88% of the total patient population for the overall SSI meta-analysis. The subgroup analysis results of Class I wounds (Figure 3) show a reduction in favor of the Solventum™ Prevena™ Incision Management System therapy and are consistent with the overall reduction in SSI observed in Figure 2.

Figure 3. Forest plot of meta-analysis studies on surgical site infection in Class I wounds

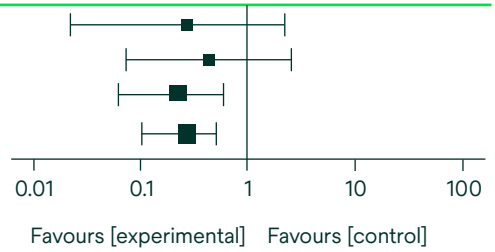
	Treatment			Control				
Study/subgroup	Events	Total	(%)	Events	Total	(%)	Odds ratio (95% CI)	Odds ratio (95% CI)
DiMuzio P 2017	6	59	(10.2)	15	60	(25.0)	0.34 (0.12, 0.95)	
Grauhan O 2013	3	75	(4.0)	12	75	(16.0)	0.22 (0.06, 0.81)	
Grauhan O 2014	3	237	(1.3)	119	3508	(3.4)	0.37 (0.12, 1.16)	
Lee AJ 2016	0	27	(0.0)	0	17	(0.0)	Not estimable	
Lee K 2017	6	53	(11.3)	9	49	(18.4)	0.57 (0.19, 1.73)	
Matatov T 2013	3	52	(5.8)	19	63	(30.2)	0.14 (0.04, 0.51)	
NCT01341444	0	28	(0.0)	2	30	(6.7)	0.20 (0.01, 4.35)	
NCT02195310	13	145	(9.0)	16	154	(10.4)	0.85 (0.39, 1.83)	
Newman JM 2017	2	80	(2.5)	12	80	(15.0)	0.15 (0.03, 0.67)	
Redfern RE 2017	2	198	(1.0)	14	400	(3.5)	0.28 (0.06, 1.26)	
Sabat J 2016	2	30	(6.7)	7	33	(21.2)	0.27 (0.05, 1.39)	
Total		**982**			**4469**		**0.36 (0.24, 0.55)**	



Three (3) of the sixteen (16) studies were included in the subgroup analysis for Class II wounds, and these three (3) studies consist of approximately 8% of the total patient population for the overall SSI meta-analysis. The subgroup analysis results of Class II wounds (Figure 4) show a reduction in favor of the Solventum™ Prevena™ Incision Management System therapy and are consistent with the overall reduction in SSI observed in Figure 2.

Figure 4. Forest plot of meta-analysis studies on surgical site infection in Class II wounds

	Treatment			Control				
Study/subgroup	Events	Total	(%)	Events	Total	(%)	Odds ratio (95% CI)	Odds ratio (95% CI)
Gunatiliake RP 2017	1	39	(2.6)	4	43	(9.3)	0.26 (0.03, 2.40)	
Ruhstaller K 2017	2	61	(3.3)	4	58	(6.9)	0.46 (0.08, 2.60)	
Swift SH 2015	3	110	(2.7)	24	209	(11.5)	0.22 (0.06, 0.73)	
Total		**210**			**310**		**0.27 (0.11, 0.66)**	



There was only one (1) study identified as having Class III wounds; therefore, a subgroup analysis for Class III wounds was not performed. In this study, no SSI events were reported for the treatment group (0 out of n=17) and nine (9) SSI events were reported for the control group (9 out of n=43). There were no studies containing Class IV wounds that could be isolated for analysis; therefore, a subgroup analysis was not performed for Class IV wounds. It should be noted that the Prevena Incision Management System are intended to be used only on closed incisions. As Class IV wounds are generally not expected to be surgically closed primarily, the Prevena Incision Management System should not be used on Class IV wounds.

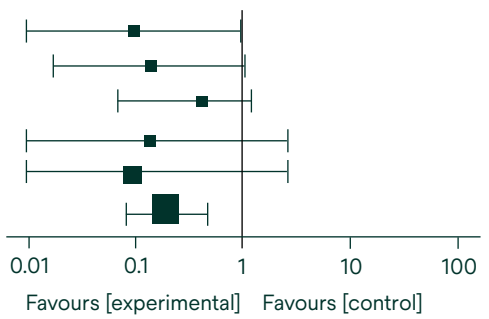
ii.) Infection depth

Surgical site infection (SSI) can be divided into three (3) subgroups: superficial incisional SSI, deep incisional SSI, and organ space SSI9. Superficial incisional SSI is infection that is limited to the skin or subcutaneous tissue of the surgical incision. Deep incisional SSI is infection that has spread to deep soft tissues such as fascial and muscle layers. Organ space SSI is deeper infection that involves any part of the anatomy that was opened or manipulated during the operation[9].

Five (5) of the sixteen (16) studies selected for SSI meta-analyses included information to stratify patient SSI events into superficial, deep, and organ space infections. Subgroup analyses examining the effect of the Prevena Incision Management System on different SSI locations were conducted based on these five (5) studies. Among the three subgroups, the Prevena Incision Management System demonstrated the greatest benefit in reducing superficial incisional SSIs (Figure 5). The reduction in superficial SSI appears to be greater than the SSI reduction in the overall data (Figure 2). There was little to no benefit of the Prevena Incision Management System in reducing deep incisional SSIs and organ space SSIs when compared to the control group.

Figure 5. Forest plot of meta-analysis studies on surgical site infection in superficial incisional SSI

	Treatment			Control				
Study/subgroup	Events	Total	(%)	Events	Total	(%)	Odds ratio (95% CI)	Odds ratio (95% CI)
Grauhan O 2013	1	75	(1.3)	8	75	(10.7)	0.11 (0.01, 0.93)	
Lavryk O 2016	1	55	(1.8)	12	101	(11.9)	0.14 (0.02, 1.09)	
Matatov T 2013	3	52	(5.8)	10	63	(15.9)	0.32 (0.08, 1.25)	
Newman JM 2017	0	80	(0.0)	3	80	(3.8)	0.14 (0.01, 2.71)	
Redfern RE 2017	0	196	(0.0)	9	400	(2.3)	0.10 (0.01, 1.81)	
Total		**458**			**719**		**0.19 (0.08, 0.46)**	

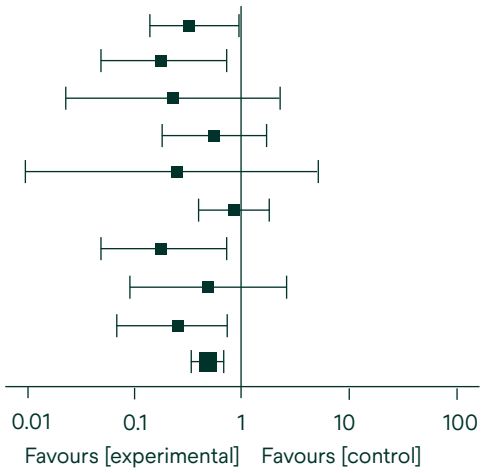


iii.) Risk factors for surgical site infection

Patients having one or more co-morbidities are generally considered to be at higher risk for surgical site complications. High risk patients were defined in the selected studies as having one or more of the following co-morbidities: obesity (body mass index ≥30 kg/m2); diabetes; history of smoking; immune suppression or receiving drugs that can cause immune suppression, such as steroids, chemotherapeutic medications, and/or antimetabolites; malnutrition with a hydrated serum albumin of less than 3.0 grams/deciliter; neutropenia; preeclampsia; patients who have cardiac, pulmonary, liver or renal disease; history of previous surgery or radiation in the treatment area. Subjects' risk factors for each of the sixteen (16) studies are described in Table 3; however, some of the studies contain all comers with only a portion being high-risk patients. Upon further examination, nine (9) studies were determined to contain only high-risk patients. A subgroup analysis was performed on these nine (9) studies (Figure 6). As expected, the incidence of SSI, in both the treatment and control groups, is higher in high-risk patients (5.5% and 12.9%, respectively) compared to the overall study population (4.2% and 5.8%, respectively). Additionally, there appears to be a greater overall percentage reduction in SSI in high risk patients. Thus, while the reduction in SSI, as measured by odds ratio, in high risk patients does not appear to be significantly different than the reduction observed in the overall data (Figure 2), there is a greater clinical benefit of the Prevena Incision Management System in patients at high risk for surgical site infection based on a greater absolute percentage reduction in the incidence of SSI.

Figure 6. Forest plot of meta-analysis studies on surgical site infection in high risk patients

	Treatment			Control				
Study/subgroup	Events	Total	(%)	Events	Total	(%)	Odds ratio (95% CI)	Odds ratio (95% CI)
DiMuzio P 2017	6	59	(10.2)	15	60	(25.0)	0.34 (0.12, 0.95)	
Grauhan O 2013	3	75	(4.0)	12	75	(16.0)	0.22 (0.06, 0.81)	
Gunatiliake RP 2017	1	39	(2.6)	4	43	(9.3)	0.26 (0.03, 2.40)	
Lee K 2017	6	53	(11.3)	9	49	(18.4)	0.57 (0.19, 1.73)	
NCT01341444	0	28	(0.0)	2	30	(6.7)	0.20 (0.01, 4.35)	
NCT02195310	13	145	(9.0)	16	154	(10.4)	0.85 (0.39, 1.83)	
Newman JM 2017	2	80	(2.5)	12	80	(15.0)	0.15 (0.03, 0.67)	
Ruhstaller K 2017	2	61	(3.3)	4	58	(6.9)	0.46 (0.08, 2.60)	
Swift SH 2015	3	110	(2.7)	24	209	(11.5)	0.22 (0.06, 0.73)	
Total		**650**			**758**		**0.40 (0.27, 0.62)**	



Together, the subgroup analyses on wound classification, infection depth, and patient risk factors for surgical site infection serve as the basis for granting the following Indications for Use:

> *When used with legally marketed compatible dressings, Prevena 125 and Prevena Plus 125 Therapy Units are intended to aid in reducing the incidence of seroma and, in patients at high risk for post-operative infections, aid in reducing the incidence of superficial surgical site infection in Class I and Class II wounds.*

Additional subgroup analyses for surgical site infection were performed based on surgical procedure risk factor, combination of surgical procedure and patient risk factors, and incision location. While the results from these subgroup analyses were reviewed, they did not serve as the basis for granting this De Novo request.

Seroma

Seven (7) prospective studies were included in the meta-analysis for seroma, which are summarized in Table 4 below. Five (5) studies are randomized controlled trials, which are level I evidence. The remaining two (2) studies are considered level II evidence, which include one (1) prospective treatment and historical controls study and one (1) prospective observational study that alternated patient assignment into either the treatment or control group (i.e., not randomized).

Table 4. Characteristics of studies included in the seroma meta-analysis

Study/level of evidence*	Study design	Surgical procedure	Subjects' risk factors	Study duration	Incisional dressings used	No. of subjects	Treatment duration (days)
Ferrando 2017[5] Level II	Prospective Observational	Breast conserving surgery, oncoplastic surgery, tissue sparing, simple mastectomies†	BMI mean Treatment: 27 kg/m^2; Control: 29.5 kg/m^2; Diabetes; Hx of Smoking; HTN; Use of Corticosteroids; Artery and Liver Disease; Chemotherapy; Radiation; Previous Surgery; Invasive surgery	1 year	Solventum™ Prevena Plus™ Customizable Dressing	17 (25 Wounds)	7
					Solventum™ Steri-Strip™ Reinforced Adhesive Skin Closures	20 (22 Wounds)	14
Gunatilake 2017[8] Level I	RCT	Cesarean delivery	BMI Mean Treatment: 46.3 kg/m^2, Control: 46.8 kg/m^2; Diabetes	42 ± 10 days	Solventum™ Prevena™ Incision Management System	39	5-7
					Solventum™ Steri-Strip™ Reinforced Adhesive Skin Closures, sterile gauze, 3M™Tegaderm™ Dressing	43	1-2
NCT01341444 Level I	RCT	Renal transplant†	BMI Mean Treatment: 29.05 kg/m^2, Control: 28.73; Diabetes; Tobacco Use;	30 days	Solventum™ Prevena™ Incision Management System	28	5
					Standard incisional dressing	30	3
Pachowsky 2012[15] Level I	RCT	Total hip arthroplasty	NR	10 days	Solventum™ Prevena™ Incision Management System	9	5 days
					Standard wound dressing	10	NR
Pauser 2016[16] Level I	RCT	Hip hemiarthroplasty†	NR	10 days	Solventum™ Prevena™ Incision Management System	11	5
					Standard wound dressing consisting of dry wound coverage	10	NR
Pleger 2017[17] Level I	RCT	Vascular procedures with access in common femoral artery†	BMI Mean Treatment: 26.7 kg/m^2, Control: 27.8 kg/m^2; Diabetes; HX of Smoking/; COPD; Renal Insufficiency; Malnutrition; Age > 50 years; Overweight	30 days	Solventum™ Prevena™ Incision Management System	43 (58 wounds)	5-7
					Conventional adhesive plaster	57 (71 wounds)	1
Redfern 2017[18] Level II	Prospective & Historical Controlled	Total hip or knee arthroplasty (elective primary)	BMI Mean Treatment: 30.5 kg/m^2, Control: 30.9 kg/m^2; Diabetes; HTN; Hx of Cancer/ Tumor; Arthritis; Myocardial Infarction/Heart Disease; Tobacco use	60 days	Solventum™ Prevena™ Incision Management System	192	6-8
					Traditional gauze dressing	400	Standard

†Population or Procedure identified as high-risk for wound complication
*Oxford Centre of Evidence-Based Medicine
NR=Not Reported
RCT=Randomized Controlled Trial
IMS=Incision Management System
ciNPWT=closed incision Negative Pressure Wound Therapy
BMI=Body Mass Index
HX=History
COPD=Chronic Obstructive Pulmonary Disorder
GERD=Gastroesophageal Reflux Disease
HTN=Hypertension
AF=Atrial Fibrillation
CVD=Cardiovascular disease
CKF=Chronic kidney failure
PVD=Peripheral vascular disease
LVD=Left ventricle dysfunction
CAD=Coronary artery disease
CKD=Chronic kidney disease
LVEF=Left ventricle ejection fraction
HIV=Human immunodeficiency virus

Together, the seven (7) studies contained 366 evaluable patients receiving Prevena Therapy (treatment group) and 586 patients receiving conventional wound dressings (control group). The conventional wound dressings used in each study can be found in Table 5 above and mostly consist of gauze and occlusive dressings. The primary endpoint in the studies was the incidence of seroma in the treatment group compared to the control group for at least 10 days following surgery.

The treatment effect for each study was summarized using odds ratio (OR), which was calculated using the following formula: OR=AD/BC, where

A=the number of subjects with seroma events for the treatment group

B=the number of subjects without seroma events for the treatment group

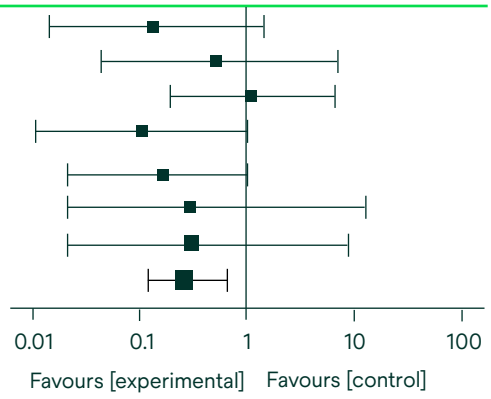
C=the number of subjects with seroma events for the control group

D=the number of subjects without seroma events for the control group

An OR of less than 1 suggests a favorable effect by the treatment in reducing seroma, whereas an OR greater than 1 suggests a favorable effect by the standard of care in reducing seroma. The 95% confidence interval (95% CI) for the odds ratio is calculated based on the standard error of Log (OR). The individual study effects are summarized in Figure 7 below.

Figure 7. Forest plot of meta-analysis studies for seroma.

	Treatment			Control			
Study/subgroup	Events	Total	(%)	Events	Total	(%)	Odds ratio (95% CI)
Ferrando PM 2017	1	25	(4.0)	5	22	(22.7)	0.14 (0.02, 1.32)
Gunatiliake RP 2017	1	39	(2.6)	2	43	(4.7)	0.54 (0.05, 6.19)
NCT01341444	3	28	(10.7)	3	30	(10.0)	1.08 (0.20, 5.85)
Pachowsky M 2012	4	9	(44.4)	9	10	(90.0)	0.09 (0.01, 1.03)
Pauser J 2014	4	11	(36.4)	8	10	(80.0)	0.14 (0.02, 1.03)
Pleger SP 2017	0	58	(0.0)	1	71	(1.4)	0.40 (0.02, 10.05)
Redfern RE 2017	0	196	(0.0)	2	400	(0.5)	0.41 (0.02, 8.49)
Total		**366**			**586**		**0.31 (0.13, 0.75)**



Overall, there is an observable trend supporting a favorable effect by the Solventum™ Prevena™ Incision Management System in reducing the incidence of seroma formation. The seroma rates ranged from 0.5 % to 90 % for the control group in the selected studies, and the seroma rates in the treatment group ranged from 0 % to 44.4 %. However, the benefit of the Prevena Incision Management Systems in reducing the incidence of seroma formation varies broadly across different studies, possibly due to many confounding factors such as different surgical procedures and patient risk factors. Subgroup analyses for seroma were not conducted as there are only seven (7) studies total and dividing them into subgroups would not result in meaningful analyses. Additionally, there are many inherent limitations associated with meta-analyses and biases with each individual study, which are discussed in the 'Limitations of the Clinical Evidence' section below. Because of these confounding factors and limitations, statistical significance cannot be reliably inferred for the treatment effect on seroma rates based on the combined results from the seven (7) studies.

Safety

Adverse events (AEs) and Serious Adverse Events (SAEs) were reported in three (3) of the twenty (20) studies included in the meta-analyses [Gunatilake (Cesarean section) 20178, NCT01341444 (Renal transplant), NCT02195310 (Sternotomy)]. There were no treatment related AEs or SAEs reported in the Cesarean section study (Gunatilake 20178). In the two studies conducted by Solventum (NCT01341444 (Renal transplant), NCT02195310 (Sternotomy)), there were no SAEs, and the twenty one (21) reported AEs related or possibly related to the device including pain (5), blisters (4), dehiscence (4), draining/wound secretion (2), erythema (2), skin irritation (2), ecchymosis (1), and hematoma (1), which are known adverse events that may be seen with the use of the device on surgical incisions.

No significant differences were reported in AEs or SAEs between the Solventum™ Prevena™ Incision Management System (treatment group) and conventional wound dressings (control group). No adverse device events, serious adverse device events, or device failures were reported. These results suggest that the Prevena Incision Management Systems have a similar safety profile as conventional wound dressing for closed surgical incisions.

Limitations of the clinical evidence

There are many inherent limitations to meta-analyses, such as publication bias and selection bias. In addition, surgical site infection (SSI) and seroma are complex post-operative outcomes that have many potential causes. While efforts were made in the study identification and selection process to ameliorate biases by including both published and unpublished studies and only the highest quality studies, not all aspects of each selected meta-analysis study are identical. First, even though only prospective studies were included in the meta-analyses, these studies often had many potential sources of bias. Bias assessment was conducted using the Cochrane guidelines and focused on randomization, allocation concealment, differences in baseline patient and risk characteristics, blinded assessments, loss to follow up, comparing purpose of study to outcomes reported, and when possible, comparing outcomes to those listed on ClinicalTrials.gov, when available. Fourteen (14) of the twenty (20) meta-analysis studies were identified as high-risk for bias (Cantero 20163, DiMuzio 20174, Ferrando 20175, Gunatilake 20178, Lavryk 201610, Lee AJ 201611, Matatov 201313, NCT013471444, Newman 201714, Pleger 201717, Redfern 201718, Sabat 201620, Swift 201522). One (1) study was assessed as low risk for bias (Lee K 201712). Risk for bias was unclear in the remaining five (5) studies due to the lack of information reported in the studies. Second, the unit of the analysis is not consistent in all studies. Some studies used the wound as the unit of analysis and others used the patient as the unit of analysis. As a result, some of the data used in these analyses were based on wounds and some patients contributed more than one (1) wound to the analyses. Third, the timing of the outcome assessments was not consistent across each of the different studies. For example, although all the SSI studies evaluated SSI events for at least four weeks post-surgery, the duration of some of the studies was much longer. Similarly, although all the seroma studies evaluated the incidence of seroma for at least ten days after surgery, the duration of some of the studies was much longer. Fourth, the reported SSI rates in the meta-analysis studies varied broadly across different studies. It should be noted that the following SSI rates based on wound classification and types of SSI (Table 5) have recently been reported based on a retrospective review of the 2011 American College of Surgeons (ACS) National Surgical Quality Improvement Program (NSQIP) database[9]:

Table 5. Surgical Site Infection (SSI) rates based on ACS NSQIP database[9].

30-d postoperative outcomes	Total	Wound classification			
		Class I	Class II	Class III	Class IV
Surgical Site Infection (SSI)	3.4%	1.8%	4.8%	5.6%	8.5%
Superficial incisional SSI	1.9%	1.2%	2.6%	2.8%	2.7%
Deep incisional SSI	0.6%	0.4%	0.6%	0.8%	1.5%
Organ space SSI	1.1%	0.3%	1.6%	2.2%	4.4%

The SSI rates reported in the studies selected for the meta-analysis, even for the control groups, are generally higher than those reported in the literature. Factors contributing to this discrepancy may be surgeon-, procedure-, or patient-dependent, but nevertheless cannot be pinpointed based on the information provided in the studies. Fifth, five (5) of the seven (7) prospective studies included in the meta-analysis for SSI and one (1) prospective study included in the meta-analysis for seroma compared the Solventum™ Prevena™ Incision Management System to historical controls. There have been significant evidence-based changes in patient care to define and reduce the risk for post-operative complications, including surgical site infections. Additionally, surgical site infection reduction measures vary among surgeons, hospitals, and countries. Changes in disease definitions, interventions, and treatment effectiveness over time contribute to non-contemporaneous bias. Results of studies using historical controls should be evaluated with caution.

These limitations should be considered when examining the results from these meta-analyses.

References

(1) Ban, K. A., Minei, J. P., Laronga, C., Harbrecht, B. G., Jensen, E. H., Fry, D. E., . . . Duane, T. M. (2017). American College of Surgeons and Surgical Infection Society: Surgical Site Infection Guidelines, 2016 Update. Journal of the American College of Surgeons,224(1), 59-74. doi:10.1016/j.jamcollsurg.2016.10.029

(2) Berríos-Torres SI, Umscheid CA, Bratzler DW, et al. Centers for Disease Control and Prevention Guideline for the Prevention of Surgical Site Infection, 2017. JAMA Surg. 2017;152(8):784–791. doi:10.1001/jamasurg.2017.0904

(3) Cantero R, Rubio-Perez I, Leon Metal. Negative-Pressure Therapy to Reduce the Risk of Wound Infection Following Diverting Loop Ileostomy Reversal: An Initial Study. Adv Skin Wound Care 2016;29:114-118. doi:10.1097/01.ASW.0000480458.60005.34.

(4) DiMuzio P, Staley C, Reiter D et al. RS06: A Randomized Study Evaluating Negative-Pressure Therapy to Decrease Vascular Groin Wound Complications. J Vase Surg 2017;65:133S.

(5) Ferrando, P. M., Ala, A., Bussone, R., Bergamasco, L., Perinetti, F. A., & Malan, F. (2018). Closed incision negative pressure therapy in oncological breast surgery: comparison with standard care dressings. Plastic and Reconstructive Surgery Global Open, 6(6).

(6) Grauhan O, Navasardyan A, Hofmann M, Muller P, Stein J, Hetzer R. Prevention of poststernotomy wound infections in obese patients by negative pressure wound therapy. J Thorac Cardiovasc Surg 2013;145:1387-1392.

(7) Grauhan, O., Navasardyan, A., Tutkun, B., Hennig, F., Müller, P., Hummel, M., & Hetzer, R. (2014). Effect of surgical incision management on wound infections in a poststernotomy patient population. International wound journal, 11(s1), 6-9.

(8) Gunatilake, R. P., Swamy, G. K., Brancazio, L. R., Smrtka, M. P., Thompson, J. L., Gilner, J. B., ... & Heine, R. P. (2017). Closed-incision negative-pressure therapy in obese patients undergoing cesarean delivery: a randomized controlled trial. American Journal of Perinatology Reports, 7(03), e151-e157.

(9) Ju, M. H., Cohen, M. E., Bilimoria, K. Y., Latus, M. S., Scholl, L. M., Schwab, B. J., Hall, B. L. (2014). Effect of Wound Classification on Risk Adjustment in American College of Surgeons NSQIP. Journal of the American College of Surgeons, 219(3). doi:10.1016/j.jamcollsurg.2014.04.009

(10) Lavryk O, Ashburn J, Liska D et al. Incisional negative pressure wound therapy reduces surgical site infections in complex colorectal surgery patients. Dis Colon Rectum 2016;59:e380. doi:1 0.1 097/01 .dcr.0000482708.50838.af.

(11) Lee AJ, Sheppard CE, KentWD, Mewhort H, Sikdar KC, Fedak PW. Safety and efficacy of prophylactic negative pressure wound therapy following open saphenous vein harvest in cardiac surgery: a feasibility study. Interactive Cardiovascular and Thoracic Surgery 2017;24:324-328. doi:1 0.1 093/icvts/ivw400.

(12) Lee, K., Murphy, P. B., Ingves, M. V., Duncan, A., DeRose, G., Dubois, L., ... & Power, A. (2017). Randomized clinical trial of negative pressure wound therapy for high-risk groin wounds in lower extremity revascularization. Journal of vascular surgery, 66(6), 1814-1819.

(13) Matatov T, Reddy KN, Doucet LD, Zhao CX, Zhang WW. Experience with a new negative pressure incision management system in prevention of groin wound infection in vascular surgery patients. J Vasc Surg 2013;57:791-795.

(14) Newman, J. M., Siqueira, M. B., Klika, A. K., Molloy, R. M., Barsoum, W. K., & Higuera, C. A. (2019). Use of Closed Incisional Negative Pressure Wound Therapy After Revision Total Hip and Knee Arthroplasty in Patients at High Risk for Infection: A Prospective, Randomized Clinical Trial. The Journal of arthroplasty, 34(3), 554-559.

(15) Pachowsky, M., Gusinde, J., Klein, A., Lehrl, S., Schulz-Drost, S., Schlechtweg, P., ... & Brem, M. H. (2012). Negative pressure wound therapy to prevent seromas and treat surgical incisions after total hip arthroplasty. International orthopaedics, 36(4), 719-722.

(16) Pauser, J., Nordmeyer, M., Biber, R., Jantsch, J., Kopschina, C., Bail, H. J., & Brem, M. H. (2016). Incisional negative pressure wound therapy after hemiarthroplasty for femoral neck fractures–reduction of wound complications. International wound journal, 13(5), 663-667.

(17) Pleger, S. P., Nink, N., Elzien, M., Kunold, A., Koshty, A., & Böning, A. (2018). Reduction of groin wound complications in vascular surgery patients using closed incision negative pressure therapy (ciNPT): a prospective, randomised, single-institution study. International wound journal, 15(1), 75-83.

(18) Redfern RE, Cameron-Ruetz C, O'Drobinak S, Chen J, Beer KJ. Closed incision negative pressure therapy effects on postoperative infection and surgical site complication after total hip and knee arthroplasty. J Arthroplasty 2017;32:3333-3339.

(19) Ruhstaller, K., Downes, K. L., Chandrasekaran, S., Srinivas, S., & Durnwald, C. (2017). Prophylactic wound vacuum therapy after cesarean section to prevent wound complications in the obese population: a randomized controlled trial (the ProVac study). American journal of perinatology, 34(11), 1125-1130.

(20) Sabat J, Tyagi S, Srouji A et al. IP123- Prophylactic Negative-Pressure Therapy for Femoral Incision in Vascular Surgery: Preliminary Results of a Prospective, Randomized Trial. (Presented at the 2016 Vascular Annual Meeting, June 8-11, 2016, National Harbor, MD). [abstract]. J Vasc Surg 2016;63:94S-95S.

(21) "Surgical Site Infection (SSI) Event." Surgical Site Infection (SSI) Event, 2019, www.cdc.gov/nhsn/PDFs/pscManual/9pscSSIcurrent.pdf?agree=yes&next=Accept.%20Updated%20January%202019.

(22) Swift SH, Zimmerman MB, Hardy-Fairbanks AJ. Effect of single-use negative pressure wound therapy on postcesarean infections and wound complications for high-risk patients. J Reprod Med 2015;60:21 1-218.

(23) Atkins BZ, et al. "Does Negative Pressure Wound Therapy Have a Role in Preventing Poststernotomy Wound Complications?" Surgical Innovations. 2009 June 16(2):140-6.

(24) Atkins BZ, et al. "Laser Doppler flowmetry assessment of peristernal perfusion after cardiac surgery: beneficial effect of negative pressure therapy." International Wound Journal. 2011 Feb;8(1):56-62.

(25) Berkowitz MJ. “Use of a Negative Pressure Incisional Dressing After Surgical Treatment of Calcaneal Fractures. ”Techniques in Foot & Ankle Surgery. 2013 December 1;12(4):172-4.

(26) Blackham AU, et al. “Prevention of surgical site infections in high-risk patients with laparotomy incisions using negative-pressure therapy.” American Journal of Surgery. 2013 January 30.

(27) Bollero D, et al. “Negative pressure surgical management after pathological scar surgical excision: a first report.” International Wound Journal. 2013 Feb 19. [Epub ahead of print]

(28) Bonds AM, et al. “Incisional Negative Pressure Wound Therapy Significantly Reduces Surgical Site Infection in Open Colorectal Surgery.” Diseases of the Colon & Rectum. 2013 December 1;56(12):1403-8

(29) Colli A. “First Experience With a New Negative Pressure Incision Management System on Surgical Incisions After Cardiac Surgery in High Risk Patients.” Journal of Cardiothoracic Surgery. 2011 December 6;6(1):160.

(30) Conde-Green A, et al. “Incisional Negative-Pressure Wound Therapy versus conventional dressings following abdominal wall reconstruction. A comparative study.” Annals of Plastic Surgery. 2013 Oct 71(4):394-7.

(31) Dutton M, Curtis K. “Well-wound therapy: use of NPWT to prevent laparotomy breakdown.” Journal of Wound Care. 2012 Aug 21(8):386-8.

(32) Faroqi L, et al. “Use of an Incision-Line Negative Pressure Wound Therapy Technique to Protect High-Risk Diabetic Foot Wounds, Postoperatively.” Journal of Diabetic Foot Complications. 2013 September 1;5(2):44-7.

(33) Glaser DA, et al. “Negative pressure therapy for closed spine incisions: A pilot study.”Wounds. 2012 Nov 24(11):308-11

(34) Gomoll AH, et al. “Incisional vacuum-assisted closure therapy.” Journal of Orthopaedic Trauma. 2006 Nov-Dec;20(10):705-9.

(35) Haghshenasskashani A, Varcoe RL. “A new negative pressure dressing (Prevena) to prevent wound complications following lower limb distal arterial bypass.”The British Journal of Diabetes and Vascular Disease. 2011 Jan/Feb;11(1):21-4.

(36) Ingargiola MJ, Daniali LN, Lee ES. “Does the application of incisional negative pressure therapy to high-risk wounds prevent surgical site complications? A systematic review.” Eplasty. 2013 September 20;13:e49.

(37) Karlakki S, et al. “Negative pressure wound therapy for management of the surgical incision in orthopaedic surgery: A review of evidence and mechanisms for an emerging indication.” Bone and Joint Research. 2013 December 1;2(12):276-84.

(38) Kilpadi DV, Cunningham MR. “Evaluation of closed incision management with negative pressure wound therapy (CIM): hematoma/seroma and involvement of the lymphatic system.” Wound Repair and Regeneration. 2011 Sep;19(5):588-96.

(39) Mark KS, et al. “Incisional Negative Pressure Therapy to Prevent Wound Complications Following Cesarean Section in Morbidly Obese Women: A Pilot Study.” Surgical Innovations. 2013 September 20.

(40) Masden D, Goldstein J, Endara M, Xu K, Steinberg J, Attinger C. “Negative pressure wound therapy for at-risk surgical closures in patients with multiple comorbidities: a prospective randomized controlled study.” Annals of Surgery. 2012 Jun;255(6):1043-7.

(41) Pauli EM, Krpata DM, Novitsky YW, Rosen MJ. “Negative Pressure Therapy for High-Risk Abdominal Wall Reconstruction Incisions.” Surgical Infections. 2013 Jun;14(3):270-4.

(42) Reddix RN, et al. “The effect of incisional negative pressure therapy on wound complications after acetabular fracture surgery.” Journal of Surgical Orthopaedic Advances. 2010 Jun;19(2):91–7.

(43) Stannard JP, et al. “Negative pressure wound therapy to treat hematomas and surgical incisions following high-energy trauma.” Journal of Trauma. 2006 Jun;60(6):1301-6.

(44) Stannard JP, et al. “Incisional negative pressure wound therapy after high-risk lower extremity fractures.” Journal of Orthopedic Trauma. 2012 Jan;26(1):37-42.

(45) Tauber R, et al. “Inguinal lymph node dissection: epidermal vacuum therapy for prevention of wound complications.” Journal of Plastic, Reconstructive, and Aesthetic Surgery. 2013 Mar;66(3):390-6.

(46) Vargo D. “Negative pressure wound therapy in the prevention of wound infection in high risk abdominal wound closures.” American Journal of Surgery. 2012 Dec;204(6):1021-4.

(47) Wilkes RP, et al. “Closed incision management with negative pressure wound therapy (CIM): biomechanics.” Surgical Innovations. 2012 Mar;19(1):67-75.

Follow local institutional protocols for infection control and waste disposal procedures. Local protocols should be based on the applicable federal, state and/or local government environmental regulations.

Note: The effectiveness Solventum™ Prevena™ Therapy in reducing the incidence of SSIs and seroma in all surgical procedures and populations has not been demonstrated. See full indications for use and limitations at Prevena.com. Specific indications, contraindications, warnings, precautions, and safety information exist for these products and therapies. Please consult a clinician and product instructions for use prior to application. Rx only

Excerpt from Solventum™ Prevena™ Therapy 125 Unit IFU, Rev A 420236

PRA-PM-US-01554 (08/21)

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