Incisional Negative Pressure Wound Dressings (iNPWD) for spinal fusions

Literature review and review of our local experience at ARI between 1/7/2021 and 1/7/2023

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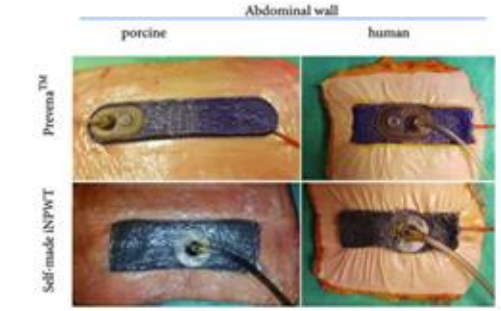
Incisional Negative pressure wound therapy (iNPWT)

NPWT: System that aids the optimization of wound healing through the application of sub-atmospheric pressure*

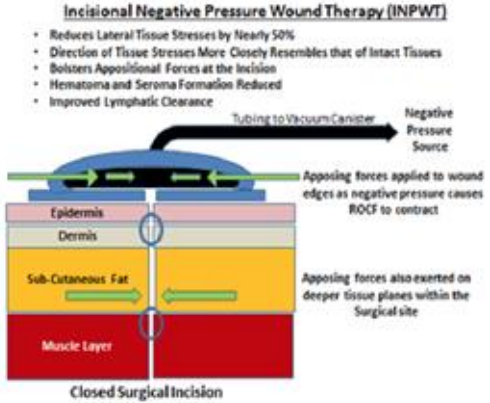
iNPWT: prophylactic use of NPWT on primary closed incisional wounds prevention of postoperative wound complications**

Benefits:

- Reduces:
  - bacterial contamination
  - exudate
  - oedema
- promotes lymphatic and local blood flow
- stimulates tissue granulation*



Incisional negative pressure wound therapy (iNPWT) dressings on abdominal wall resections.



*Negative Pressure Wound Therapy https://www.ncbi.nlm.nih.gov/books/NBK576388/

**The lancet https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(23)00282-1/fulltext

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Associated known Complications

iNPWT:

- Skin blisters and maceration
- Pump failure*
- Pressure sores

NPWT:

- Pain, bleeding, infection
- Hypersensitivity reaction to the dressing
- Negative pressure erosion or necrosis

*NICE guidelines https://www.nice.org.uk/guidance/MTG43

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NICE Guideline (2019)

Evidence suggests:

- Fewer surgical site infections
- Reduces the rate of seromas
- Not add to the overall costs of treatment

Recommenced for: Orthopaedic, Colorectal, Obstetric, Plastic/breast surgery, Vascular and Cardiothoracic surgery

No clear guidance from NICE to use this dressing in spinal surgery

*NICE guidelines https://www.nice.org.uk/guidance/MTG43

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The Lancet meta-analysis (2023)

Findings

- Systematic review:
  - 57 RCTs with 13,744 patients
  - RR of 0.67
- GRADE assessment shows high-certainty evidence that iNPWT is effective in reducing SSI
- Uncertainty is less than in previous meta-analyses
- Further trials are unlikely to change the effect estimate for the outcome of SSI

Incisional negative pressure wound therapy for the prevention of surgical site infection: an up-to-date meta-analysis and trial sequential analysis

Hannah Groenen,[a,b,c,*] Hasti Jalalzadeh,[a,b,c,*] Dennis R. Buis,[c,d] Yasmine E. M. Dreissen,[c,d] Jan H. M. Goosen,[c,e] Mitchel Griekspoor,[c,f] Wouter J. Harmsen,[c,f] Frank F. A. IJpma,[c,g] Maarten J. van der Laan,[c,h] Roald R. Schaad,[c,i,j] Patrique Segers,[c,k] Wil C. van der Zwet,[c,l] Stijn W. de Jonge,[a,b] Ricardo G. Orsini,[a,m] Anne M. Eskes,[a,b,n,o] Niels Wolfhagen,[a,b,c] and Marja A. Boermeester[a,b,c,*]

	No. of studies	SSIs/participants iNPWT	SSIs/participants standard wound care	RR (95% CI)*	GRADE
Primary outcome					
SSI overall	57	540/6849 (7.9%)	802/6895 (11.6%)	**0.67 (0.59–0.76)**	High
Type of Surgery	p value for subgroup differences = 0.14				
Abdominal	18	187/1175 (15.9%)	280/1152 (24.3%)	**0.66 (0.54–0.81)**	
Breast	1	0/50 (0%)	5/50 (10.0%)	0.09 (0.01–1.60)	
Cardiac	4	1/161 (0.6%)	14/155 (9.0%)	**0.14 (0.03–0.62)**	
General	2	5/54 (9.3%)	7/44 (15.9%)	0.57 (0.19–1.72)	
Obstetric	11	207/3121 (6.6%)	260/3139 (8.3%)	0.82 (0.66–1.03)	
Orthopedic/trauma	12	78/1750 (4.5%)	127/1824 (7.0%)	**0.64 (0.46–0.89)**	
Plastic	3	6/95 (6.3%)	7/87 (8.0%)	0.84 (0.30–2.34)	
Vascular	6	56/443 (12.6%)	102/444 (23.0%)	**0.55 (0.39–0.77)**	

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No clear guidance on this dressing in prophylactic use in spinal surgery

The Lancet https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(23)00282-1/fulltext

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Evidence of iNWPT in spine

- 1 systematic review
- 3 meta analysis
- 4 observational studies

Review > World Neurosurg. 2022 Dec:168:258-267.e1. doi: 10.1016/j.wneu.2022.09.048. Epub 2022 Sep 16.

The Usefulness of Closed Incision Negative Pressure Wound Therapy After Spinal Fusion: A Systematic Review and Meta-Analysis

Mark J Lambrechts [1], Nicholas D D'Antonio [2], Tariq Z Issa [2], Hannah A Levy [2], Goutham R Yalla [2], Emily Berthiaume [2], Kerri-Anne Ciesielka [2], Christopher K Kepler [2], Jose A Canseco [2]

Affiliations + expand

PMID: 36116727 DOI: 10.1016/j.wneu.2022.09.048

Systematic review
(Dec 2022, World Neurosurgery)*

- ciNPWT may:
  - reduce the rates of SSI after spinal fusion
  - reduce postoperative wound complications
  - the meta-analysis was insufficiently powered to make this association

*https://pubmed.ncbi.nlm.nih.gov/36116727/

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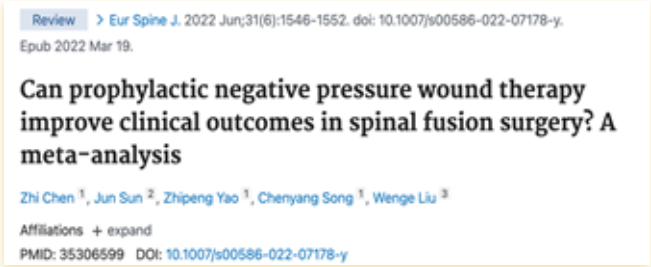
Evidence of iNWPT in spine (cont)

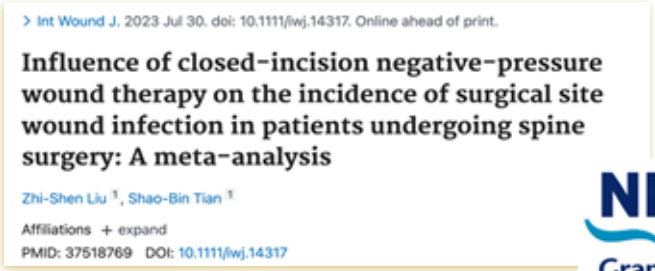
Meta-analysis (2022, European Spine Journal)

- NPWT could effectively reduce postoperative surgical site infection
- No significant benefit in reducing:
  - incidence of wound dehiscence
  - overall wound complication
  - readmission and reoperation.



Meta-analysis (July 2023, International Wound Journal)

- Reduces the incidence of postoperative surgical site wound infections
- Does not shorten hospital stay for patients.



*https://pubmed.ncbi.nlm.nih.gov/35306599/
**https://pubmed.ncbi.nlm.nih.gov/37518769/

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Our Outcomes at Aberdeen Royal Infirmary

- 182 cases, retrospectively
  - Period of 1 July 2021 - 1 July 2023
  - Departments: T&O and Neurosurgery
  - Spinal fusion
- 15 cases containing “VAC” “vacuum dressing” “PICO” “Prevena”
  - 13 of them NPWT was used prophylactically
- Compared to 13 (out of same 182) randomly selected and demographically matched outcomes

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PREVENA

- Negative pressure of 125 mmHg for up to seven days.

https://www.acelity.com/healthcare-professionals/global-product-catalog/catalog/prevena-incision-management-system

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PICO

- Continuous, even distribution of negative pressure of 80 mmhg
- Portable, canister-free, single-use (4)

NICE guidelines https://www.nice.org.uk/guidance/MTG43

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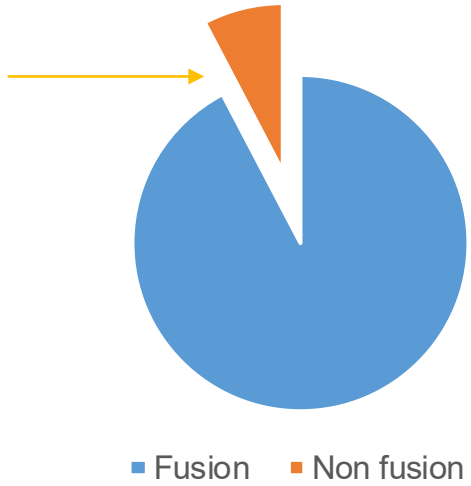
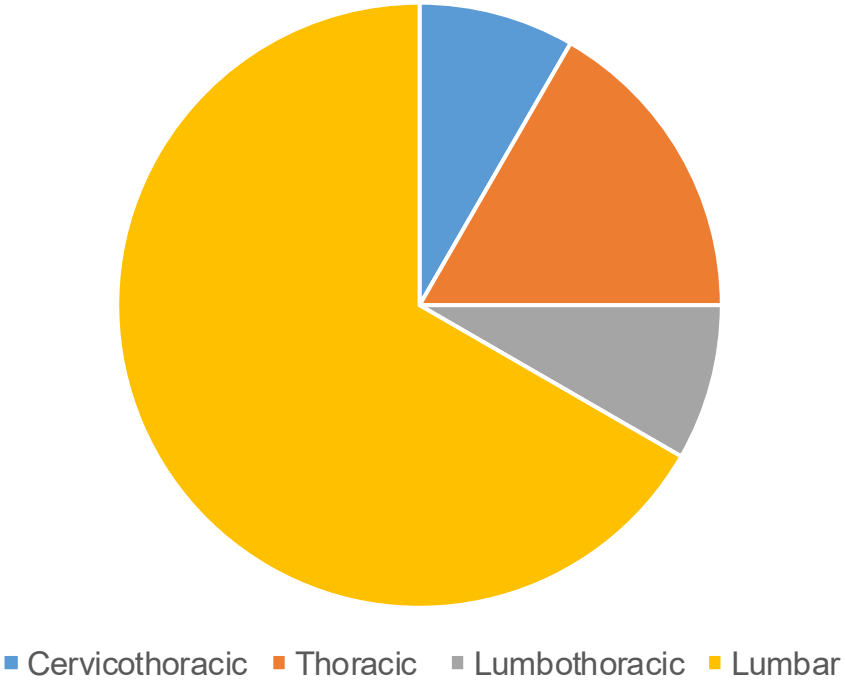
Types of surgery

Bariatric patient



Total of 13*



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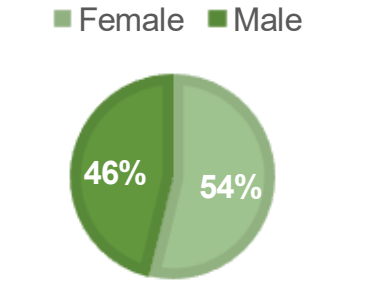
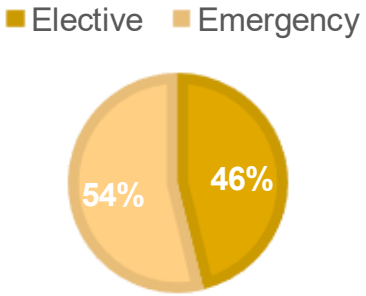
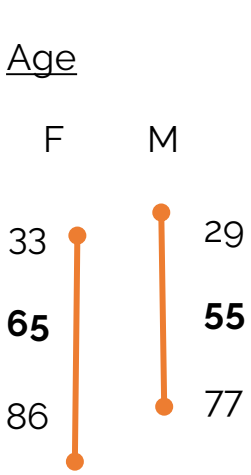
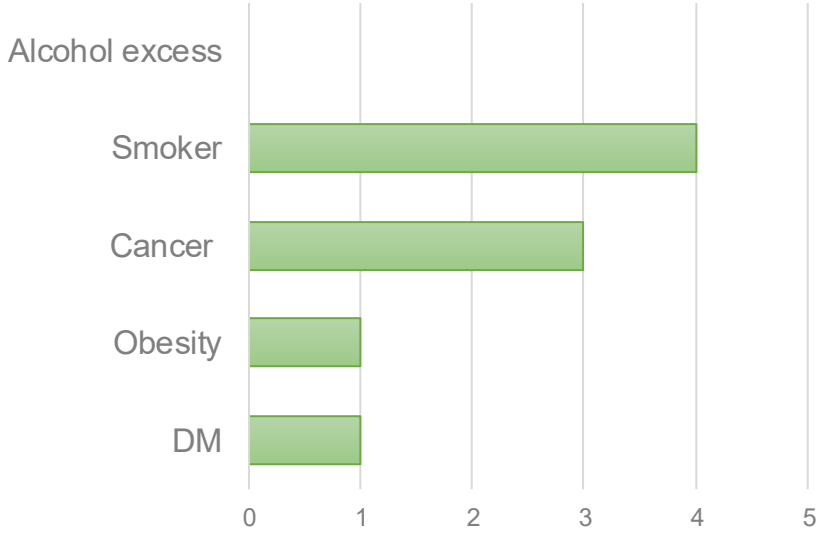
Demographics / comorbidities









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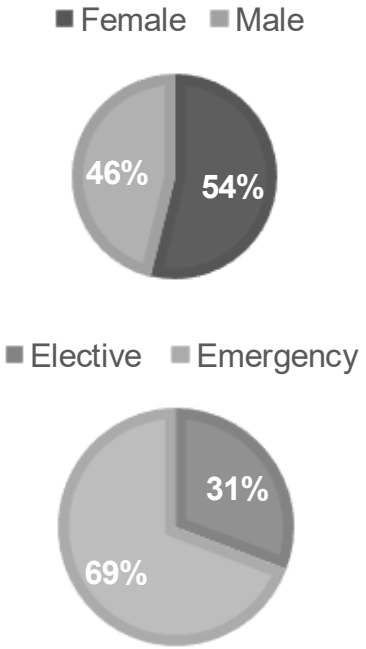
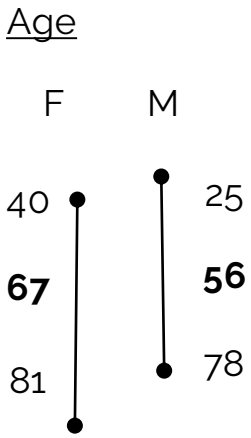
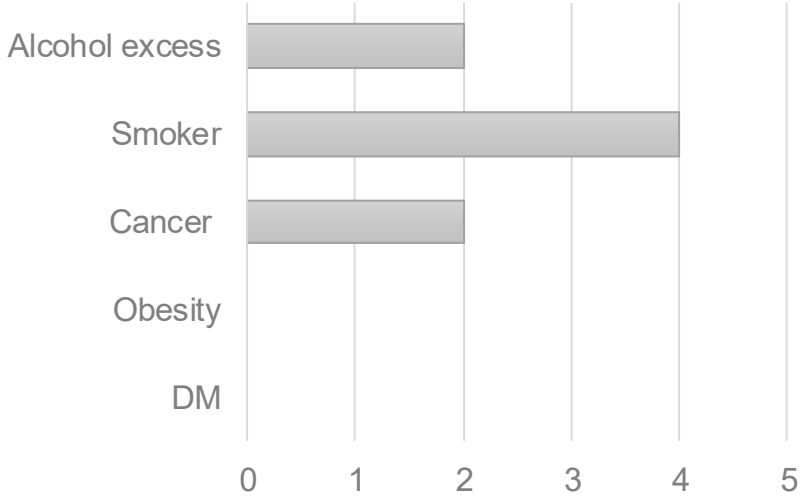
Demographically-matched outcomes







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Outcomes

- None of 13 patients using iNPWT had Surgical Site Infection and the wound healed properly
- 2 of the 13 patients *not* using iNPWT had Surgical Site Infection

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Conclusions

- Ambiguous evidence regarding the use of iNPWT in spinal fusion procedures
- Need for further use of iNPWT and audit of outcomes / do prospective study with patients using iNPWT in spinal fusion procedures
- No clear guidance / indication of use in spine surgery except large wound and some risk of wound healing (comorbidities)

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Limitations

- Not looked at all patients who did not have iNPWT
- Surgeon and patient specific - more evidence needed
- Low number of identified patients with iNPWT
- ?incorrect coding in OPERA
- Demographically-matched patients: unlikely to represent the true outcomes

Recommendations

- Prospective study
- Advocated use of iNPWT
- Revisit and audit

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