Received: 16 June 2021 | Revised: 24 August 2021 | Accepted: 25 August 2021
DOI: 10.1111/iwj.13689

ORIGINAL ARTICLE

Economic model to estimate cost of negative pressure wound therapy with instillation vs control therapies for hospitalised patients in the United States, Germany, and United Kingdom

Paul J Kim[1] | **Siobhan Lookess**[2] | **Christine Bongards**[2] | **Leah Passmore Griffin**[2] | **Allen Gabriel**[3]

[1]Department of Plastic Surgery, University of Texas Southwestern Medical Center, Dallas, Texas, USA
[2]3M, San Antonio, Texas, USA
[3]Department of Plastic Surgery, Loma Linda University Medical Center, Loma Linda, California, USA

Correspondence
Paul J Kim, Department of Plastic Surgery, University of Texas Southwestern Medical Center, 1801 Inwood Rd, Dallas, TX 75390-9132, USA.
Email: paul.kim@utsouthwestern.edu

Abstract
An economic model was developed to estimate the cost of negative pressure wound therapy with instillation and dwelling of a topical wound solution vs control therapies. Economic model inputs were means derived from the results of a recently published systematic review and meta-analysis of 13 comparative studies of negative pressure wound therapy with instillation. Means across studies comprising complex acute and chronic wounds for negative pressure wound therapy-instillation vs control (negative pressure wound therapy without instillation, gauze dressings, or gentamicin polymethylmethacrylate beads) groups were 1.77 vs 2.69 operating room visits ($P = .008$) and 9.88 vs 21.80 therapy days ($P = .02$), respectively. These inputs plus hospital cost data were used to model costs for the United States, Germany, and the United Kingdom. For the United States, Germany, and United Kingdom, respectively, economic model estimates of total potential per patient savings were $33 338, €8467, and £5626 for negative pressure wound therapy-instillation group vs control, based on assumed number of OR visits during therapy, cost of therapy system, and length of therapy. Model results showed an overall potential cost-savings with negative pressure wound therapy-instillation vs control, based on fewer OR visits and shorter therapy duration as reported in the published systematic review and meta-analysis.

KEYWORDS
cost-savings, debridement, infection, wound, wound closure techniques, wound healing

Key Messages

- measuring the economic impact of outcomes with negative pressure wound therapy and instillation (NPWTi-d) of a topical wound solution is increasingly important in wound care product decision-making

- an economic model was developed to estimate the cost of NPWTi-d vs control therapies in managing complex wounds in the US, Germany, and UK acute healthcare systems
- total cost was determined by the sum of three main cost components: cost of hospital stay, cost of therapy, and cost of operating room associated with excisional debridement
- endpoint assumptions for the model were derived from the results of a recently published systematic review and meta-analysis of NPWTi-d vs control therapies in managing complex acute and chronic wounds
- model estimates for US, Germany, and UK markets, respectively, showed average total per patient estimated costs, for NPWTi-d vs control, of $32 584 vs $65 922, €9103 vs €17 570, and £5973 vs £11 599, based on assumed fewer OR visits, lower overall product cost, and shorter length of therapy for the NPWTi-d group

1 | INTRODUCTION

Health care systems are under immense pressure to deliver improved patient outcomes within ever-tightening budget constraints. Consequently, economic analyses are playing a growing critical role in wound care product decision-making.[1] However, particularly with respect to wound care options, there is often a lack of good prospectively derived economic data required by health care decision makers to improve the objective selection process of certain technologies. Such is the status with negative pressure wound therapy (NPWT) with instillation and dwelling of a topical wound solution (NPWTi-d).

NPWTi-d is an advancement from standard NPWT in that a topical wound solution is introduced to the wound bed and remains for a set period before being removed via negative pressure cycles. Regularly irrigating the wounds between negative pressure intervals may assist with wound cleansing and lowering wound fluid viscosity to facilitate more efficient removal of exudates and infectious material during negative pressure.[2,3] Compared with conventional NPWT (without instillation), several studies have demonstrated lower bacterial bioburden levels,[4-6] a reduced number of surgical debridements,[7-9] and a shorter time to readiness for final surgical closure[10] during wound management with NPWTi-d. Successful use of NPWTi-d as an adjunctive therapy, along with debridement and systemic antibiotics, has been reported in patients with infected wounds associated with skin/soft tissue defects, severe high-energy open fractures, diabetes, and treated osteomyelitis.[11-19]

Despite a growing number of recent clinical publications,[20-22] there are currently no large, comparative economic studies designed to assess the overall value of NPWTi-d vs other wound management strategies. In the absence of quality trial-based information, an economic model was developed to estimate the cost of NPWTi-d vs control therapies in managing complex wounds within a hospital setting. To estimate the overall cost, the model was designed to calculate the sum of three main cost components: cost of hospital stay for duration of therapy, cost of therapy (device, dressings, canisters, and/or instilled solutions), and cost of operating room associated with excisional debridement. Endpoint assumptions for the model were derived from the results of a recently published systematic review and meta-analysis of NPWTi-d (Veraflo Therapy, 3M Company, St. Paul, MN) vs control therapies in managing complex acute and chronic wounds. These meta-analysis outcomes plus country-specific hospital cost data were used to populate the model. Model results for the US, Germany, and the UK wound care markets are presented.

2 | METHODS

An economic model was developed to estimate differences in cost between NPWTi-d and control therapies with data inputs derived from published literature and hospital cost data. Model inputs for "mean number of wound-related OR visits" and "mean number of wound-related therapy days in hospital" for NPWTi-d and control groups were non-standardised means derived from the results of a recently published systematic review and meta-analysis of 13 comparative NPWTi-d studies comprising 720 patients.[23] Mean outcomes across the analysed studies for NPWTi-d vs control, respectively, were 1.77 vs 2.69 OR visits ($P = .008$), 7.88 vs 14.36 days to final wound-related surgical procedure ($P = .003$), 9.88 vs 21.80 wound-related therapy days in hospital

($P = .02$), and 11.39 vs 26.79 hospital stay days ($P = .02$) (Table 1). Wound types included in the 13 studies were contaminated, infected, non-infected, acute, and chronic. Standard NPWT (without instillation) was the comparative control in nine studies, gauze dressing in three studies, and gentamicin polymethylmethacrylate beads in one study.

Within the model, "wound-related therapy days in hospital" refers to the mean number of therapy days as reported in the meta-analysis results. Country-specific information was used to populate the model for three separate health care markets: the United States, Germany, and the United Kingdom. Daily therapy acquisition cost was calculated per the US, Germany, or UK nationwide average or non-contracted cost of NPWT device (3M V.A.C. Ulta Therapy Unit, St. Paul, MN) rental, dressing, and canister for standard NPWT group (control group), and NPWTi-d device rental, dressing, canister, cassette unit, and instillation solution for NPWTi-d group. Dressing cost equated to the standard average cost of a single unit small-, medium-, or large-size open-cell foam dressing (3M V.A.C. Granufoam, St. Paul, MN). The canister unit cost equated to the standard average cost of a single 1000 mL canister.

Based on published literature and data reports, mean daily costs of $2517, €661, and £431 per hospital inpatient stay[24-27] were assumed for US, Germany, and UK patients, respectively. The US mean daily cost of inpatient stay ($2517) was assumed from a 2018 US nationwide average of all operating and non-operating expenses per inpatient community hospital day reported by the Kaiser Family Foundation.[24] Germany's mean daily cost of an inpatient stay (€660.68) was calculated as follows: average cost per inpatient case (€4823)[25] divided by the average duration of inpatient stay (7.3 days) according to Germany's Federal Statistical Office.[26] The UK daily cost of inpatient stay (£431.00) was based on a weighted average of hospital stay per the 2016/2017 National Prices and National Tariff Workbook produced by the National Health Service.[27]

The number of OR visits and/or number of surgical debridements was a reported variable in seven studies in the original meta-analysis. In five of the studies, the number of surgical debridements during wound-related therapy was reported; the remaining two studies reported the number of OR visits, which consisted of wound-related surgical procedures performed in the OR during patient admission, including excisional debridement, mesh replacement or removal, and final surgical wound closure. Because the majority of reported OR visits included surgical debridement, for this model, we assumed an average cost of an excisional OR debridement as the cost of an OR visit: $3393, €505, and £459 per operating room debridement for US, Germany, and UK patients, respectively.[28-33]

The US cost of OR debridement ($3393.00) used as a basis for the model was obtained from a published retrospective analysis[28] that estimated an average OR debridement cost from individual billing records at a university hospital. The cost of OR debridement for Germany (€505.11) was based on the reported average daily reimbursement amount for Germany's DRG Code J08A.[32,33] The UK mean cost of OR debridement (£458.62) was calculated as the assumed average cost of theatre time per minute (£16.49) (reported by the Information Service Division of Scotland)[30] multiplied by 17.7 minutes,[29] plus the analysed cost of a sharp debridement with lidocaine (£166.75).[31]

Total cost per patient was calculated as follows:

$$\text{Total cost per patient} = \text{inpatient cost} + \text{OR visit cost} + \text{therapy acquisition cost},$$

where, inpatient cost is the mean wound-related therapy days × daily cost of inpatient stay; OR visit cost is the

TABLE 1 Non-standardised mean outcomes of previously published meta-analysis[23] used as inputs for economic model

Outcome	# Of studies	Subjects/ Wounds	Means across studies		Mean difference (95% CI)	*P* value
			NPWTi-d	Control		
Mean number of wound-related OR visits	7	495	1.77	2.69	−0.92 [−1.59, −0.24]	.008
Mean time to final wound-related surgical procedure (days)	8	525	7.88	14.36	−6.48 [−10.81, −2.16]	.003
Mean length of wound-related therapy (days)	4	183	9.88	21.80	−11.91 [−21.83, −1.99]	.02
Mean length of wound-related hospital stay (days)	3	254	11.39	26.79	−15.39 [−28.28, −2.50]	.02

Abbreviations: CI, confidence interval; NPWTi-d: negative pressure wound therapy with instillation and dwelling of a topical wound solution (including normal saline or antiseptic solutions).

mean number of OR debridements or OR visits × cost per debridement; therapy acquisition cost is the mean wound-related therapy days × average daily cost of therapy.

The difference in cost between the two groups was calculated as control cost minus NPWTi-d cost, and the percent difference in cost was calculated as control cost minus NPWTi-d cost divided by control cost.

3 | RESULTS

Economic Model results for the United States, Germany, and the United Kingdom are shown in Table 2.

3.1 | US economic model

Estimated costs in the US model for NPWTi-d vs control, respectively, were the following: $24 868 vs $54 871 per inpatient stay, $6006 vs $9127 for OR visit expenditures, and $1711 vs $1924 for NPWTi-d product vs standard NPWT product costs. The total estimated cost per patient for NPWTi-d vs control, respectively, was $32 584 vs $65 922 based on assumed fewer OR visits, lower product cost, and shorter length of therapy for the NPWTi-d group.

3.2 | Germany economic model

The Germany economic model showed the following estimated costs for NPWTi-d vs control, respectively: €6528 vs €14 403 per inpatient stay, €894 vs €1359 for OR visit expenditures, and €1681 vs €1808 for NPWTi-d product vs standard NPWT product costs. The total estimated cost per patient for NPWTi-d vs control, respectively, was €9103 vs €17 570 based on assumed fewer OR visits, lower product cost, and shorter length of therapy for the NPWTi-d group.

TABLE 2 Economic model estimated results

	US Healthcare System		Germany Healthcare System		UK Healthcare System	
	Control	NPWTi-d	Control	NPWTi-d	Control	NPWTi-d
Wound-related therapy days[23]	21.80	9.88	21.80	9.88	21.80	9.88
Daily cost of inpatient stay	$2517.00[24]	$2517.00	€660.68[a]	€660.68	£431.00[b]	£431.00
Total inpatient cost (daily rate × days)	$54 870.60	$24 867.96	€14 402.82	€6527.52	£9395.80	£4258.28
Number of OR visits[23]	2.69	1.77	2.69	1.77	2.69	1.77
Mean cost of OR visit	$3393.00[28]	$3393.00	€505.11[c]	€505.11	£458.62[d]	£458.62
Total OR visit cost (trips x cost)	$9127.17	$6005.61	€1358,75	€894.04	£1233.69	£811.76
Days to final surgical procedure[23]	14.36	7.88	14.36	7.88	14.36	7.88
Daily acquisition cost of therapy (standard NPWT without instillation is control)	$88.27	$173.16	€82.94	€170.17	£44.47	£91.36
Total therapy costs (days × daily cost)	$1924.29	$1710.82	€1808.09	€1681.28	£969.45	£902.64
Total cost per patient	$65 922.06	$32 584.39	€17 569,66	€9102.84	£11 598.93	£5972.67
Difference in cost (control cost-NPWTi-d cost)						
Inpatient cost during therapy		$30 002.64		€7875.31		£5137.52
OR visit cost		$3121.56		€464.70		£421.93
Cost of therapy		$213.47		€ 126.81		£66.81
Total per patient cost difference Percentage difference in per patient cost[e]		$33 337.67 (50.6%)		€8466.82 (48.2%)		£5626.26 (48.5%)

Abbreviations: NPWT, negative pressure wound therapy; NPWTi-d, negative pressure wound therapy with instillation and dwelling of a topical wound solution; OR, operating room.

[a]Germany mean daily cost of inpatient stay (€660.68) = average cost per inpatient case (€4823)[25]/average duration of inpatient stay (7.3 days).[26]

[b]United Kingdom daily cost of inpatient stay (£431.00) based on weighted average of hospital stay.[27]

[c]Germany cost of OR debridement (€505.11) was calculated based on average 2021 daily reimbursement of DRG Code J08A,[32] assuming average length of stay of 19.5 days: €2628/19.5 * €3747,98[33] = €505,11 per OR debridement.

[d]United Kingdom mean cost of OR debridement (£458.62) = average cost of theatre time per minute (£16.49)[30] * 17.7 min[29] + cost of a sharp debridement with lidocaine (£166.75).[31]

[e]Percentage difference in cost = (control cost − NPWTi-d cost)/control cost.

3.3 | UK economic model

Comparative costs in the UK model for NPWTi-d vs control, respectively, were estimated to be £4258 vs £9396 per inpatient stay, £812 vs £1234 for OR visit expenditures, and £903 vs £969 for NPWTi-d product vs standard NPWT product costs. The total estimated cost per patient for NPWTi-d vs control, respectively, was £5973 vs £11 599 based on assumed fewer OR visits, lower product cost, and shorter length of therapy.

3.4 | Total difference in cost

Compared with the control group, the estimated total per patient cost was lower for the NPWTi-d group by $33 338 (50.6%), €8441 (48.2%), and £5626 (48.5%) in US, Germany, and UK markets, respectively.

4 | DISCUSSION

This economic model shows an estimated savings of approximately 50% with the use of NPWTi-d vs control therapies in adjunctive management of complex wounds, based on assumptions of 9.88 therapy days vs 21.80 therapy days and 1.77 OR visits vs 2.69 OR visits during the use of NPWTi-d vs control therapy, respectively. The estimated percentage of cost reduction with the use of NPWTi-d based on these assumptions was similar across US, Germany, and UK healthcare systems. Of the three primary components considered in the cost—inpatient hospital stay, cost of surgical debridement, and cost of the therapy system—inpatient hospital stay cost accounted for the majority (73.2%-89.7%) of the total cost in each of the three countries. As such, it could be expected that a considerably shorter mean length of therapy of the NPWTi-d vs control patients would result in cost-savings for the NPWTi-d group. Smaller differences between the groups in terms of length of inpatient hospital stay during wound treatment would result in less savings with NPWTi-d.

In the original systematic review and meta-analysis of 13 studies, from which assumptions for this economic analysis were based, NPWT without instillation was the comparative control in nine studies, gauze dressing in three studies, and gentamicin polymethylmethacrylate beads in one study. For the purposes of the model, only the cost of a standard NPWT system without instillation was input as the cost of therapy for each patient in the control group, without factoring in the cost for gauze or gentamicin polymethylmethacrylate beads. This was performed for simplicity, but it is an overestimate of the cost of control therapy. When the control therapy cost was set to zero, the estimated overall savings in the model were $31 413, €6659, and £4657 in the United States, Germany, and the United Kingdom, respectively.

Length of therapy was a reported endpoint in four studies for control and NPWTi-d groups and three studies for the NPWTi-d group only (not the control group); six studies reported length of hospital stay as an endpoint. For our model, we chose to use the "length of therapy" endpoint vs "hospital length of stay" endpoint to provide a more conservative estimate that is less influenced by multiple supply and demand factors.[34] A recent NICE document concluded similarly that length of hospital stay may be a poor choice of outcome for model input because it does not consider other important clinical outcomes, including quicker time to surgical closure, time to complete closure, reduced negative pressure wound therapy time, and better overall wound healing.[35]

Like all models that involve the use of assumptions to estimate variable effect for predicting the future, the economic wound care model presented in this paper is a simplification of reality with several limitations. Key clinical parameters used in this economic model were derived from a meta-analysis of comparative studies that lack methodology rigour. Only three of the studies were randomised controlled trials, and the rest were level II or III studies.[23] In addition, uncertainties likely existed in the relationship between reported length of stay and length of therapy. Importantly, populations and reporting methods across the meta-analysed studies were highly heterogeneous; the studies included a wide mixture of patients with varying wound types, locations, and comorbidities. There were also variances among studies in the way OR visits and surgical debridements were reported. The complexity of the populations, together with the heterogeneity of the available evidence, makes it difficult to generalise these results to other study populations.

Accuracy of the cost estimates can only be proven with time and will be dependent on repeated adjustments to the assumptions and inputs used as the basis for estimating total NPWTi-d cost. Large-scale real-world data collection in the form of registries could be helpful in providing confidence in assumptions made in the model, as could results from high-quality randomised controlled trials. Although these economic model results suggest potential cost benefits of NPWTi-d, more evidence is needed to establish the cost-effectiveness of this adjunctive therapy.

ACKNOWLEDGEMENT

The authors thank Karen Beach for her assistance in manuscript preparation.

CONFLICT OF INTEREST

Dr. Kim and Dr. Gabriel are consultants for 3M. Siobhan Lookess, Christine Bongards, and Leah Griffin are employees of 3M.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

ORCID

Paul J Kim https://orcid.org/0000-0002-6186-6890

REFERENCES

1. Rudmik L, Drummond M. Health economic evaluation: important principles and methodology. *Laryngoscope*. 2013;123(6):1341-1347.
2. Lessing C, Slack P, Hong KZ, Kilpadi D, McNulty A. Negative pressure wound therapy with controlled saline instillation (NPWTi): dressing properties and granulation response in vivo. *Wounds*. 2011;23(10):309-319.
3. Horch RE, Braumann C, Dissemond J, et al. Use of negative pressure wound therapy with instillation and dwell time for wound treatment - results of an expert consensus conference. [English translation]. *Zentralblatt Fur Chirurgie*. 2018;143(6):609-616.
4. Yang C, Goss SG, Alcantara S, Schultz G, Lantis Ii JC. Effect of negative pressure wound therapy with instillation on bioburden in chronically infected wounds. *Wounds*. 2017;29(8):240-246.
5. Goss SG, Schwartz JA, Facchin F, Avdagic E, Gendics C, Lantis JC II. Negative pressure wound therapy with instillation (NPWTi) better reduces Postdebridement bioburden in chronically infected lower extremity wounds than NPWT alone. *J Am Col Clin Wound Spec*. 2014;4(4):74-80.
6. Kim PJ, Lavery LA, Galiano RD, et al. The impact of negative-pressure wound therapy with instillation on wounds requiring operative debridement: pilot randomised, controlled trial. *Int Wound J*. 2020;17:1194-1208.
7. Kim PJ, Attinger CE, Steinberg JS, et al. The impact of negative-pressure wound therapy with instillation compared with standard negative-pressure wound therapy: a retrospective, historical, cohort, controlled study. *Plast Reconstr Surg*. 2014;133(3):709-716.
8. Gabriel A, Kahn K, Karmy-Jones R. Use of negative pressure wound therapy with automated, volumetric instillation for the treatment of extremity and trunk wounds: clinical outcomes and potential cost-effectiveness. *Eplasty*. 2014;14:e41.
9. Chowdhry SA, Wilhelmi BJ. Comparing negative pressure wound therapy with instillation and conventional dressings for sternal wound reconstructions. *Plast Reconstr Surg Glob Open*. 2019;7(1):e2087.
10. Kim PJ, Attinger CE, Oliver N, et al. Comparison of outcomes for Normal saline and an antiseptic solution for negative-pressure wound therapy with instillation. *Plast Reconstr Surg*. 2015;136(5):657e-664e.
11. Timmers MS, Graafland N, Bernards AT, Nelissen RG, van Dissel JT, Jukema GN. Negative pressure wound treatment with polyvinyl alcohol foam and polyhexanide antiseptic solution instillation in posttraumatic osteomyelitis. *Wound Repair Regen*. 2009;17(2):278-286.
12. Yang CK, Alcantara S, Goss S, Lantis JC II. Cost analysis of negative-pressure wound therapy with instillation for wound bed preparation preceding split-thickness skin grafts for massive (>100 cm(2)) chronic venous leg ulcers. *J Vasc Surg*. 2015;61(4):995-999.
13. Hodson T, West JM, Poteet SJ, Lee PH, Valerio IL. Instillation negative pressure wound therapy: a role for infected LVAD salvage. *Adv Wound Care*. 2019;8(3):118-124.
14. West JM, Jordan SW, Mendel E, Khan SN, Chandawarkar RY, Valerio IL. Instillation negative pressure wound therapy: an effective tool for complex spine wounds. *Adv Wound Care*. 2018;7(10):333-338.
15. Soylemez MS, Ozkan K, Kilic B, Erinc S. Intermittent negative pressure wound therapy with instillation for the treatment of persistent periprosthetic hip infections: a report of two cases. *Ther Clin Risk Manag*. 2016;12:161-166.
16. Hasegawa IG, Murray PC. Circumferential negative pressure wound therapy with instillation and dwell prior to delayed flap coverage for a type IIIB open tibia fracture. *Cureus*. 2019;11(4):e4511.
17. Brinkert D, Ali M, Naud M, Maire N, Trial C, Teot L. Negative pressure wound therapy with saline instillation: 131 patient case series. *Int Wound J*. 2013;10(Suppl 1):56-60.
18. Ali M, Reda FM, Abbassi H, Issaoui H, Gargouri M, Razanabola F. Management of a severe degloving injury with a type 2 open tibia fracture using negative pressure wound therapy with instillation and dwell time. *Wounds*. 2020;32(12):E110-e3.
19. Ali M, Reda FM, Issaoui H, Abbassi H, Gargouri M, Razanabola F. Management of a High-Energy Soft Tissue Injury of the lower extremity using negative pressure wound therapy with instillation and dwell time and a reticulated open cell foam dressing. *Wounds*. 2020;32(12):376-377.
20. Fernandez L, Ellman C, Jackson P. Use of negative pressure wound therapy with instillation in the Management of Complex Wounds in critically ill patients. *Wounds*. 2019;31(1):E1-E4.
21. Milcheski DA, Portocarrero ML, Alvarez DM, Mazuca LGMP, Monteiro AA Jr, Gemperli R. Initial experience with negative-pressure wound therapy with instillation in complex wounds. *Rev Col Bras Cir*. 2017;44(4):348-353.
22. Matiasek J, Djedovic G, Kiehlmann M, Verstappen R, Rieger UM. Negative pressure wound therapy with instillation: effects on healing of category 4 pressure ulcers. *Plast Aesthetic Res*. 2018;5:36.
23. Gabriel A, Camardo M, O'Rorke E, Gold R, Kim PJ. Effects of negative-pressure wound therapy with instillation versus standard of care in multiple wound types: systematic literature review and meta-analysis. *Plast Reconstr Surg*. 2021;147(1S-1):68S-76S.
24. Association AH. Hospital Adjusted Expenses per Inpatient Day. Timeframe: 2018. Kaiser Family Foundation; 2019. Available from https://hostedvl202.quosavl.com/domains/kci/qb/doc/e8da6trl6ekkp93hhujkdmt0cc; https://www.kff.org/health-costs/state-indicator/expenses-per-inpatient-day/?currentTimeframe=0&sortModel=%7B%22colId%22:%22Location%22,%22sort%22:%22asc%22%7D.

25. Hospitals: Key data on hospital patients. Wiesbaden, Germany: Statistisches Bundesamt (Destatis); 2021. Available from https://hostedvl202.quosavl.com/domains/kci/qb/doc/f5rueuclo434p126s2dmcu7o1k; https://www.destatis.de/DE/Themen/Gesellschaft-Umwelt/Gesundheit/Krankenhaeuser/Tabellen/entlassene-patienten-eckdaten.html.
26. Kostennachweis der Krankenhauser-Fachserie 12 Reiche 6.3–2018. Report. Wiesbaden, Germany; September 11, 2020 [Report No: Fachserie 12 Reihe 6.3].
27. Annex A: 2016/17 National Prices and National Tariff Workbook. *Monitor*. London, UK: NHS England Publications; 2017.
28. Granick MS, Jacoby M, Noruthrun S, Datiashvili RO, Ganchi PA. Clinical and economic impact of hydrosurgical debridement on chronic wounds. *Wounds*. 2006;18(2):35-39.
29. Caputo WJ, Beggs DJ, DeFede JL, Simm L, Dharma H. A prospective randomised controlled clinical trial comparing hydrosurgery debridement with conventional surgical debridement in lower extremity ulcers. *Int Wound J*. 2008;5(2):288-294.
30. *R142X-average theatre running costs, and usage by specialty, by board*. Edinburgh, Scotland: Scotland PH; 2019.
31. Roberts C, Lewis N, Leaper D. Development of a UK cost analysis model for the various methods of debriding leg ulcers. *Wounds*. 2019;15(2):54-61.
32. Fallpauschalen-Katalog 2021. Report; November 12, 2020.
33. Federal base rate published for 2021. Healthcare Heads; 2021. Available from https://hostedvl202.quosavl.com/domains/kci/qb/doc/tdvveear3kbkv9419gefi61ksg; https://www.healthcareheads.com/en/news/details/federal-base-rate-published-for-2021/.
34. Clarke A. Length of in-hospital stay and its relationship to quality of care. *BMJ Qual Saf*. 2002;11(3):209-210.
35. Excellence NIfHaC. The VAC Veraflo Therapy system for acute infected or chronic wounds that are failing to heal. Report. London, UK; January 27, 2021. Contract No.: Medical Technologies Guidance [MTG54].

How to cite this article: Kim PJ, Lookess S, Bongards C, Griffin LP, Gabriel A. Economic model to estimate cost of negative pressure wound therapy with instillation vs control therapies for hospitalised patients in the United States, Germany, and United Kingdom. *Int Wound J*. 2022;19(4):888-894. doi:10.1111/iwj.13689