

Costing update report of MTG9: PleurX peritoneal catheter drainage system for vacuum-assisted drainage of treatment-resistant, recurrent malignant ascites

This medical technology guidance was published on 21 March 2012, and updated on 19 February 2018.

All medical technology guidance is reviewed 3 years after publication according to the process described in the MTEP Interim [addendum on guidance reviews](#).

This report is part of the information considered in the guidance review. It describes an update of the cost model so that it reflects any new relevant information including revising the cost and resource parameters to current values. The results from the updated cost model are used to estimate the current savings associated with the use of the technology.

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1. Background

PleurX is an indwelling catheter for vacuum drainage of malignant ascites (MA) in the community setting. The technology was evaluated by NICE, with assessments completed by one of the external assessment centres (EAC), Cedar in 2011. The assessment result is published as a NICE medical technology guidance ([MTG9](#)), recommending the case for adopting the PleurX peritoneal catheter drainage system in the NHS which is supported by evidence. The available clinical evidence suggests that the PleurX peritoneal catheter drainage system is clinically effective, has a low complication rate and has the potential to improve quality of life: it enables early and frequent treatment of symptoms of ascites, in the community, rather than waiting for inpatient treatment. The PleurX peritoneal catheter drainage system is also associated with a cost saving per patient when compared with inpatient large-volume paracentesis.

A cost model was submitted as a part of the assessment. This model evaluated the costs per patient and system impact of the PleurX peritoneal catheter drainage system for the drainage of treatment-resistant, recurrent malignant ascites in the community setting when compared with inpatient and outpatient large-volume paracentesis (LVP). The base-case analysis showed that PleurX peritoneal catheter drainage system may result in cost saving of £679 per patient when compared with inpatient LVP. The cost-savings were heavily dependent on a reduction in inpatient stay in the PleurX arm. When the PleurX peritoneal catheter drainage system was compared with outpatient LVP, an additional cost of £1,010 per patient was incurred. This is because the use of PleurX peritoneal catheter drainage system requires an increased number of home nurse visits, with only a small saving in hospital bed days. The original model and parameters submitted by the manufacturer was accepted by assessing EAC and subsequently by NICE. The committee was advised by experts that many patients may not prefer outpatient to inpatient large-volume paracentesis because it does not necessarily alleviate the intolerable symptoms associated with ascitic fluid build-up any better than inpatient large-volume paracentesis and yet still creates the need for repeated outpatient visits. Thus, an inpatient setting was considered representative of the pathway. The results of the cost model informed recommendation development by NICE.

In 2018, the cost model was updated by NICE. The updated base-case analysis showed that managing treatment-resistant, recurrent malignant ascites with the PleurX peritoneal catheter drainage system may result in cost saving of £1,051 per patient when compared with inpatient LVP. When the PleurX peritoneal catheter drainage system was compared with outpatient LVP, an additional cost of £871 per patient was incurred.

An update of this assessment is planned and as part of the review process NICE has requested an update to the cost analysis for the base-case scenario. The company has not identified any further evidence relevant to the decision problem during the current review process. It is to be noted that the company have notified that they have changed the name of the technology to PeritX. For the purpose of this report, the technology is referred to as PleurX.

2. Current validity of model

The updated MTG9 pathway used in the model is still valid. The cost analysis based on a decision tree model with an embedded Markov model. This model evaluated the costs per patient and system impact of the PleurX peritoneal catheter drainage system for the drainage of treatment-resistant, recurrent malignant ascites in the community setting when compared with inpatient and outpatient large-volume paracentesis.

The key assumptions used in the model were:

- no change in the survival rate in both arms of the model
- the need for 2 nurse visits to train patients to self-manage the drainage at home using the PleurX peritoneal catheter drainage system
- similar levels of treatment monitoring needs in both arms of the model
- a nurse visit length of 15 minutes for the PleurX peritoneal catheter drainage system to help with drainage at home
- drainage volume of 9.2 litres per procedure in patients who have repeated large-volume paracentesis
- average drainage volume of 3.5 litres per week using the PleurX peritoneal catheter drainage system
- one nurse visit per litre of ascitic fluid drained using the PleurX peritoneal catheter drainage system
- the cost of re-intervention being equivalent to a first-time catheter insertion procedure.

There are no changes to the assumptions used in the original guidance. Some of the cost parameters have changed and need updating in the model.

3. Updated input parameters

KiTEC reviewed the cost model and updated all cost parameters. Since the most recent NHS reference costs were available only for the year 2019-2020, costs have been updated to 2020 prices. Where updated unit costs were not readily available, the original cost was inflated to 2020 prices using the NHS cost inflation index ([NHSCII](#)). The original unit costs were taken from the [2009 NHS reference costs](#); and the 2018 update used the [2016 NHS reference costs](#). The costs for this cost update were taken from the most recent [2019-20 NHS reference costs](#), and the unit costs published by the Personal Social Services Research Unit ([PSSRU](#) 2020). The intervention cost for LVP is based on Mullan et al (2015), inflated to 2020 prices. KiTEC could not find an alternative source for LVP costs in the UK and concludes that Mullan et al(2015) is the best available source. In the 2018 update, a hospital bed day cost was estimated on the basis of excess bed day cost from the NHS reference cost. Excess bed day cost are no longer available in the 2019-20 reference costs for any HRG, and other episode costs cannot be used, because the cost per bed day is a crucial driver of the cost savings. Hence, we inflated the 2015-2016 unit costs to 2020 prices.

The updated unit costs and source of the costs for LVP and PleurX catheter are presented in Table 1 and 2, respectively.

Table 1. Updated unit costs for LVP

Cost Parameter	Cost parameters			Source for updated cost parameters
	Value used in the original model	Updated value (2018)	Updated value (2022)	
Intervention cost of LVP				
Catheter and pack	£ 32.00	£33.64	£34.85	Uplifted and inflated from Mullan et al [2]
Connector	£ 6.87	£7.22	£7.48	Uplifted and inflated from Mullan et al [2]
Drain	£ 4.94	£5.19	£5.38	Uplifted and inflated from Mullan et al [2]

2L Drainage Bag	£ 0.64	£0.67	£0.69	Uplifted and inflated from Mullan et al [2]
Procedure cost/sundries	£ 121.00	£127.21	£131.78	Uplifted and inflated from Mullan et al [2]
<i>Inpatient stay for LVP</i>				
Cost per hospital bed day	£ 312.00	£ 355.00	£367.78	NHS reference cost 2015-16 , HRG code used: FZ12Q (Major General Abdominal Procedures, 19 years and over, with CC Score 0). The cost update in 2018 used Elective Inpatient Excess Bed Days cost, and this is no longer available in the 2019-2020 NHS reference costs.. Hence an inflation was used on the 2015-2016 costs.
<i>Cost of complications of LVP</i>				
Infection	£ 194.06	£198.97	£153,11	Includes: <ul style="list-style-type: none"> • A medical oncology consultant led first attendance visit: £151 (Source: NHS reference cost 2019-20, HRG code: WF01B, non-Admitted Face to Face Attendance, First appointment) • 7 day course of antibiotics (Ciprofloxacin) £ 2.11 (Source: British National Formulary)
Catheter failure	£ 395.91	£405.73	£441.50	Includes: <ul style="list-style-type: none"> • A medical oncology consultant led first attendance visit: £151 (Source: NHS reference cost 2019-20, HRG code: WF01B, non-Admitted Face to Face Attendance, First appointment) • 250,000 unit vial of Streptokinase: £97.50

				<p>(Source: British National Formulary)</p> <ul style="list-style-type: none"> • Ultrasound lasting less than 20 minutes: £70.00 (NHS reference cost 2019-20, HRG code RD42Z, Ultrasound Scan with duration of less than 20 minutes, without contrast) • A contrast fluoroscopy lasting less than 20 minutes: £123.00 (NHS reference cost 2019-20, HRG code: RD30Z, Contrast Fluoroscopy Procedures with duration of less than 20 minutes)
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Table 2. Updated unit costs for PleurX catheter

Cost Parameter	Cost parameters			Source for updated cost parameters
	Value used in the original model	Updated value (2018)	Updated value (2022)	
<i>Intervention cost of PleurX catheter</i>				
PleurX catheter kit (50-9050)	£245.00	£245.00	£257.25	Provided by manufacturer
PleurX drainage kit (50-7510)	£63.75	£63.75	£66.94	Provided by manufacturer
Procedure cost/sundries	£121.00	£127.21	£131.78	Uplifted and inflated from Mullan et al [2]
<i>Inpatient stay for PleurX catheter</i>				
Cost per hospital bed day	£ 312.00	£ 355.00	£367.78	NHS reference cost 2015-16 , HRG code used: FZ12Q (Major General Abdominal Procedures, 19 years and over, with CC Score 0). The cost update in 2018 used Elective Inpatient Excess Bed Days cost,

				and this is no longer available in the most recent NHS reference cost 2019-20. Hence an inflation was used on the 2015-2016 costs.
Follow-on costs of ascites management				
PleurX drainage kit box (10 units)	£637.50	£637.50	£669.40	Provided by manufacturer
Cost per home visit per hour	£78.00	£67.89	£49.00	Community nurse cost (PSSRU 2015) not available in the PSSRU 2020, hence used a band 6 nurse cost of £49 from PSSRU 2020 .
Cost of travel per nurse visit	£1.50	£1.58	£1.64	Uplifted and inflated from the original model
Cost per typical nurse visit (20 minutes)	£27.00	£14.33	£14.00	Nurse (GP practice) £42 per hour PSSRU 2020
Cost of complications of PleurX catheter				
Infection	£ 194.06	£198.97	£153,11	Assumed to be the same as the cost of treating infection caused by LVP
Catheter failure	£ 395.91	£405.73	£441.50	Assumed to be the same as the cost of treating catheter failure caused by LVP
Cost of re-intervention	£741.75	£790.96	£823.75	Assumed to be the cost of the first PleurX peritoneal catheter placement procedure including one hospital bed day

4. Results from updated model

The results of the updated base case scenario are reported in Table 3. The updated base-case analysis showed that managing treatment-resistant,

recurrent malignant ascites with the PleurX peritoneal catheter drainage system may result in cost saving of £1,095 per patient when compared with inpatient LVP. In this scenario, 7.4 hospital bed days were saved per patient, but 23.5 more community nurse visits to the patient's home were needed. When the PleurX peritoneal catheter drainage system was compared with outpatient LVP, an additional cost of £896 per patient was incurred, including 23.5 extra nurse visits but 2 fewer hospital bed days used per patient.

Table 3. Base case result per patient

	PleurX	LVP inpatient	LVP outpatient
Total cost per patient	£2,564	£3,659	£1,668
Cost savings (2018)		£1,051	-£871
Cost saving (2022)		£1,095	-£896
Cost savings (difference)		£44	£25

5. Conclusion

LVP is currently offered as an inpatient, outpatient or day-case procedure and that practice varies across the UK. However, there is a lack of evidence about the proportion of patients treated using LVP in an inpatient versus outpatient setting. For this cost update we assumed that LVP is largely provided in an inpatient setting (e.g. [Milton Keynes Hospital Trust Guideline](#)), but an expert we contacted said that they provide it as an outpatient procedure, and there is a trend towards that but they do not think this is an established practice yet. However, the results of the cost update is provided for both inpatient and outpatient setting. In an inpatient setting, the cost savings have increased by £44 compared to the 2018 update, and in an outpatient setting the technology is cost incurring by an additional £25 compared to the 2018 update. The conclusions in the guideline remain the same and the cost sections in the guidance can be updated.

6. References

Mullan, D., et al., Draining malignant ascites at home with tunnelled catheters: complications and costs. EUROPEAN JOURNAL OF PALLIATIVE CARE, 2015. 22(6).

Appendix 2. Background documents for this review

Hyperlinks for the background documents for this review report:

1. [Medical technologies guidance document](#)
2. [Assessment report](#)
3. [Scope of assessment](#)
4. A copy of the company information request regarding the technology
5. A list of expert advisers and their completed questionnaires on the MTG review