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# Managing the delivery of venous leg ulcer services: A willingness to pay study

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## Abstract

**Background and Aims:** There is widespread variation in venous leg ulcer (VLU) wound care contributing to inadequate service provision resulting in poor outcomes to patients. Little has been published on the perspectives of where treatments should be carried out. The aim of the study was to quantify respondents' preferences for the preferred place of treatment for VLU.

**Methods:** A UK general population sample was interviewed to elicit preferences for clinic or home care treatment using the willingness to pay elicitation method. Participants were presented with two vignettes describing clinic or home care of VLU, and were asked to select the treatment process that they preferred and provide a detailed explanation for selecting that choice. Then they were asked to state their maximum hypothetical amounts that they were willing to pay for the treatment processes.

**Results:** One hundred fifty-four participants completed the interviews. Respondents were willing to pay £498.96 to receive VLU treatment at a clinic and £505.60 to receive care at home. This difference between the clinic compared to home care was not statistically significant. Advantages of clinic care include being able to book an appointment allowing participants to plan events around the booking and for home care the convenience for those with impaired mobility who may have difficulty traveling.

**Conclusions:** The results show that respondents placed an equal valuation on the place of treatment suggesting no strong preference for either home or clinic care. However, qualitative findings emphasized that impaired mobility may be a barrier to accessing VLU services for some therefore, individuals should be given the choice to select their preferred setting to receive treatment where possible.

## KEYWORDS

impact on care, nursing, quantitative research, venous leg ulcer, willingness to pay

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## 1 | INTRODUCTION

Venous leg ulcers (VLUs) are the most frequently occurring wounds on the lower limb, with a prevalence rate of 0.1%–0.3% in the United Kingdom.<sup>1,2</sup> VLUs are caused when valves in the lower limb veins become damaged, which creates a backflow of blood that increases the pressure in the vessels, leading to damage and reduced tissue perfusion. The resultant reduction in blood supply to the skin tissue impairs healing and means that the skin tissue is more delicate and can easily become broken with minimal trauma. VLUs are chronic wounds, with a recurrence rate of 60%–70%.<sup>3</sup> They can severely impact on quality of life and can take months or even years to heal.<sup>1,4</sup> Increasing age, being obese (BMI > 30), family history of VLU or deep vein thrombosis have been identified as factors associated with increasing the risk of developing VLU.<sup>3,5,6</sup>

In addition to the health impact, the economic burden to patients (i.e., prescription costs) and the NHS (i.e., treatment costs) are estimated to be £1938 million per year in the United Kingdom.<sup>7</sup> Evidence suggests that the cost of wound care and other costs related to loss of productivity or caregiver costs all contribute to the patients' overall burden of illness.<sup>7</sup> However, little has been published on eliciting preferences for different treatment options using a willingness to pay (WTP) method to value services and improve the treatment pathways or reduce the economic burden of VLU.

Current literature shows a lack of access to evidence-based treatments, with wide variation in VLU care contributing to inadequate service provision in the United Kingdom and poor outcomes to patients.<sup>1,8</sup> Compression bandages and dressings are the mainstay of treatment in the United Kingdom, and in severe cases, surgical interventions may be indicated.<sup>1,9,10</sup> A trained healthcare professional (HCP) usually administers wound care treatment either at a patient's home or in community clinics. Currently, available evidence comparing clinic versus home care has found no statistically significant differences in wound healing between the two settings.<sup>11,12</sup> However, access to appropriately trained HCPs and poor management pathways in the community contribute to low patient satisfaction, poor compliance, and deteriorating patients needing hospital admissions.<sup>12–15</sup>

Although there is some evidence about the reasons that may contribute to inadequate care, little research has been published on the perspectives of where treatments should be carried out.<sup>1</sup> Additional research is needed on where VLU care should be managed, this can also give insights into what matters to service users and enhance care delivery. Therefore, the aim of this study was to quantify respondents' preferences for the preferred treatment process for VLU using a WTP methodology.

## 2 | METHODS

### 2.1 | Study design

WTP is an established stated preference elicitation technique that has been used in health research to elicit the value of healthcare benefits.<sup>16–21</sup> In WTP studies respondents make decisions about the

maximum price they would be willing to pay to gain a health benefit or their willingness to accept compensation for a disutility, in either a hypothetical or actual scenario. This monetary amount is a measure of the value that respondent has for a given health (dis)benefit. WTP is a method that can be used to explore the relationship between service users' internal preferences and the caring externalities of service delivery.<sup>22</sup>

### 2.2 | Survey design

A two-part survey was developed and used in face-to-face interviews conducted by trained interviewers. The first section of the survey contained the WTP tasks. At the start of the interview, participants were asked to imagine a scenario that detailed a typical outlook of a patient living with VLU providing details of the symptoms they are experiencing (see Supporting Information for full description). Next, participants were presented with two alternative treatment processes—clinic care or home care. The treatment descriptions contained, among other things, details of the type of HCPs providing care, length, and frequency of the appointments (see Supporting Information for full descriptions). These descriptions were informed by conducting a qualitative sub-study with interviews ( $n = 18$ ) and a focus group with HCPs working in primary and secondary care settings in the United Kingdom.<sup>23</sup>

After reading the two treatment descriptions, participants were asked to select the treatment process they preferred and provide a detailed explanation for selecting that choice. Following this, they were asked to state the maximum hypothetical amount that they were willing to pay (in British pounds) to have their VLU treated by their least preferred method, using the payment card approach. Next, participants were asked to think about their preferred treatment and asked to state the maximum hypothetical amount they were willing to pay for their preferred treatment, using the payment card approach (see Supporting Information for an example WTP task). After both WTP questions, the interviewer asked follow-up questions to confirm that the price stated was their definite maximum value. A payment card approach is a well-established method of eliciting WTP.<sup>16,24,25</sup> All respondents were shown the same payment card format with a series of monetary values ranging from zero to £1000 to elicit their maximum WTP amount. Respondents willing to pay more than the highest amount in the payment card could state their own WTP value to avoid censoring<sup>24</sup> with only five of the participants selecting this option.

In the last section of the interview, participants completed a demographic booklet. The booklet contained demographic questions (sex, age, marital status, education, employment status, and income), health questions (history of VLU in family, weight, and health insurance status), and a quality of life questionnaire. The EQ-5D-3L instrument was used to measure quality of life, it is a validated instrument<sup>26,27</sup> that captured questions on mobility, self-care, usual activities, pain, and anxiety or depression.<sup>28</sup> It generated a summary

utility score between  $-0.59$  and  $1$ , where higher scores represented better quality of life.<sup>28</sup>

## 2.3 | Sample

Adult members (18+) of the UK general public were eligible to take part in the study. We decided against choosing patients living with VLU because the National Institute for Health and Care Excellence (NICE) guidance recommends sampling from the general public.<sup>29</sup> In addition, our study results could be used to inform the future of VLU care, and so it was vital to assess the preferences of individuals who may potentially develop the disease—rather than patients currently living with the disease. The target sample size was 150 participants, this was estimated based on precedents from other WTP studies.<sup>30</sup> Participants were sent an invitation letter by post, those willing to take part were asked to contact the study team. At the start of the interview, participants provided written informed consent. This study was reviewed by the School of Health and Related Research Ethics Committee at The University of Sheffield.

## 2.4 | Data analysis

Sociodemographic and WTP preferences were analyzed descriptively using frequencies and percentages for categorical variables and means, standard deviations, medians, and ranges for continuous variables. Differences in WTP value for key independent variables, including demographics and health status, were calculated. Wilcoxon signed-rank test (Table 2) and analysis of variance (Table 3) was used to test whether the WTP amounts were significantly different, these tests were used to account for repeated measurements on a single sample. A  $p$  value less than  $0.05$  was considered statistically significant. Inductive thematic analysis was used to analyze the free text question detailing why the participants chose their preferred treatment.<sup>31</sup> All quantitative analyses were undertaken using STATA version 16.

# 3 | RESULTS

## 3.1 | Sample characteristics

One hundred fifty-four participants completed the interviews. Table 1 shows the sociodemographic characteristics of the sample. The median age of the respondents was 65 years, with a marginally higher proportion of women (55.2%) compared to men (44.2%). The majority of respondents were married (61.7%) and educated to secondary GCSE level or above. Half of the participants were retired, and only 27.3% were in paid employment. All income categories were represented in the sample, where 44% had a household income below £20,000; 27.9% had

**TABLE 1** Sociodemographic characteristics of the sample

Characteristic	No. (%), N = 154
<b>Sex</b>	
Male	68 (44.2)
Female	85 (55.2)
Missing	1 (0.6)
<b>Marital status</b>	
Married	95 (61.7)
Living with partner	13 (8.4)
Widowed/widower	23 (14.9)
Divorced/separated	7 (4.5)
Single/living alone	16 (10.4)
<b>Education</b>	
Primary/part secondary	19 (12.3)
Secondary (O Level/GCSE)	55 (35.7)
A Level	8 (5.2)
College/University	61 (39.6)
Other	9 (5.8)
Missing	2 (1.3)
<b>Employment status</b>	
In paid employment	42 (27.3)
Self-employed	9 (5.8)
Housework	14 (9.1)
Unemployed	5 (3.3)
Retired/pensioner	81 (52.6)
Other	3 (2.0)
<b>Total Gross income of household</b>	
<£10,000	28 (18.2)
£10,000–£19,999	38 (24.7)
£20,000–£29,999	26 (16.9)
£30,000–£39,999	17 (11.0)
£40,000–£49,999	10 (6.5)
>£50,000	21 (13.6)
Missing	14 (9.1)
Household size—median [range]	2 [1–8]
<b>Does anyone in household have private health insurance</b>	
Yes	56 (36.4)
No	97 (63.0)
Missing	1 (0.6)
<b>How would you describe your weight</b>	
Underweight	4 (2.6)

(Continues)

TABLE 1 (Continued)

Characteristic	No. (%), N = 154
Normal weight	92 (59.7)
Overweight	54 (35.1)
Very overweight	4 (2.6)
<b>Anyone in family has an ulcer?</b>	
Yes	34 (22.1)
No	114 (74.0)
Do not Know	6 (3.9)
<b>Any friends/acquaintances got/had leg ulcer</b>	
Yes	41 (26.6)
No	97 (63.0)
Do not know	16 (10.4)
	<b>Mean (SD) [range]</b>
EQ-5D-3L utility score	0.812 (0.259) [-0.181 to 1]
	<b>Median [IQR]</b>
Age	65 [50–72]

Abbreviations: IQR, interquartile range; N, number of respondents; SD, standard deviation.

an income between £20,000 and £40,000; and 20% had an income greater than £40,000. Participants reported a mean EQ-5D-3L utility score of 0.81, indicating a relatively high quality of life; this is similar to the reported quality of life score of 0.85 for the UK general population.<sup>32</sup> When participants were asked to self-select whether they were underweight, normal weight, overweight, or very overweight, most participants stated they were normal weight (59.7%), with 35% stating overweight. The majority (>64%) did not have any family members or friends that had VLU. Fifty-six respondents (36%) said that they or someone in their household had private health insurance. The sample broadly represented the demographic profile of the UK population except for age and employment categories.

### 3.2 | WTP estimates

Out of the 154 respondents, 84 preferred clinic care, 65 were in favor of home care, and 5 were indifferent. The maximum mean amount respondents were willing to pay £498.96 to receive treatment at a clinic and £505.60 to receive care at home (Table 2). The difference between the maximum WTP value for clinic compared to home was tested using the Wilcoxon signed-rank test and the results showed that there was no statistically significant difference ( $Z = 0.79$ ,  $p = 0.43$ ). Therefore, respondents placed an equal valuation on clinic care or home care. A minority

TABLE 2 Preferences for clinic versus home care and WTP estimates

Treatment option	Number of respondents choosing their preferred treatment, N (%)	Number of respondents unwilling to pay (i.e., WTP = 0), N (%)	Number of responders protesting/missing, N (%)	Median amount in GBP respondents are willing to pay (range) [N]	Mean amount in GBP respondents are willing to pay (SD) [N]	p value
Clinic care	84 (54.6)	5 (3.2)	24 (15.6)	250 (0–6000) [125]	498.96 (761.62) [125]	$p = 0.43$
Home care	65 (42.2)	3 (1.9)	27 (17.5)	225 (0–7000) [124]	505.60 (819.89) [124]	

Note: significance level;  $p \leq 0.05$ .

Abbreviations: N, number of respondents; SD, standard deviation; WTP, willingness to pay.

of responders (<4%) chose zero as their true WTP amount because they could not afford to pay for the service, these genuine zero WTP bids were included in the WTP calculations. However, approximately 17% of the respondents were classed as “protestors” because they refused to engage in the exercise stating reasons such as “the NHS should pay because I have paid taxes or national insurance,” these protest bids were excluded from the analysis. Table 3 summarizes the WTP findings for both clinic care and home care by subgroups. Respondents' income was consistently and significantly important in the valuation of clinic care and home care, those respondents who have higher income were willing to pay more for the VLU treatments compared to those with lower incomes. No other subgroup differences were statistically significant.

### 3.3 | Qualitative explanations for preferring clinic or home care

The most common theme in preference of clinics was that participants preferred to have an appointment booked at the clinic, so they did not have to wait at home for a district nurse, allowing them to plan events around the booking. Participants also found clinics were more social areas and felt less lonely about their condition as they could speak to others with VLU. Participants said they would have better relationships with medical staff by seeing the same nurses or doctors and felt that clinics would have better trained and numerous staff in case of any complications. Finally, treatment at home was perceived as unsanitary with an increased risk of infection and more complicated as participants would have to order bandages.

**TABLE 3** WTP amounts by different population groups

Characteristics	Clinic care			Home care		
	Median (range)	Mean (SD)	p value	Median (range)	Mean (SD)	p value
<b>Sex</b>						
Female	200 (0–6000)	450 (766)	0.42	220 (0–7000)	468 (878)	0.54
Male	250 (0–5000)	563 (765)		237.5 (0–5000)	557 (756)	
<b>Income</b>						
<£20,000	150 (0–1000)	314 (332)	0.02	150 (0–1500)	330 (357)	0.07
£20,000–£40,000	500 (0–2000)	566 (476)		500 (0–2000)	591 (487)	
>£40,000	450 (0–6000)	741 (1184)		350 (0–7000)	702 (1352)	
<b>Marital status</b>						
Married/partner	300 (0–5000)	512 (640)	0.75	300 (0–5000)	516 (634)	0.83
Single/divorced/widowed	140 (0–6000)	464 (1021)		150 (0–7000)	481 (1167)	
<b>Education</b>						
Below degree level	199.5 (0–6000)	468 (910)	0.52	200 (0–7000)	484 (1000)	0.63
Degree level or above	500 (0–2000)	560 (476)		500 (10–2000)	557 (422)	
<b>Employment status</b>						
Retired/not working	240 (0–6000)	535 (889)	0.47	224.5 (0–7000)	548 (967)	0.42
Employed/self-employed	275 (0–2000)	432 (443)		237.5 (0–1500)	423 (399)	
<b>Weight</b>						
Normal weight	250 (0–6000)	570 (914)	0.14	275 (0–7000)	589 (1000)	0.14
Overweight	200 (0–2000)	362 (405)		200 (5–1500)	363 (371)	
<b>Health insurance</b>						
No private insurance	240 (0–6000)	530 (889)	0.59	225 (0–7000)	562 (983)	0.34
Has private insurance	300 (0–2000)	452 (444)		275 (0–1500)	415 (386)	
<b>Mobility</b>						
No mobility problems	275 (0–5000)	507 (641)	0.85	250 (0–5000)	513 (638)	0.88
Some mobility problems	150 (0–6000)	477 (1039)		200 (0–7000)	488 (1174)	

Note: significance level:  $p \leq 0.05$ .

Abbreviations: SD, standard deviation; WTP, willingness to pay.

Alternatively, the most common theme favoring home care was convenience and the difficulty in traveling faced by participants with impaired mobility. Other respondents expressed a greater sense of comfort and control at home, with more privacy. In addition, some participants said they would receive more attention from district nurses at home and tended to dislike clinics and hospitals, as they were seen as places for more serious issues.

## 4 | DISCUSSION

This study assessed respondents' treatment preferences for clinic care and home care using the WTP method. The study found that in terms of the simple direction of preference, participants preferred clinic care marginally higher (12%) than home care. However, results of WTP values for these two services showed that respondents were willing to pay similar amounts to be treated at either service, suggesting that there was no strong preference for the features of one service over the other. This finding is similar to the evidence from the VLU literature where patients place the most value on familiarity with their HCP and being within a shared decision-making environment.<sup>33</sup>

The literature quantitatively evaluating preferences for VLU clinic care or home care is limited.<sup>34</sup> We only found one other study that evaluated the role of patient preferences for home or clinic care setting on outcomes such as healing time, quality of life, and patient satisfaction.<sup>34</sup> Out of the 230 participants that were included in the study, 126 were randomly allocated to home care or clinic care; 104 were given a choice to select their preferred place, either home care or clinic care, to receive treatment. At 3-month follow-up, the results showed no significant difference between the allocated and choice groups on all the outcomes.

This study also adds to the qualitative evidence literature on preferences for VLU treatment. We found that some participants favored clinic care because they can book appointments allowing them to plan events around the booking; however, other participants that favored home care rated the convenience of staying at home due to the difficulties in traveling to clinics faced by those with impaired mobility. This finding is echoed in the literature which shows that patients who relied on family for transport to appointments at wound clinics faced greater disruption to their lives as often their family members would have to take time off work, thus placing a financial burden on families.<sup>35</sup> The literature also highlights other service delivery barriers that prevent service users from receiving high-quality VLU care. Barriers such as increased pressure on community nurses to work long hours across wide areas have contributed to nurses with specialist wound care skills leaving these roles resulting in a lack of appropriately skilled nurses available to deliver this service.<sup>36,37</sup> Moreover, nurses felt ill-equipped for treating patients as supplies such as dressings that are needed for wound care were not available if patients forgot to order dressings via prescriptions.<sup>37</sup> Overall, more work needs to be done to assess ways to reduce these barriers to providing high-quality care in both settings.

Our study has some important strengths. The WTP questionnaire was developed using best practices emerging from the literature on preference elicitation, such as the payment card method, and developing the treatment descriptions by doing extensive qualitative interviews with HCPs. Also, the WTP surveys were conducted face-to-face with a trained interviewer to improve the quality of the data gathered. In addition, to the best of our knowledge, this is the first study quantifying public preferences (as opposed to patient preferences) for treatment processes using the WTP method.

In our study, we identified a relationship between income and the WTP values, this finding coincides with other WTP studies where higher-income earners report larger WTP values.<sup>38,39</sup> While we acknowledge that income effect can lead to biased WTP estimates, the aim of the study was not to get a perfect WTP amount instead, the WTP amount was used to capture the value or preference individuals placed on each service. The true WTP amount is not so important in the context of the NHS as patients are not paying out of pocket to access health care, but the value respondents place on the treatment processes are important to make decisions about how best to provide VLU services in the UK. This income effect also shows good construct validity of the survey, as intuitively it makes sense that higher-income earners would be willing to pay more to access treatment.

A limitation of WTP studies can be the problem of protest bids. In our study, approximately 17% of the sample were excluded from the analysis because participants refused to engage in the task. The literature report similar findings where approximately 20% of respondents were excluded across WTP studies.<sup>40</sup> Participants' reasons for not providing a hypothetical WTP value were on the premise of the "principle" that they were not interested in paying any amount because they pay taxes for the NHS to pay for care. Protest bids are not unusual in the UK context, because healthcare is free at the point of access, and people are unfamiliar with being asked to pay to get treatment. If 17% of protest respondents faced the choice of selecting home care or clinic care in a real-life situation, their choice would be different; consequently, their true preference is not captured by this method. Another limitation of this study was the imbalanced sample characteristics of the respondents. The sample had a relatively equal distribution of males and females and a good distribution of income, but a larger proportion of the sample was older and retired (53%), so caution should be used when interpreting the results of the younger working adults of the UK general population.

## 5 | CONCLUSION

This study shows that respondents placed an equal valuation on where they receive treatment for VLU. Qualitative findings show that both services had strong advantages that suited the participants. These include the convenience of being able to book an appointment at clinics or receiving care at home if the respondent has difficulty traveling to the clinic. Therefore, we conclude that service users



should be given the option to choose either clinic care or home care where possible. Further research could be done using a different elicitation technique to confirm our findings. In future studies, it could be useful to include participants who have VLU to confirm if their preferences are similar to that of the general population.

## AUTHOR CONTRIBUTIONS

**Nyantara Wickramasekera:** Formal analysis; investigation; methodology; software; validation; writing—original draft; writing—review and editing. **Simon Palfreyman:** Conceptualization; funding acquisition; investigation; methodology; project administration; resources; supervision; validation; writing—review and editing. **Elizabeth Lumley:** Conceptualization; data curation; funding acquisition; investigation; methodology; project administration; validation; writing—review and editing. **Arvind Dosanjh:** Data curation; formal analysis; methodology; project administration; validation; writing—original draft; writing—review and editing. **Phil Shackley:** Conceptualization; data curation; formal analysis; funding acquisition; investigation; methodology; project administration; supervision; validation; visualization; writing—review and editing.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## DATA AVAILABILITY STATEMENT

The data generated during the current study are not publicly available as no consent was sought from participants to allow sharing of data with third parties.

## TRANSPARENCY STATEMENT

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned (and, if relevant, registered) have been explained.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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