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The "self-treatment of wounds for venous leg ulcers checklist" (STOW-V Checklist V1.0): Part 2—The reliability of the Checklist

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Abstract

The "Self-Treatment of Wounds for Venous Leg Ulcers Checklist" (STOW-V Checklist V1.0) is an evidence-based, standardised tool designed to assist nurses to appraise the conduct of wound treatment when undertaken by patients who have venous leg ulcers. A prospective reliability study was conducted to determine the reliability of the STOW-V Checklist V1.0. Video-recordings of patients who self-treated their leg ulcer were obtained (n = 5) and nurses (n = 15) viewed each video-recording three times and concurrently completed the Checklist. Internal consistency, inter-rater reliability and intra-rater reliability were evaluated. Cronbach's alpha for items in the Checklist was 0.792, 0.791 and 0.783 for Occasions 1, 2 and 3, respectively, indicating good reliability. Inter-rater reliability was 0.938, 0.958 and 0.927 for Occasions 1, 2 and 3, respectively; these results were statistically significant and indicative of excellent reliability. Intra-rater reliability was 0.403 to 0.999; these results were statistically significant and meeting or exceed adequacy in the case of all except two raters. The study provides preliminary evidence that the Checklist is measuring the concepts that it intends to measure and that there is a high level of agreement among raters. It is recommended that the STOW-V Checklist V1.0 is utilised with patients in a shared-care model, with nurses and other healthcare professionals providing supervision and oversight of self-treatment practices whenever this is feasible and acceptable to the patient.

KEYWORDS
Checklist, leg ulcers, reliability study, self-management, self-treatment

Key messages
- the "Self-Treatment of Wounds for Venous Leg Ulcers Checklist" (STOW-V Checklist V1.0) is an evidence-based tool designed to assist nurses to appraise the conduct of wound treatment when undertaken by patients who have venous leg ulcers

- a prospective reliability study was conducted to determine the reliability of the STOW-V Checklist V1.0
- the internal consistency of the Checklist was good and the results indicate excellent inter-rater reliability
- the STOW-V Checklist V1.0 should be utilised with patients in a shared-care model, with nurses and other healthcare professionals providing supervision and oversight of self-treatment practices whenever feasible and acceptable to the patient

1 | INTRODUCTION

Supporting patients to self-treat chronic wounds is an innovative approach to management of wounds such as leg ulcers.[1,2] Self-treatment of wounds is defined as "the patient cleaning the wound, applying and removing wound dressings, and/or applying and removing compression therapy."[1,2] This publication reports the reliability of the Self-Treatment of Wounds for Venous Leg Ulcers Checklist (the "STOW - V Checklist V1.0"), a tool designed to assist nurses to appraise the conduct of wound treatment when undertaken by patients who have venous leg ulcers. The study is the second of two studies arising from a programme of research that initially developed, piloted and refined the STOW-V Checklist.[1]

1.1 | Background

Self-management is an approach to engaging patients in health care and is standard practice for the management of common chronic health conditions such as diabetes, asthma and cardiac disease.[3] It is widely recognised that patients should be active participants in their management and care and that self-management can have benefits for the patient, care provider and healthcare system[4]; however, self-management of chronic wounds such as venous leg ulcers is not yet a widely published practice.[2]

Self-treatment of wounds aligns with Orem's model of self-care, which seeks to promote adaptation to one's environment and personal independence.[5] Self-treatment of wounds is highly relevant to the nursing profession as nurses typically attend to wound treatment and should support self-management interventions for this patient group. For self-treatment of wounds to be a feasible approach to wound care, patients must have a desire or need to self-treat, and evidence suggests that this can be the case.[6-9]

Patients must also be able to self-treat effectively. Our previous research conducted in Australia and Wales (n = 113) identified that self-treaters were not supervised when they started self-treatment (n = 76, 67.3%) and

were not regularly supervised during the wound care episode (n = 90, 80%).[2] Furthermore, structured and targeted education from a healthcare provider was reported by few of our study participants (n = 6, 5.3%). During our pilot trial of the earlier version of the STOW Checklist that is reported in this publication, we identified that some Key Behaviours associated with self-treatment were not always conducted and that some were more challenging to complete than others.[1] Our research has, therefore, indicated that self-treaters can be underprepared to self-treat and lack sufficient ongoing professional oversight of their self-treatment practice. We believe that this may result in suboptimal clinical outcomes.

Innovative approaches to health care will help to meet the current and future needs of patients who have chronic wounds and address the burden experienced at the personal, system and economic levels. The COVID-19 pandemic has seen accelerated interest in approaches to wound care that can reduce or eliminate the need to provide in person professional care. However, for self-treatment of chronic wounds to be effective, the patient must know how to self-treat and be able to conduct self-treatment related activities. Close monitoring is also required when and if self-treatment is acceptable to the patient. It is most important to appraise the self-treatment activities that are and that are not conducted by patients, and then intervene as needed in the form of patient education, support and monitoring so as to improve patient outcomes.

An important step in the process of enabling self-treatment of wounds is appraisal of the conduct of self-treatment related activities, specifically those associated with cleaning the wound, applying and removing wound dressings, and/or applying and removing compression therapy. Evidence-based, validated instruments to appraise the conduct of wound treatment have, to date, not been available to healthcare providers; however, we have recently published the development, pilot testing and refinement of the "STOW - V Checklist V1.0." The aim of the Checklist is to assist nurses to appraise the conduct of leg ulcer treatment when undertaken by the patient.[1]

The initial development of our Checklist was undertaken with input from patients who had chronic wounds (primarily venous leg ulcers), similarly, the pilot testing of the Checklist was undertaken with patients who had primarily venous leg ulcers.[1] Venous leg ulcers are prevalent internationally, in hospitals 0.5%, in settings such as residential aged care 2.5%, and in the community up to 1.0%.[10] We believe that people living in the community are a group that should be engaging in self-management activities given the symptoms, chronicity and recurrence associated with leg ulcers.[11] It is for this reason that the target group for application of the STOW Checklist reported in this publication is patients who have venous leg ulcers and who receive care from community nurses.

The aim of the current study was to describe the reliability of the "STOW - V Checklist V1.0." The primary objective of the study was to determine the extent to which the Checklist was reliable over time when used by community nurses with patients who self-treated venous leg ulcers.

2 │ METHODS

2.1 │ Design

A prospective reliability study.

2.2 │ The Self-Treatment of Wounds Checklist

The "STOW-V Checklist V1.0" is a clinical tool to assist healthcare professionals to appraise the conduct of wound treatment when undertaken by the patient. The STOW-V Checklist was designed to help identify self-treatment activities (Key Behaviours) that are and are not conducted and where intervention (in the form of patient education, support and monitoring) is required. The tool has been designed to be completed by the healthcare professional while observing the patient self-treating their wound. The development of the STOW-V Checklist V1.0 is detailed in Kapp and Santamaria.[1]

The STOW-V Checklist V1.0 has eight Checklist Areas (Equipment and Workspace; Hand Hygiene; Wound Dressing Removal; Skin Care; Wound Cleansing and Debridement; Wound Assessment, Wound Dressing Application, and Compression Therapy Application) and each Checklist Area has four Key Behaviours (32 items in total). For each Key Behaviour, the option of selecting one code is available (either "yes" "not applicable" or "no"). "Yes" and "not applicable" represent a positive result (the Key Behaviour has been attended or is not required) and "no" represents a negative result (the Key Behaviour has not been attended or has not been observed). The eight Checklist sub-scores and one overall total score are calculated by sum.

Ethical approval was granted for the study by the Melbourne Health Human Research Ethics Committee on 15 November 2017. The study was supported by a grant from the Australian Wound Management Research Foundation. Each patient participant was gifted a shopping voucher (AU$50) and the nurse participants went into a draw to win one AU$150 shopping voucher and Wounds Australia annual membership (value AU$100).

2.3 │ Setting and sample

A convenience sample of English speaking patients who self-treated a leg ulcer (n = 5) was sought from a nurse-led inter-disciplinary wound management clinic in Melbourne, Australia. A convenience sample of English speaking nurses (n = 15) from any area in Australia was sought via Author SK's professional networks and advertisement within Wounds Australia, a national professional wound organisation. A pragmatic decision was made regarding the sample size of patients and nurses as previous similar research conducted with patients who have wounds was not identified. More broadly, studies testing Checklists for self-management in related fields (specifically those which relate to patients undertaking care or treatments tasks, eg, medicines self-management[12-14]) did not describe sample size calculations therefore did not provide any guidance.

2.4 │ Eligibility

Patient participants were self-treating their chronic wound, were prepared to be video-recorded while self-treating and were able to provide informed consent. Nurse participants were enrolled nurses, registered nurses or nurse practitioners who had wound management experience in the community care setting. Nurses from the wound management clinic where the patient participants were recruited were not eligible to be nurse participants in the study to prevent bias.

2.5 │ Screening, recruitment and consent

Patient participants were initially screened by wound clinic staff for eligibility to participate in the study. The researcher, Author SK spoke to the potential participant (in the wound clinic) to ascertain interest in participating

and to provide the non-technical statement and consent form. If eligible and agreeing to participate, the consent form was signed and a date and time were scheduled for the researcher (Author SK) to visit the participant in their home to video-record the self-treatment. Nurse participants who responded to direct contact from the researcher or the study advertisement received the non-technical statement and consent form via email and returned the latter, signed, if willing to participate. Any questions regarding participation were addressed by phone or email.

2.6 | Patient procedure and data collection: The self-treatment video-recordings

Video-recordings were selected as the medium for the nurses to observe the self-treatment Key Behaviours, this approach selected on account of three main factors. Firstly, the logistical difficulty of assembling multiple nurse-raters in the patient participants' home on multiple self-treatment occasions led to the appeal of using video-recordings, which could be conveniently accessed remotely by nurse-raters at a time that suited. Secondly, reliability can be enhanced by the use of video-recordings.[15] In this study, subject reactivity and environmental extraneous variables were minimised as the patient participant was video-recorded on one occasion only, the participant was watched only by the person who was taking the video-recording, the participants were aware that the person taking the video-recording was not going to subsequently be a nurse-rater, and the subsequent nurse-raters were not present at the time of the self-treatment. Finally, the use of one video-recording of each participant's self-treatment (which was viewed by nurse participants on multiple occasions) ensured that variability of self-treatment practice over occasions was eliminated.

Patient participants completed one self-treatment of their wound, in their home, while being video-recorded by the researcher (Author SK) with a digital single lens reflex camera. The participant attended to the wound treatment as usual and the researcher did not assist with wound treatment or provide direction or advice during the video-recording. Participant age, sex, duration of wound and wound diagnosis were collected. Each participant was offered the opportunity to view the video-recording.

The video-recordings were subsequently edited to remove confidential and irrelevant content (eg, mention of relative's names and unanticipated noise) via muting and cropping of the video-recording, thereby minimising environmental extraneous variables and minimising the risk of nurse-rater fatigue. This resulted in some sections of the video-recording being silent for which the nurse participants were pre-advised. When time elapsed with no change to the content (eg, when one participant soaked a wound for a prolonged period of time and no other activity was undertaken) the video-recording was shortened and the message "5 minutes later..." was displayed to save the nurse participant's time. The video-recordings were copied to DVD in .m4v file format in preparation for distribution to the nurses.

2.7 | Nurse procedure and data collection: Viewing of the self-treatment video-recordings and completion of the Checklist

Detailed written instructions were provided in advance to nurse participants regarding how to complete the STOW-V Checklist V1.0 (which was in paper form), particularly the need to familiarise themselves with the Checklist prior to watching any self-treatment video-recordings, to complete the Checklist while watching each video-recording, and the need to complete a new Checklist for each viewing. Participants were directed to make contact with the researcher to discuss any queries relating to their participation. Participants were encouraged to make any free text comments after completing the Checklist so as not to be distracted while viewing the video-recording and completing the Checklist. It was emphasised that once each Checklist was completed it was to be securely filed (envelope provided) and not referred to when subsequently watching the video-recordings and completing Checklists.

Each nurse participant was instructed to watch each of the five video-recordings three times (a total of 15 self-treatment views in total). Viewing occurred once at baseline and in the random order listed (previously generated by the researcher in Microsoft Excel). Viewing then occurred a further two times, and in a new random order, 1 week later. This resulted in each nurse participant watching each of the five video-recordings three times; once at baseline and twice 1 week later. This time schedule was selected as a 1-week interval most closely aligns to the target change frequency for best practice treatment of venous leg ulcers, specifically when using multi-component compression systems.[16] By viewing a week apart and then immediately following any variability associated with this timing could be considered.

2.8 | Analysis

2.8.1 | Internal consistency

Internal consistency is the degree to which how closely related a set of items are as a group or how well the set of items measure the same underlying attribute. This was measured with Cronbach's coefficient alpha, which gives average correlation among all items that make up the scale.[17] The range is reported from 0 to 1 and a higher Cronbach's coefficient alpha indicates greater reliability. Cronbach's alpha item to total correlation coefficient was used to identify the relative contribution of each item to the total Checklist score.

2.8.2 | Inter-rater and intra-rater reliability

Inter-rater reliability is the degree of agreement among a group of raters and intra-rater reliability is a score of the consistency in ratings provided by the same rater across multiple occasions. These were measured with intraclass correlation coefficient.[18] This analysis was conducted on the total score of the STOW-V V1.0 Checklist, which was between "0" (the lowest possible score) and "32" (the highest possible score). The average ICC shows the measurement of the reliability of their mean from multiple raters (the rating of a whole panel of raters). Based on the 95% confident interval of the ICC estimate, the values and reliability of the Checklist have been interpreted as follows: less than 0.5 (poor), between 0.5 and 0.75 (moderate), between 0.75 and 0.9 (good), and greater than 0.90 (excellent).[17]

For inter-rater reliability (n = 3 occasions), raters (n = 15) were used as fixed effect and patients (n = 5) used as random effect. For intra-rater reliability (n = 15 raters), patients (n = 5) were used as random effect and occasion (n = 3) was used as fixed effect.

IBM SPSS Statistics for Windows, (Version 24.0; Armonk, New York) was used to compute the Cronbach's alpha and ICC using a two-factor mixed-effects model and type consistency (selected raters were considered unique and not a random sample of raters). The analysis was completed by a researcher with statistical expertise who was not involved in the conception, design or implementation of the study. An independent expert from a statistical consulting centre provided review of the approach to the analysis.

3 | RESULTS

3.1 | Patient participant characteristics

A total of 10 patients were determined to be eligible and were approached to participate, of which five agreed. No participants withdrew during the study. The sample had an average age of 62.6 years (minimum 45 years, maximum 81 years, SD = 12.75), three were male and two were female. All participants had lower leg ulcers of venous aetiology, which were on average 18.6 months duration (minimum 7 months, maximum 36 months, SD = 12.02). The characteristics of each patient participant are presented in Table 1.

Following editing to remove irrelevant content, the video-recordings were on average 11 minutes duration (minimum 5.5 minutes, maximum 18 minutes, SD = 4.09). Some sections of the video-recordings were muted on account of the participants talking about matters that were of a confidential nature. Deidentified still images of a section of each participant video-recording are displayed in Figure 1.

3.2 | Nurse participant characteristics

In total, 24 nurses made contact following advertisement of the study, of which 15 agreed to participate and nine declined. The 15 participants were all female with an average age of 51 years (minimum 38 years, maximum 63 years, SD = 9.95). The majority of the participants were registered nurses (n = 13), one was an enrolled nurse and one was a nurse practitioner. The participants had been nursing for 28 years on average (minimum 7 years, maximum 42 years, SD = 12.58), and providing wound care to patients for 19 years on average (minimum 7 years, maximum 30 years, SD = 7.90). The characteristics of each nurse participant are presented in Table 2.

TABLE 1 Patient participant characteristics

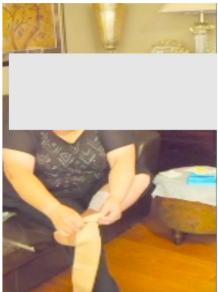|	Gender	Age	Wound duration (weeks)	Wound aetiology
1	Male	45	12	Venous leg ulcer
2	Male	81	30	Venous leg ulcer
3	Male	61	8	Venous leg ulcer
4	Female	54	7	Venous leg ulcer
5	Female	72	36	Venous leg ulcer

FIGURE 1 Image from each participant video-recording

3.3 | Viewing of the self-treatment video-recordings and completion of the STOW-V Checklists

Nurse participants recorded the dates and times that they viewed the video-recordings and completed the Checklists on paper forms. The duration between the first viewing and the second viewing (and therefore duration between completing the Checklists the first and second times) was 7.6 days on average (minimum 5 days, maximum 13 days, SD = 1.99). Every participant completed the third viewing of the five video-recordings immediately after completing the second viewing. Each participant spent 162 minutes viewing the video-recordings in total.

3.4 | Internal consistency and inter-rater and intra-rater reliability of the STOW-V Checklist

The results for internal consistency of the Checklist and inter-rater and intra-rater reliability of the Checklist are shown in Tables 3-5 respectively. Rater 12 has contributed two missing values in Occasion 2, and hence listwise deletion has excluded two cases from the analysis.

4 | DISCUSSION

The aim of the study was to describe the reliability of the "STOW-V Checklist V1.0." The primary objective of the

	Age	Duration of nursing	Years wound care experience	Practice setting
1	58	30	20	Aged care
2	61	30	30	Aged care
3	58	39	23	Wound clinic
4	38	10	9	Wound clinic
5	58	40	23	Community nursing
6	30	7	7	Community nursing
7	55	36	29	Community nursing
8	63	42	25	Community nursing
9	47	25	20	Community nursing
10	57	36	15	Community nursing
11	44	23	23	Community nursing
12	57	37	27	Community nursing
13	61	42	20	Community nursing
14	43	10	5	Community nursing
15	38	8.5	8.5	Community nursing

TABLE 2 Nurse participant characteristics

Occasion	Number of Items	Cronbach's alpha	95% CI
1	32	0.792	0.718, 0.854
2	31	0.791	0.716, 0.854
3	31	0.783	0.706, 0.848

TABLE 3 Internal consistency of the STOW-V Checklist

Abbreviation: STOW-V Checklist, Self-Treatment of Wounds for Venous Leg Ulcers Checklist.

Average-measures			
Occasion	ICC	95% CI	F Test
1	0.938	0.811, 0.993	$(F(4, 56) = 16.01, P < .001)$
2	0.958	0.821, 0.999	$(F(2, 28) = 23.64, P < .001)$
3	0.927	0.780, 0.991	$(F(4, 56) = 13.75, P < .001)$

TABLE 4 Inter-rater reliability of the STOW-V Checklist

Abbreviation: STOW-V Checklist, Self-Treatment of Wounds for Venous Leg Ulcers Checklist.

study was to determine the extent to which the Checklist was reliable over time when used by community nurses with patients who self-treated venous leg ulcers.

Cronbach's alpha for items in the Checklist was 0.792, 0.791 and 0.783 for Occasions 1, 2, and 3, respectively (Table 3). These results surpass the minimum requirement of 0.7 for adequate reliability as described by Nunnally[19] and DeVellis[20] and meet the indication of good reliability (are between 0.75 and 0.79) according to Koo and Li.[18] This result provides preliminary evidence that the Checklist is measuring the concepts that it intends to measure.

The inter-rater reliability results were 0.938, 0.958 and 0.927 for Occasions 1, 2 and 3, respectively (Table 4).

These results are statistically significant and meet the indication of excellent reliability according to Koo and Yi.[17] This finding is positive and indicates a high level of agreement among raters. The intra-rater reliability results (Table 5) meet or exceed adequacy as specified by Nunnally,[19] DeVellis,[20] and Koo and Li[18] in the case of 14 of the 15 raters. The ICC was 0.403 to 0.999 and these results were statistically significant in the case of all except two raters.

The purpose of the STOW-V Checklist V1.0 is to assist nurses to appraise the conduct of venous leg ulcer treatment when undertaken by the patient. Our earlier research has described how the Checklist was developed and the subsequent pilot and refinement of the

TABLE 5 Intra-rater reliability of the STOW-V Checklist

Average			
Rater	ICC	95% CI	F Test
1	0.746	(−0.283, 0.972)	($F(4, 8) = 3.937, P = .047$)
2	0.403	(−2.016, 0.934)	($F(4, 8) = 1.675, P = .248$)
3	0.958	(0.786, 0.995)	($F(4, 8) = 23.581, P \leq .001$)
4	0.821	(0.097, 0.980)	($F(4, 8) = 5.595, P = .019$)
5	0.974	(0.867, 0.997)	($F(4, 8) = 37.938, P \leq .001$)
6	0.800	(−0.012, 0.978)	($F(4, 8) = 4.993, P = .026$)
7	0.942	(0.709, 0.994)	($F(4, 8) = 17.352, P \leq .001$)
8	0.858	(0.281, 0.984)	($F(4, 8) = 7.029, P = .010$)
9	0.873	(0.357, 0.986)	($F(4, 8) = 7.857, P = .007$)
10	0.995	(0.974, 0.999)	($F(4, 8) = 196.316, P \leq .001$)
11	0.977	(0.885, 0.997)	($F(4, 8) = 43.836, P \leq .001$)
12	0.630	(−2.942, 0.991)	($F(2, 4) = 2.701, P = .181$)
13	0.829	(0.138, 0.981)	($F(4, 8) = 5.861, P = .017$)
14	0.999	(0.996, 1.000)	($F(4, 8) = 1241.5, P \leq .001$)
15	0.876	(0.375, 0.986)	($F(4, 8) = 8.083, P = .007$)

Abbreviation: STOW-V Checklist, Self-Treatment of Wounds for Venous Leg Ulcers Checklist.

Checklist.[1] This study has investigated the reliability of the STOW-V Checklist V1.0 and provided preliminary evidence that the Checklist is reliable.

Evidence-based, reliable instruments to appraise the conduct of wound treatment have, to date, not been reported. The STOW-V Checklist V1.0 is an evidence-based tool that can assist nurses to enable self-treatment by venous leg ulcer patients and guides the nurse regarding how to assess and monitor self-treatment practices in a standardised manner. Importantly, the Checklist can identify the self-treatment Key Behaviours that are and are not conducted, providing valuable information to inform subsequent interventions to improve self-treatment practices.

Access to the STOW-V:

https://healthsciences.unimelb.edu.au/departments/nursing/research/projects/self-treatment-of-venous-leg-ulcers-checklist-stow-v

4.1 | Strengths and limitations of the study

The successful use of video-recordings of self-treatment in the study provides justification for the use of this novel approach to extend this programme of research in the future. The study was prospective, participant characteristics have been detailed, methods for performing and scoring tests has been stated, and a detailed description of the approach to analysis is presented. We paid attention to important threats to validity and reliability[15] in

particular, subject reactivity, environmental extraneous variables, and ambiguous behavioural definitions during the development, pilot[1] and testing of the Checklist. The COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN) Checklist[21] and the Guidelines for Reporting Reliability and Agreement Studies (GRRAS)[22] informed the reporting of the study, thereby enhancing the transparency of our study design, conduct and reporting. Limitations include the relatively small sample size of 15 nurses who agreed to participate; however, we suggest this sample was adequate for the purpose of this initial testing of the Checklist.

4.2 | Future research

The study provides insights that will be valuable when designing and conducting future research with the STOW-V. We believe that the current study should be replicated with larger samples of both nurses and patients. Translation into other languages could be undertaken to enable use with diverse patient and nurse groups. The use of the STOW-V Checklist V1.0 by other care providers who are involved in the management of people who have chronic wounds (eg, informal carers, doctors and allied health) could be explored.

Patients with chronic wounds of other aetiologies should be accounted for in future developments of the Checklist. The potential usefulness of the STOW-V Checklist V1.0 (and future STOW Checklists) as a research tool is evident, as research investigating the clinical and cost-effectiveness of self-

treatment should ensure self-treatment is implemented and measured in an evidence-based and standardised manner.

It is recommended that the STOW-V Checklist V1.0 is utilised with patients in a shared-care model, with nurses and other healthcare professionals providing supervision and oversight of self-treatment practices whenever this is feasible and acceptable to the patient. We are also of the view that patients who self-treat their wounds should be offered a broader range of educational resources than are currently available and that these could include e-learning packages and other web-based materials.

5 | CONCLUSION

Self-treatment of wounds is an innovative and enabling approach to the care of chronic wounds. This approach offers potential benefits in terms of patient engagement and satisfaction, and possibly cost and service delivery efficiencies.[23-25] The STOW-V Checklist V1.0 is an evidence-based tool, and preliminary evidence suggests the tool is reliable for use with patients who have venous leg ulcers and who self-treat. Self-treatment may be promoted as a single intervention or a component of a complex intervention for people who have chronic wounds. The vision for the STOW-V Checklist V1.0 is that it is now used for appraising the conduct of wound treatment when undertaken by the venous leg ulcer patient in a model of shared care that provides patients with education and monitoring to support their self-treatment practice.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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