

# Experience of Silhouette™, a new wound assessment and information management system, in clinical practice.

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This study outlines a qualitative evaluation of a new wound assessment and electronic information management system, the Silhouette™ Product Suite, conducted by the patient care team at the Eastbourne Wound Healing Centre (WHC), during September to October 2011.

The Eastbourne WHC used the Silhouette wound assessment and information management system for assessing and recording changes in wounds for patients under their care in a practical, real-world community environment. The tools assessed were two different Silhouette wound assessment device options (SilhouetteMobile™ and SilhouetteStar™+SilhouetteConnect™) which allow patient-side wound imaging, wound measurement and assessment data entry, together with an information management system (SilhouetteCentral™).

In order for electronic, computerised systems to be useful in wound care they must address the pertinent issues surrounding this field of nursing care. Any such system must be effective in accurately recording wound management and wound progression with a clear focus on patient outcomes. This evaluation considered the user experience and the clinical value in completing a wound assessment in an electronic format; ease of capture and storage of digital images, generation of precise wound measurement data and reliable capture of individual patient notes. The evaluation by Eastbourne WHC also reports on their experience of the information management functionality provided by SilhouetteCentral software.

***We used Silhouette for assessing and recording changes in wounds for four patients under our care in a practical, real-world community environment.***

Tools are needed to support the continuous and efficient shared understanding of a patient's care history that simultaneously aids sound intra- and interdisciplinary communication and decision making about the patient's future care. Such tools are vital to ensure that the continuity, safety, and quality of care endure across the multiple handovers made by the many clinicians involved in a patient's care.

Nursing documentation has been one of the most important functions of nurses since the time of Florence Nightingale because it serves multiple and diverse purposes (Cheevakasemsook et al, 2006). However, the problems associated with wound assessment and documentation are well recorded by clinicians and researchers from diverse disciplines and perspectives (Cheevakasemsook et al, 2006) and even though this documentation is vital as it serves as the foundation for an effective and consistent plan of care, ensuring quality treatment for the patient, there remains limitations in nursing documentation (Törnvall et al 2004). Therefore, an improved system of recording is considered to be essential and availability of new technologies such as the Silhouette Product Suite brings new opportunities in how we can capture and manage wound information to support patient care and wound outcomes management.

Wounds are subject to complications and can change rapidly from a healing wound into a non-healing wound. The review of wounds is often undertaken by different nurses with differing views. Therefore, accurate records are vital to ensure that each nurse can assess and identify immediately any change in the wound condition. The written word makes that extremely difficult to accomplish as each nurse will have different descriptions for the same wound (Maylor, 2009) and, if the records are misunderstood, then there can be a failure in the care which could be detrimental to the well being of the patient.

The common method of recording in community is to write in the patients notes, held in the patient's home, and then to complete a second set of notes online when returning to District Nurse Base. For this reason, records are not always accurately provided. Dowsett (2009, cited by Fletcher, 2010) found in her study of community nurses knowledge and practice, that only 42% of patients had baseline assessment forms completed.

The Silhouette Product Suite is designed to enhance quality and consistency of wound assessment information by generating quality photographs for comparison, clear electronic documentation and accurate measurements of the wound to provide a quantified, objective view of wound changes and outcomes over time, something that until now, has been very difficult for nurses to achieve consistently in practice.

***Silhouette is designed to provide a quantified, objective view of wound changes and outcomes over time, something that until now, has been very difficult for nurses to achieve consistently in practice.***

## Aims

The Eastbourne WHC undertook a qualitative evaluation of the Silhouette Product Suite to assess the value of this new technology in clinical practice and to report on how the Silhouette wound assessment devices and software tools meet the requirements for achieving effective and efficient wound assessments and information management for patients managed in a community setting.

## Methods

Over a 4 week period, the Eastbourne WHC monitored four patients as they progressed through their wound care treatment, using the Silhouette Product Suite. Three patients were assessed with SilhouetteMobile and one patient was assessed with SilhouetteStar+SilhouetteConnect. The Silhouette wound assessment device was used patient-side, to capture an image, generate wound measurements and input clinical assessment data which was then downloaded and managed on SilhouetteCentral, a secure database hosted on a server, to track wound progression and outcomes.

User feedback was gathered using a score based evaluation tool (Appendix 1) to assess the ease of use and clinical benefits of Silhouette.

Patient consent was requested and granted by the four patients participating in the study.

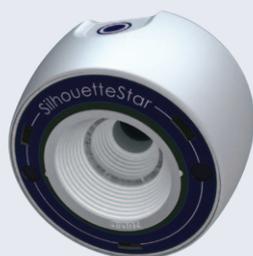
## Silhouette Point-of-Care Wound Assessment Device Options



SilhouetteMobile is a portable device which utilises a hand-held computer (PDA) to generate digital images, 3D wound measurements and capture of electronic clinical notes. Data captured with SilhouetteMobile is easily uploaded via an internet or network connection to the SilhouetteCentral information database which can be hosted on a client server.

*SilhouetteMobile point-of-care wound assessment device for imaging, measurement and assessment data capture in one convenient, portable device.*

## Silhouette Point-of-Care Wound Assessment Device Options

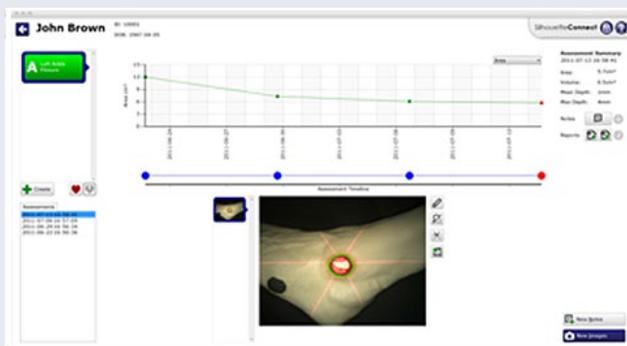


SilhouetteStar is a lightweight, compact wound imaging camera which connects via a USB cable to a computer; it is operated by the software application SilhouetteConnect which controls the camera and is used to collect and review the wound information. Images, 3D measurements and clinical data captured with SilhouetteStar+SilhouetteConnect is uploaded to the SilhouetteCentral database via an internet or network connection.

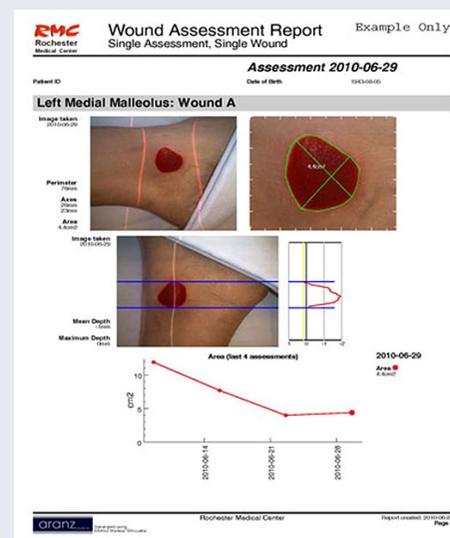
*SilhouetteStar camera provides quick and easy capture of wound images. Operated by SilhouetteConnect software which processes the images, wound measurements and records data, on a Windows compatible desktop, laptop or tablet PC.*

## Silhouette Reporting and Data Management

Automated Silhouette Wound Assessment Reports are produced in PDF format directly on SilhouetteMobile or SilhouetteConnect or on the SilhouetteCentral information management system. The Silhouette Wound Assessment Reports are user configurable and can be adapted to meet the needs of each organisation's wound care practice.



Example of Patient Dashboard on SilhouetteConnect screen, showing wound assessment summary.



Example of automatically generated Silhouette Wound Assessment Report, for easy review of patients' wound assessment data across care team.

Information from SilhouetteMobile and SilhouetteConnect is easily and securely transferred to SilhouetteCentral which is hosted on a client server and accessed with a secure web-browser using a unique username and password, with access permissions set for each user. Both SilhouetteMobile and SilhouetteStar+SilhouetteConnect\* are Wi-Fi and Mi-Fi enabled to support telehealth applications.

(\*Dependent on PC specification).

## Patient 1 (assessed with SilhouetteMobile)

Mrs PB was monitored over a 2.5 week period with 4 visits from the TVN. Her wound is a longstanding pressure injury and due to her routines, keeping dressings in situ has historically been problematic. She is currently being treated with the KCI Vacuum Assisted Closure (V.A.C.) system of Negative Pressure Wound Therapy. Attempts have been made to amend the dressing regime to alternative therapies but Mrs PB always finds that when therapy is changed, the wound deteriorates. Progress of her wound has been erratic with at times dramatic improvement followed by periods of deterioration.

SilhouetteMobile was used to capture images, measurements and clinical assessment information during the 4 assessments. The wound measurements taken over the assessment period show an overall reduction in the surface area of the wound. This provides quantitative and documented evidence of how the wound is changing over the assessment period.

[View Patient 1 Silhouette Wound Assessment Summary](#)



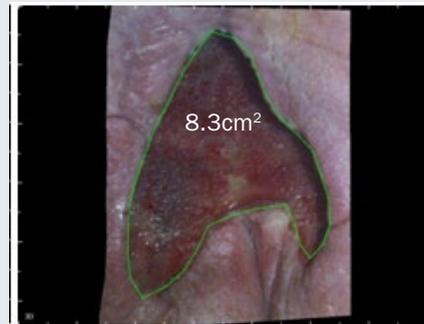
Patient 1, 21.10.2011

Digital image of sacral pressure ulcer captured with SilhouetteMobile, shown with reference laser lines which enable automated 3D surface area and depth measurements and volume calculations for a wound.



Patient 1, 21.10.2011

Wound boundary defined by user on SilhouetteMobile interactive screen, using a stylus.



Patient 1, 21.10.2011

Scaled image view available on SilhouetteMobile and SilhouetteCentral. 3D measurement of surface area generated automatically on SilhouetteMobile, data reported on stored image and assessment report.



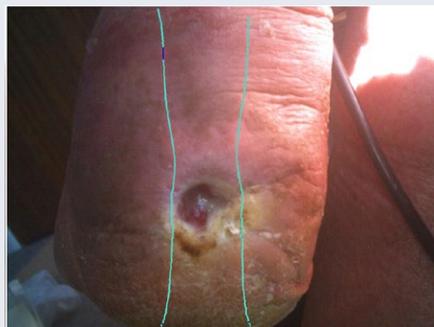
Patient 1, 14.10.2011

Illustration of how depth measurement is captured on SilhouetteMobile. The user moves the blue sliders on the interactive screen with a stylus to indicate top and bottom of wound, allowing software to report on depth of wound cavity as maximum depth and mean depth. For a large cavity wound, a user can take multiple depth measurements to report an average maximum depth.

## Patient 2 (assessed with SilhouetteMobile)

Mr WS has a pressure injury to posterior aspect of his left heel which has been slow to progress. He was assessed over a 4 week period by the TVN with twice weekly visits. The Silhouette wound assessments allowed the TVN to track even subtle changes reliably for the small wound, including overall reduction in wound surface area and depth and improvement in the state of the wound bed with healing accelerated.

SilhouetteMobile captures the photograph images using reference lasers for 3D wound measurement to determine the surface area, depth and calculated volume of the wound.



*Patient 2 Silhouette assessment on 30.09.2011*

*Surface area measurement as 0.7cm<sup>2</sup>, showing reference laser lines flanking either side of wound, for the heel pressure ulcer.*



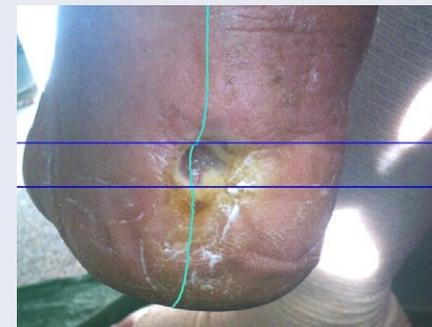
*Patient 2 Silhouette assessment on 30.09.2011*

*Depth measurement with SilhouetteMobile involves placement of single reference laser line (light blue line) through wound cavity, maximum depth 5mm, mean depth 3mm.*



*Patient 2 Silhouette assessment on 18.10.2011*

*Surface area measurement of heel pressure ulcer with SilhouetteMobile, reported as 0.3cm<sup>2</sup>*



*Patient 2 Silhouette assessment on 18.10.2011*

*Depth measurement with SilhouetteMobile indicates maximum depth 3mm, mean depth 2mm. Small changes which may be difficult to detect reliably are captured with Silhouette's 3D measurement technology.*

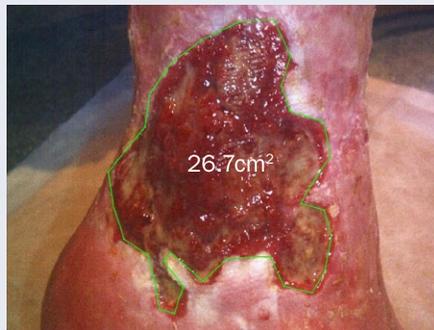
By obtaining wound measurements at each assessment the progression of the wound can be fully reviewed at each subsequent assessment with objective data which is presented both as numerical data and a plot of wound surface area, depth and calculated volume to show wound change over time. The format in which SilhouetteCentral stores all this information makes it easy for members of the multidisciplinary team to follow the patient's journey as care team members can be granted permission to access SilhouetteCentral via a secure internet web-browser or network connection.

# Silhouette Evaluation Results

## Patient 3 (assessed with SilhouetteMobile)

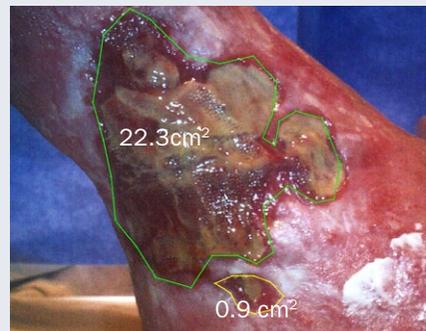
Mr JM has a mixed aetiology ulcer to the right lateral malleolus. During the study he was seen by the TVN over a 3 week period with visits twice a week. By using the SilhouetteMobile, the TVN was able to produce wound assessment reports in PDF format which are stored on the SilhouetteCentral database and can be printed out to give to the patient or other healthcare professional.

[View Patient 3 Silhouette Wound Assessment Report](#)



Patient 3, 29 September 2011

Scaled image on SilhouetteCentral Wound Details screen showing surface area as 26.7cm<sup>2</sup>



Patient 3, 29 September 2011

Scaled image on SilhouetteCentral Wound Details screen showing wound changes with images and measurements, with main wound area reduced in size to 22.3 cm<sup>2</sup> and an island wound of 0.9 cm<sup>2</sup>

The assessment report can be configured to produce either just the images with measurements or graphs or to incorporate the full assessment details based on data input into the clinical notes section of the Silhouette software.

The layout of the assessment report enables the clinician to quickly review the treatment regime(s) to date, coupled with the wound images, measurements and clinical assessment data, to objectively assess the progression of the wound.

# Silhouette Evaluation Results



## Patient 4 (assessed with SilhouetteStar+SilhouetteConnect)

Mr DR is a fully mobile and independent male who attends the Eastbourne WHC for his treatment.

The SilhouetteStar camera is very simple to use. The clinician simply points the camera towards the wound that they wish to photograph, and by either moving the device closer or further away, create a 'star' pattern using the reference laser lines. Once all the laser lines align to create the star pattern within the wound boundary, a single click of the button captures the image.

Images taken with SilhouetteStar camera upload to SilhouetteConnect software automatically via the USB cable connection instantly. The wound boundary tracing and clinical data input is made directly onto the SilhouetteConnect software screen on the PC using a keyboard and mouse, touchpad or tablet touch screen.

***View Patient 4  
SilhouetteConnect  
Patient Dashboard***



*Patient 4, 27.10.2011*

*Image captured using SilhouetteStar+SilhouetteConnect, showing the SilhouetteStar camera "star" reference laser lines which support reliable image capture and 3D wound measurements and below, the user-traced outline of the wound which is generated on the computer screen using a mouse or touchpad.*



# Discussion and Conclusions

## - Ease of Use



### Overview

Overall, Silhouette was user-friendly, intuitive and could easily be incorporated into practice with only minimal training required.

- Taking photographs and capturing clinical notes

Use of the SilhouetteMobile and SilhouetteStar+SilhouetteConnect made image capture easy; essentially taking the photograph was no more difficult than taking a photograph with a compact digital camera or smart phone. Data input could be done in real time in front of the patient either directly onto SilhouetteMobile or in the case of SilhouetteStar, onto SilhouetteConnect software on the PC. As most of the assessment is with drop down boxes or tick boxes, entering the data proved easy enough. Using SilhouetteMobile free text was slightly more difficult as the data entry is achieved using a stylus; with familiarity and repetitive use, this no doubt becomes easier.

The data can be edited if required by logging onto SilhouetteCentral. The ability to edit clinical notes at any time on SilhouetteCentral or the wound assessment device software is a useful function if time is limited when with the patient, as additional notes can be added subsequent to the actual assessment. Any additions or edits are logged on the system and can therefore be tracked for audit purposes.

- Reporting

The Silhouette Wound Assessment Report PDF layout (see Patient 3 Silhouette Wound Assessment Report) shows the wound surface area, depth and volume data and clinical notes of each assessment to date and therefore makes it easy to follow the progression of the wound week by week.

Creating Silhouette Assessment Reports is a 'one-click' process and therefore the assessment is documented quickly as a PDF file and is easily shared with the relevant care team members and harvested for audit purposes.

- User interface

The SilhouetteMobile took a little practice to ensure proficient use of the device but on the whole was very 'user-friendly' being similar in use to a palm top computer (PDA) or smart phone, if slightly larger in size. SilhouetteCentral is accessed via a secure internet browser a network connection with a personal login facility. Once on the SilhouetteCentral database, it is easy to navigate and edit information. SilhouetteCentral has an automatic 'time-out' if left idle for a period of time, so that the user would be required to log back in for security purposes.

***Overall, Silhouette was user-friendly, intuitive and could easily be incorporated into practice with only minimal training required.***

### Overview

As a wound assessment and information management system, Silhouette is effective and provides a comprehensive wound imaging, measurement and data capture system. The electronic documentation, reporting and information management facilities provided by Silhouette have benefits for managing patient care, audit and clinical governance more effectively than paper-based systems as key tasks are automated and consistency and quality of information for wound outcomes management can be improved.

- Quantitative wound assessments

Identified benefits were the ability to have quantitative assessment with strong outcome measurements that did not rely on the memory of the assessing nurse or the subjective assessment of the previous nurse. The value of computerised systems in the assessment and management of complex wound care is that they have the potential to ensure that correct data is gathered in order to facilitate accurate documentation of treatment and to enhance communication across the multidisciplinary team. For this reason, Silhouette has significant clinical value, not only for the nurses for ease of recording, downloading and managing wound assessment information, but also for the scope the system provides to improve safety and care for the patient through consistent, electronic documentation of wound assessment information which is more accessible to the care team.

- Adaptability for range of clinical settings

Both SilhouetteMobile and SilhouetteStar+SilhouetteConnect have their place in the type of service provided by the Eastbourne Wound Healing Centre as patients are seen in a variety of settings including the WHC Patient Clinic itself, GP Practices, Patients in their own homes and Care Homes.

Our assessment was that SilhouetteMobile was well-suited for community based or mobile assessments. For an out-patient clinic location or where the clinician has easy access to a desktop, laptop or tablet PC, then SilhouetteStar + SilhouetteConnect lent itself perfectly to simple and rapid capture of images and data, allowing a complete wound assessment, documentation and reporting within minutes.

***Identified benefits were the ability to have quantitative assessment with strong outcome measurements that did not rely on the memory of the assessing nurse or the subjective assessment of the previous nurse.***

### Overview (continued)

- Data Security

Maintaining patient confidentiality is a key consideration for health care service providers like Eastbourne WHC. Silhouette uses data and image encryption, and operates with access security measures to ensure Silhouette data is protected from unauthorised access.

- Interfacing to other systems

It is understood that the system can be linked to other software systems, based on HL7 standard format, to enable interoperability with existing applications, although this was not evaluated by Eastbourne WHC.

- Future of Wound Management Service Documentation, Analysis and Metrics

With the current climate of litigation in health care, clear and accurate documentation is critical if health care providers are to be able to provide evidence of care provision. Computerisation of nursing documentation has the potential to provide such evidence and as communication across the team is enhanced, these systems provide an effective solution to the problem of inadequate nursing records.

In addition a Silhouette Reports Module is available for population-level analysis and reporting based on data collected by the organisation on the SilhouetteCentral database over time. Although it was not possible to evaluate this functionality, the authors acknowledge this would be of interest to wound care service providers to track and report wound outcomes and wound care service metrics, an increasing requirement as we transition towards the new clinical commissioning mandate for health care service provision.

***Clear and accurate documentation is critical if health care providers are to be able to provide evidence of care provision.***

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## Silhouette Publications

Please visit <http://www.aranzmedical.com/publications.php> to view current Silhouette publication citations.

## Silhouette Evaluation by Eastbourne WHC, Score Summary

Part 1 - Meeting Strategic Objectives for Organisation

Part 2 - Value for Wound Management Clinical Practice

Part 3 - Functionality, Product Design & Practical Considerations

Silhouette, SilhouetteCentral, SilhouetteMobile, SilhouetteConnect, SilhouetteStar, and SilhouetteLink are trademarks of ARANZ Medical Limited.

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