



Vernacare

Research & Real World Evidence

to support touchless technology
& single-use disposables

 **EBOS**
HEALTHCARE

ESSENTIAL TO HEALTH



Global Leaders

Vernacare's long-term commitment to delivering a sustainable solution to reduce risk and enhance dignity for healthcare professionals, patients & residents is the reason why we are the market leaders in human waste management.

- We have installed over **20,000** hospital macerators worldwide.
- We manufacture over **170 million** medical pulp containers each year.
- Our disposable system is used by **over 95% of all UK hospitals** and more than **50 countries worldwide**.
- Our products are used by **500,000 patients** every day worldwide.
- We manufacture over **221 million maceratable/flushable wipes** per year.

COLUMBIA ASIA



Riddle Hospital
Mid-Lancashire

SES
Hospital de Caldas

ST. OLAVS HOSPITAL
TRONDHEIM UNIVERSITY HOSPITAL

Wits University
Donald Gordon
Medical Centre

CWZ

Supporting Evidence

This document combines a body of evidence which supports the sustainable use of Vernacare hospital macerators and pulp products.

Our evidence are segmented into the following areas:

✔ Infection Prevention

- Reducing Clostridium Difficile Infection in Acute Care by Using an Improvement Collaborative. 6
- Microbiological evaluation of the ability of the DEKO-190 Washer Disinfectant to remove Clostridium difficile spores from bedpan surfaces. Infection, Disease & Health Journal 7
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✔ Environmental

- Vernacare pulp biodegradation tests FG505A & FG506A as described in the EDANA GD4 Guidelines for Assessing the Flushability of Dispersible Nonwoven Products 15
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✔ Nurse Productivity

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Full copies of the evidence referenced in this document is available on request.



Infection Prevention



On average, there are **over 93 contact episodes per hour** between patients, staff and visitors, demonstrating the potential for cross-infection¹

Excreta management is a **concerning** but often **neglected** subject.² Using **reusable plastic** or **stainless steel** containers for patient toileting and bathing is **proven** to put both patients and healthcare professionals at **risk**.

Supporting Evidence

New evidence and guidance is being published every day, outlining the risks posed by reusable equipment and highlighting the benefits of disposables in helping to break the chain of infection.

Below you will find a selection of excerpts from studies published recently within the Journal of Hospital Infection and also the latest guidance from the World Health Organisation following the Covid-19 pandemic.

What are the studies saying?



Over 53% of patients who tested positive for **SARS-CoV-2** had a viable pathogen in their stool, making the handling of human excreta a **high-risk** area, with 'faecal shedding' identified as a significant contributor to transmission.^{3,4}



Pathogens such as **SARS-CoV-2** are able to survive when **aerosolised** and on some surfaces for up to 9 days.⁵



Contaminated surfaces are an established route of transmission for **high-risk nosocomial pathogens** including C.diff, MRSA, VRE & Norovirus.⁶



World Health Organization guidance published during the **Covid-19 pandemic** recommends that wherever possible, equipment should be **single-use** and **disposable**.⁷

References

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Reducing Clostridium Difficile Infection in Acute Care by Using an Improvement Collaborative

Clinical Study: British Medical Journal article – “Reducing Clostridium Difficile Infection in Acute Care by Using an Improvement Collaborative” Maxine Power, Neil Wigglesworth, Emma Donaldson, Paul Chadwick, Stephen Gillibrand, Donald Goldmann

Setting

Salford Royal NHS Foundation Trust, a university teaching hospital in the north west of England with 850 beds, provides care for about 320 000 inpatients per year. In 2006, Salford Royal had 350 cases of C difficile infection in patients aged over 65, the fourth highest rate of infection in north west England. In spite of system-wide changes in infection control, infections rose, peaking at 115 cases during the first quarter of 2007. We describe the effect of three measures: system-wide changes to guidelines and practices for using antimicrobial drugs; an improvement collaborative to reduce the incidence of C difficile infection by 50% within one year; and the impact of spreading successful improvements from the collaborative throughout the hospital.

Key Changes Introduced

- ✓ Change to the Antimicrobials Policy; including introduction of an antimicrobial management team.
- ✓ Identification and containment; development of local protocols to clarify the responsibility of ward teams at the point of suspected symptoms.
- ✓ Of the 414 Enterococcus species isolated, 385 (93%) were VRE, and 36 of the 40 (90%) S aureus strains were MRSA.
- ✓ Habits and patterns; strict hand hygiene enforcement, weekly hand hygiene audits.
- ✓ Environment; introduction of disposable washbowls, cleaning of key touchpoints with high level cleaners.

Main Findings

The study shows the importance of careful use of antibiotics on the incidence of C difficile infection, and also that simple changes at the frontline can accelerate and amplify reductions. More complex is the cause and effect relation between the interventions and their impact on outcomes. It would seem that antibiotic stewardship and collaborative participation combined resulted in 73% rate reduction within three months in the five collaborative wards. In the non-collaborative wards, introducing antibiotic stewardship alone had an impact later, but with less effect and without additional benefit from scaling-up of the changes during 2008. In 2006, Salford Royal had a higher than average rate of C difficile infection, and by the end of the study this had fallen to lower than average for both the health region and England as a whole.

73%
rate reduction
within
three months
in the five
collaborative
wards.

Microbiological evaluation of the ability of the DEKO-190 Washer Disinfector to remove *Clostridium difficile* spores from bedpan surfaces.

Infection, Disease & Health Journal

Collins, D.A. (2019) School of Pathology and Laboratory Medicine, The University of Western Australia, Crawley, Australia

Setting

Controlled laboratory-based study in Australia aimed to evaluate the effectiveness of the DEKO-190 WD in removing *C. difficile* spores from bedpans. The WD was installed and commissioned to requirements as specified by the manufacturer according to reference standards EN ISO 15883-1 and IEC 61010-2-45.

Post-cycle disinfection recommended with an appropriate strength bleach solution to ensure minimal contamination of equipment with *C.difficile* spores.

Main Findings

- ✓ Spores were able to withstand the temperatures within the WD, with the action of rinsing and detergent required to reduce the count more significantly.
- ✓ Spore counts were reduced most effectively using a long or intensive wash cycle using alkaline detergent.
- ✓ Spores were also isolated inside the machine following wash cycles, suggesting cross contamination of surfaces and survival of spores during the cycle.
- ✓ Additional disinfection requirements require additional resource and carry potential for exposure of staff to *C. difficile* spores.

Clinical study within the British Columbia Health Authority

Association for Professionals in Infection Control and Epidemiology

Setting

This study comprises of an evaluation of the in-use performance of two brands of bedpan washers across two separate acute care facilities.

Main Findings

- ✓ 33% of reusable bedpans failed a visual inspection for faecal contamination after the bedpan washer cycle had finished. Study describes the results as 'disturbing'.
- ✓ Machines over 2 years old showed a failure rate of 38.3%.
- ✓ When a rinse agent was not used, failure rates increased by 30%.
- ✓ Failure rates declined to 7.6% on 2 pilot wards after an intensive education campaign combined with daily monitoring by the IP&C team. This could not be sustained and failure rates returned to previous levels within 2 months.

A number of human factors issues contributed to the processing failures, including:

- Staff not disposing of bedpans immediately, allowing contents to dry
- Bedpans being double-stacked
- Chemical and detergent dispensers not being topped-up
- Staff indicating that they were not sure how to properly load the machine and finding the loading racks confusing

Hospital bath basins are frequently contaminated with multidrug-resistant human pathogens. American Journal of Infection Control.

Marchaim, D. et al. (2012) Division of Infectious Diseases, Detroit Medical Center, Wayne State University, Detroit, MI

Setting

A prospective, multi-center trial conducted between July 2007 and February 2011 in the United States and Canada. During a 44-month study period, a total of 1,103 re-usable basins from 88 hospitals were sampled.

Main findings

- ✓ The specific groups of pathogens identified are not only common causative organisms in HAIs, but also include multidrug-resistant organisms (MDROs), such as VRE and MRSA.
- ✓ Of the 414 Enterococcus species isolated, 385 (93%) were VRE, and 36 of the 40 (90%) S aureus strains were MRSA.
- ✓ The use of basins should be limited to the extent possible, to eliminate a potentially hazardous environmental reservoir for serious nosocomial pathogens
- ✓ Hospital-acquired infection (HAI) is the most common complication among hospitalized patients and is among the top 10 leading causes of death in US hospitals.

Strengths of the Study

- ⊕ supports message to switch from reusables to single-use disposables
- ⊕ Supports use of pre-impregnated bed bathing products or disposable washbowls.
- ⊕ Large-scale study published in reputable medical journal.

Overall, **62.2%** of the reusable basins (at least 1 basin at each hospital) were contaminated with commonly encountered hospital-acquired pathogens.



Measurement of aerosol production from the Vernacare Compact macerator. Investigation into aerosol production and the escape of fluid from the inflatable lid seal of the Vernacare Compact Hospital Macerator during use.

Dr. Jonathan A. G. Cox, J. (2018) Aston University

Setting

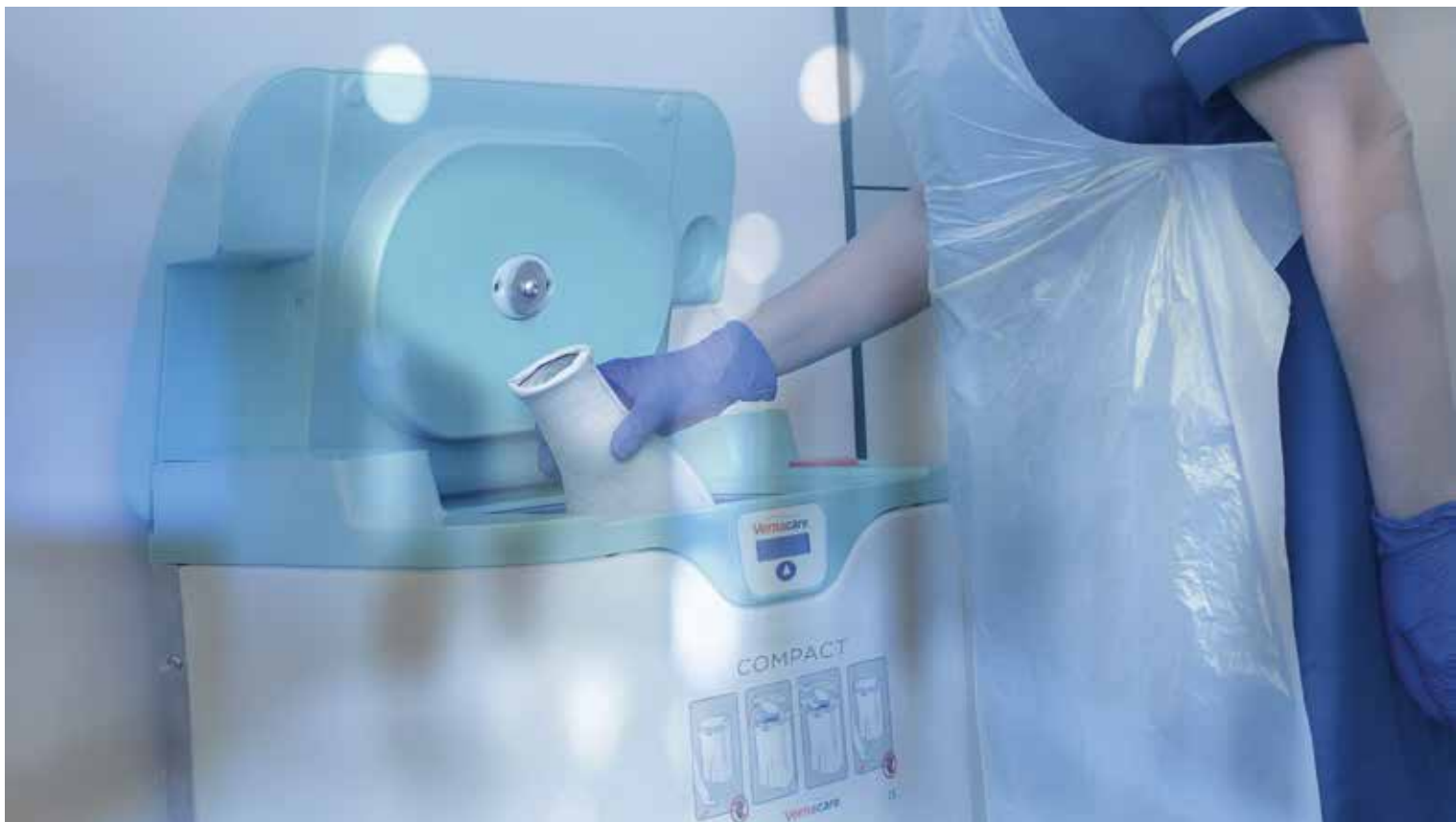
A laboratory study examining aerosol production and the escape of fluid from the lid seal of the Vernacare Compact macerator during use. Research carried out by Aston University in the United Kingdom using *Escherichia coli* NCTC 10418, faecal soil load (BS2745), 1% (w/v) methylene blue solution and Vernacare bedpans and urine bottles.

Main Findings

- ✓ When tested for 4 consecutive cycles, the Vernacare Compact macerator did not produce any aerosols or contaminate any adjacent user accessible areas.
- ✓ A range of areas around the macerator tested to ensure no aerosol is created and no residue is left surrounding the Vernacare Compact macerator.

Strengths of the Study

- ⊕ No contamination of surrounding surfaces of the Vernacare Compact macerator.
- ⊕ Recent study that can be used for both the Compact and Compact+.
- ⊕ The test gives us a competitive advantage over competitors who do not make this claim.



Reduced rate of intensive care unit acquired gram-negative bacilli after removal of sinks and introduction of 'waterfree' patient care. Antimicrobial Resistance and Infection Control

Hopman, J. et al (2017) Department of Medical Microbiology, Radboud University Medical Center, The Netherlands

Setting

A clinical trial to evaluate the impact of introducing of 'water-free' patient care on intensive care unit acquired gram-negative bacilli rates.

Two-year pre/post quasi-experimental study in Netherlands comparing gram-negative bacilli (GNB) colonization rates across 5 ICUs. 1496 patients (9153 admission days) were included in the pre-intervention period, and 1444 patients (9044 admission days) were included in the post-intervention period.

All patient care related activities that would normally involve the use of tap water (including bathing) were adapted to a 'water-free' alternative, with all sinks removed from ICU rooms.

Main Findings

- ✓ The introduction of 'water-free' patient care is associated with a significant reduction of patient colonization with GNB, especially in patients with a longer ICU length of stay.
- ✓ Moistened disposable shampoo caps and wash gloves were used for patient bathing.
- ✓ Study explicitly references that products used DID NOT contain chlorhexidine.
- ✓ Overall GNB colonization rates dropped by 18% from 26.3 to 21.6 GNB/1000 ICU.
- ✓ Results were most pronounced in patients with a longer ICU length of stay - 1.22-fold reduction (≥ 2 days), 1.6-fold (≥ 5 days), 2.5-fold (≥ 10 days) and 3.6-fold (≥ 14 days).

Strengths of the Study

- ⊕ Supports use of pre-impregnated bed bathing products.
- ⊕ Demonstrates the clinical benefits of single-use washmitts and shampoo caps in reducing HCAs
- ⊕ Recent study published in reputable medical journal.



Chlorhexidine Bathing and Health Care Associated Infections : A Randomized Clinical Trial, JAMA

Noto, M.J. et al. (2015) Vanderbilt Health, Nashville, Tennessee, USA

Setting

A clinical trial to determine if daily bathing of critically ill patients with chlorhexidine decreases the incidence of health care-associated infections. A pragmatic cluster randomized, crossover study of 9340 patients admitted to 5 adult intensive care units of a tertiary medical center in Nashville, Tennessee, from July 2012 through July 2013.

Main Findings

- ✓ Daily bathing with chlorhexidine did NOT reduce the incidence of healthcare-associated infections including central-line associated bloodstream infections (CLABSIs), catheter associated urinary tract infections (CAUTIs), ventilator-associated pneumonia (VAP) and Clostridium difficile infections.
- ✓ The findings did NOT support daily bathing of critically ill patients with chlorhexidine.
- ✓ If performed correctly, it is widely accepted that the mechanical action of wiping will remove most harmful bacteria from the skin, without the requirement for a biocide (e.g. chlorhexidine) within the formulation.

Strengths of the Study

- ⊕ Supports use of non-antibacterial bed bathing products.
- ⊕ Recent study published in reputable medical journal.



Global practices related to handling of faeces and urine in hospitals - results of an International Federation of Infection Control (IFIC) survey.

International Journal of Infection Control. Popp, W. Et al. (2013) Hospital Hygiene, University Clinics, Essen, Germany.

Setting

Summary of a worldwide survey conducted by The International Federation of Infection Control about the handling of faeces and urine in hospitals. There were over 1,400 responses from 93 countries.

Main Findings

- ✓ In instances where re-usable bedpans were used, a bedpan washer was available only 50% of the time.
- ✓ Bedpan washers use heat only (no disinfectants) in 31% of cases, posing increased infection risks.
- ✓ Where bedpans are washed by hand, this is done on average with water only 17% of the time; Canada (14%), US (31%), Netherlands (20%), France (9%), China (20%), Egypt (19%) & Pakistan (18%).
- ✓ On average, bedpans are hand-washed in the patient's own bathroom 44% of the time; Canada (35%), US (65%), France (45%), Saudi Arabia (56%), Thailand (54%), Mongolia (84%), Tunisia (88%), Egypt (69%), India (45%) and Pakistan (77%).
- ✓ The study also highlights that it is "astonishing" that so little has been published about the hygienic situation of defecation and urination in hospitals on a worldwide level.

Strengths of the Study

- ⊕ supports message to switch from reusables to single-use disposables
- ⊕ Significant data pool, with over 1,400 responses from 93 countries. Study published in reputable medical journal.
- ⊕ Large-scale study published in reputable medical journal.



Environmental



Vernacare's macerated pulp slurry successfully passed both the **FG505A** and **FG506A** biodisintegration tests.

100% of the macerated slurry passed through the 1mm in sieve in both aerobic and anaerobic conditions.

Supporting Evidence

Vernacare pulp biodisintegration tests FG505A & FG506A as described in the EDANA GD4 Guidelines for Assessing the Flushability of Dispersible Nonwoven Products

Leroy, L. (2019) Centre Technique du Papier, France

Setting

A laboratory study to demonstrate the biodisintegration of Vernacare's macerated pulp slurry under aerobic/anaerobic conditions typically found in sewers as well as onsite and municipal waste water treatment systems.

Controlled laboratory study taking a sample of Vernacare's macerated pulp slurry and testing it within both aerobic and anaerobic conditions, typically found in sewers as well as onsite and municipal waste water treatment systems.

The pulp slurry (4.09% solids) was collected from a Vernacare Washbowl (118AA100) macerated within a Vortex macerator and mixed with a sludge collected from Saint Egreve municipal waste water treatment plant. Two separate samples were retained in aerobic conditions (14 days) and anaerobic conditions (28 days) before being passed through a 1mm sieve. In order to successfully pass the test, 95% of the mass must pass through the sieve.

Main Findings

- ✓ Vernacare's macerated pulp slurry successfully passed both the FG505A and FG506A biodisintegration tests.
- ✓ 100% of the macerated slurry passed through the 1mm in sieve in both aerobic and anaerobic conditions.
- ✓ Despite being a test standard for flushable wipes, the EDANA GD4 testing replicates the lifecycle of the macerated pulp slurry once it has been discharged to drain.

Strengths of the Study

- ⊕ Demonstrates how the macerated Vernacare pulp slurry breaks down and causes no issues for municipal waste water treatment systems.
- ⊕ Replicates a real-world environment, using sludge recovered from a waste water treatment site in both aerobic and anaerobic conditions.
- ⊕ Completely independent testing, conducted by a leading test house (CTP).
- ⊕ The European Disposables and Nonwovens Association (EDANA) are the leading global voice of the nonwovens industry and their flushability guidance is being increasingly turned into legislation in markets across Europe, including Belgium and Spain.

What is the impact on drains when single-use containers are disposed of in Healthcare Facilities. An investigation into whether the use of Vernacare Disposal Units and single-use containers causes a problem in the drains in the municipality of Trondheim, Norway

Yttereng, J., Nordvik, B. & Moen, T. (2017) Christian Thams Technical College, Trondheim, Norway

A dissertation investigating whether the use of Vernacare Disposal Units and single-use containers may have a negative impact on the drainage system in Trondheim, Norway. Research was carried out on waste produced by St. Olavs Hospital and Sobstad Rehabilitation Centre. These are two of the major consumers of single-use containers in the Trondheim municipality, Norway.



Testing to determine whether using pulp disposal units for single-use sanitary products caused any obstruction in the waste pipes.

Alarcon, A. (2017) Department of Hydraulic and Environmental Engineering, Division of Water and Liquid Industrial Waste Analysis, Santiago, Chile.

Testing demonstrated that Vernacare's medical pulp products pass through drains unhindered once macerated. Testing was carried out at a DICTUC testing facility and the test protocol was based on Chilean standard N.Ch. 407/2005, setting out the requirements for the length and diameter of the pipes to be used for the test, as well as the acceptance or rejection criteria for the testing process.

At the end of the cycle, the quantity of pulp recovered demonstrated that Vernacare's medical pulp products pass through drains unhindered.

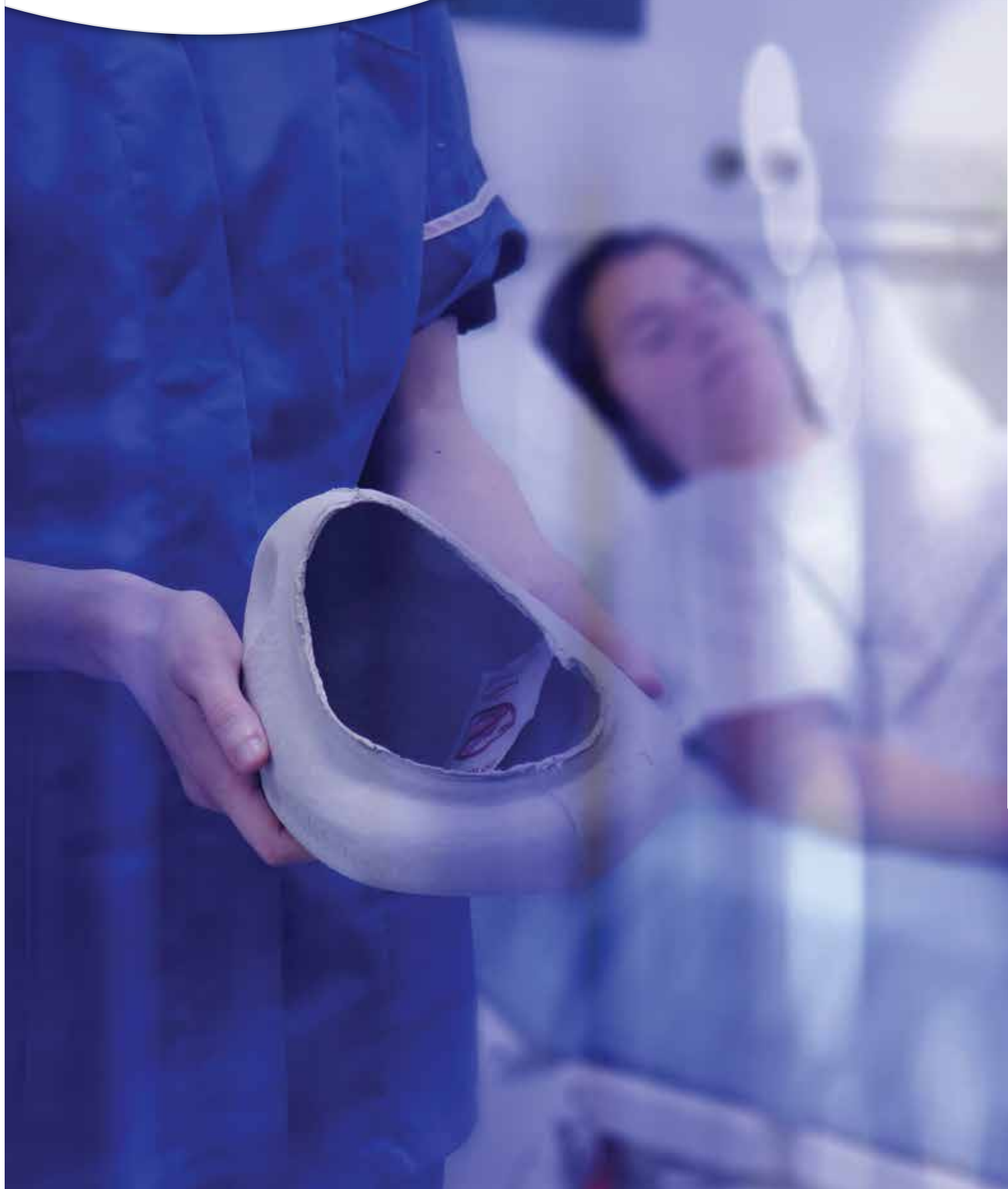


A large landfill of plastic waste under a sunset sky. The foreground is filled with various types of plastic debris, including bottles, containers, and fragments, stretching into the distance. The sky is a mix of orange, yellow, and blue, suggesting a sunset or sunrise. Two white circular callouts are overlaid on the image, containing text about plastic decomposition and pulp testing standards.

Plastics
take up to
**1000 years to
decompose,**
endangering our
environment.

Our pulp is
tested to **EDANA
standards** with
100% of the
macerated pulp
slurry breaking
down into
**particles less than
1mm.**

Nursing Productivity



Supporting Evidence

Evaluation of time factors in the use of the Vernacare Macerator

Garratt, S. & Coles, J. (2002) Caulfield General Medical Centre, Australia

Setting

The objective of the study was to provide an examination of the time involved in the use of the Macerator compared to the standard Pan Flusher / Sanitiser that was in use at the time.

An observational study at Caulfield General Medical Centre, Australia, where a structured approach was used to monitor the use of both the macerator and the pan flusher/sanitizer. The study aimed to understand the total number of uses per shift and the pattern of usage including the collection of the reusable item and transportation to/from the patient/dirty utility room. The study also explored the maintenance of infection control procedures when disposing of bodily fluids and in the case of reusable pans, the process of unloading the machine and storing/cleaning the reusable items.

Main Findings

- ✓ The Vernacare system saves nurses on average 24.5 seconds compared to the bedpan washer process.
- ✓ The practice for the pan flusher/sanitiser was not conducive for good practice as a soiled bedpan or urinal must be placed on a bench or the floor to enable the nurse to open the machine. This increases the risk of cross infection.
- ✓ More extensive cleaning of the pan rooms (sluice) is required when bedpan washers are in situ.
- ✓ On three separate occasions the bedpans were not visibly clean after going through the process. Hand cleaning was therefore required by a nurse, further increasing the risk of cross-infection.

Strengths of the Study

- ⊕ Clearly demonstrates the time benefits of the Vernacare system and subsequent efficiency savings.
- ⊕ Highlights other negative elements of a reusable system in regards to infection control.HCAIs

Disposable single-use receptacles in a tertiary hospital: A large survey of staff after a hospital-wide implementation.

Phua, M.Y., Salmon, S., Straughan, P. & Fisher, D. (2016) National University Hospital, Singapore

Setting

Study conducted within the National University Hospital in Singapore, surveying staff following a hospital-wide implementation of the Vernacare single-use system. The study was subsequently published in the American Journal of Infection Control.

Main Findings

- ✓ The disposable single-use system was seen to be more convenient, more hygienic, and less of a risk in spreading infectious diseases.
- ✓ Comparisons between the sanitizer and macerators showed that macerators were less smelly and noisy when being used, and this was perceived as contributing to a cleaner and more pleasant environment.
- ✓ Patients also felt more comfortable using a fresh single-use disposable receptacle.

Strengths of the Study

- ⊕ Large sample size (931 responses / 84.6% response rate).
- ⊕ Highlights a full Vernacare system conversion.
- ⊕ Recent study published in a reputable journal.
- ⊕ Highly reputable university hospital with a high bed count (1,100 beds).





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Transforming the standards within healthcare environments across the globe through innovation and manufacturing excellence. Vernacare has revolutionised the experience of patients and healthcare professionals for more than 50 years. Vernacare and its international network of partners, provides market-leading hygiene & surgical solutions that prevent infection and create a safer future.

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