Evidence brochure

clinell®

Peracetic Acid Wipes

Proven protection against high risk and hard-to-kill-organisms.

Made from plant-based fibres

Clinical findings

"The number of sites with identified MDROs also **decreased significantly** following the [introduction] of the wipes."
– Siani et al. American Journal of Infection Control. 2018;46(10).

"The overall rate of *C. difficile* infection was **reduced by 72%** following introduction of the wipes."
– Carter & Barry. Nursing Times. 2011;107(36).

"Only [the Clinell Peracetic Acid Wipe] was shown to **prevent the transfer of spores.**"
– Siani et al. American Journal of Infection Control. 2011;39(3).

"When the cost per patient is multiplied by the reduction in cases the cost saving is **£660,000** [per annum]."
– Carter & Barry. Nursing Times. 2011;107(36).

£

"**90%** of staff report that use of the wipes shortened the cleaning process."
– Martin et al. Open Forum Infectious Diseases. 2018;5(S1).

"The use of wipes resulted in greater adherence to room cleaning."
– Martin et al. Open Forum Infectious Diseases. 2018;5(S1).

"Peracetic Acid Wipes seem to be more effective against Gram-negative organisms."
– Saha et al. American Journal of Infection Control. 2016;44(11).

"Peracetic acid at 3500 ppm combined with a non-woven wipe **was significantly more effective** in biofilm eradication."
– Ledwoch et al. Materials. 2019;12(8).

"Peracetic Acid Wipes" ... "were more effective at **reducing spore count** than the chlorine-releasing agent."
– Doan et al. Journal of Hospital Infection. 2012;82(2).

Contents page

High-performance disinfection

Surface contamination plays an important role in the transmission of healthcare associated infections[1].

By reducing the number of organisms in our environment, infection preventionists aim to reduce transmission.

Role of surfaces

Clinell Peracetic Acid Wipes are high-performance cleaning and disinfection wipes. They give you proven protection against outbreaks, high-risk and hard-to-kill organisms.

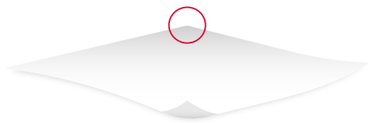
As a high-performance product, Clinell Peracetic Acid Wipes perfectly complement an everyday disinfectant – such as Clinell Universal Wipes – as part of a robust infection prevention policy.

Clinell Peracetic Acid Wipes were originally introduced as 'Clinell Sporicidal Wipes.' However, as the evidence-base has grown, they offer clear clinical benefits beyond spore-forming organisms. As new multi-drug resistant organisms such as *Candida auris* emerge, and as we deepen our understanding of the role biofilms play in sustaining outbreaks within healthcare, the role for Clinell Peracetic Acid Wipes has grown.

Patented technology

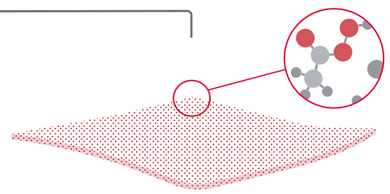
Cleans and disinfects

Our unique dual-layer construction traps microorganisms, whilst added detergents make sure Clinell Peracetic Acid Wipes are just as effective in dirty conditions.



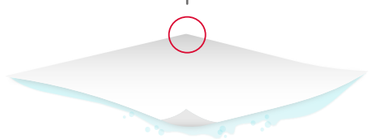
Gentle on surfaces

By combining the action of peracetic acid and hydrogen peroxide, we're able to achieve unbeatable disinfectant efficacy at near neutral pH. Clinell Peracetic Acid Wipes are therefore kind to surfaces, unlike other peracetic acid-based products.



5x the surface coverage

Thanks to our unique construction, each single Clinell Peracetic Acid Wipe delivers surface coverage equivalent to 5 standard disinfectant wipes. This reduces wasted wipes, time and money.



Unbeatable efficacy

Clinell Peracetic Acid Wipes are proven effective against otherwise hard-to-kill organisms.

Making them ideal for outbreaks and enhanced disinfection. They're tested by third-party laboratories according to EN standard test methods.

HIGH

MID

LOW

Tolerance to disinfectants	Organism example	Test
Biofilms	Dry surface biofilm	Modified ASTM E2967-15[2]
Bacterial spores	*Bacillus subtilis*	EN17126
	Clostridioides difficile	EN17126
Mycobacteria	*Mycobacterium avium*	EN14348
	Mycobacterium terrae	EN14348
Small, non-enveloped viruses	*Canine parvovirus*	EN14675
	Poliovirus	EN14476
Fungal spores	*Aspergillus brasiliensis*	EN13624
Gram-negative bacteria	*Acinetobacter baumannii*	EN13727
	Escherichia coli (E. coli)	EN13727
	Klebsiella pneumoniae (ESBL)	EN13727
	Pseudomonas aeruginosa	EN16615 EN13727
Yeast	*Candida auris*	EN13624
	Candida albicans	EN13624
Large non-enveloped viruses	*Adenovirus*	EN14476
	Norovirus	EN14476
Gram-positive bacteria	*Staphylococcus aureus*	EN16615 EN13727
	Enterococcus faecalis	EN16615 EN13727
	Enterococcus hirae	EN16615 EN13727
Enveloped viruses	Vaccina virus	EN14476

Typical tolerance of microorganism types to disinfectants, adapted from McDonnell & Russell[3]

Dry-surface biofilms

A hidden cause of persistent outbreaks?

Shedding light on why some outbreaks seem impossible to resolve: dry surface biofilms protect microorganisms from traditional disinfectants. Present on up to 95% of “disinfected” surfaces[4], these protective biofilms provide increased resistance to traditional disinfectants[5–7] and allow drug-resistant organisms to recover within days.

Dry surface biofilms – a “microbial city”.

Biofilms are protective structures formed by colonies of microorganisms. When microbes attached to a surface, they begin secreting Extracellular Polymetric Substance (EPS) – a protective matrix that traditional disinfectants can’t penetrate.

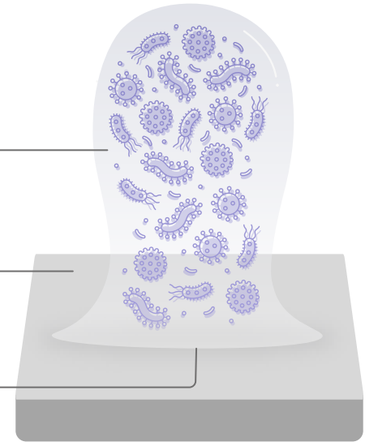
A single biofilm can shelter dozens of species of pathogens.

Inside the biofilm, microorganisms can “swap” genes needed to promote antibiotic resistance. This process of horizontal gene transfer can occur between microorganisms of different species, allowing resistance seen in one species to suddenly “jump” into another.

The microbes produce a mix of Extracellular Polymeric Substances (EPS) – the “biofilm matrix” providing an added layer of microbial defence from disinfectants.

Planktonic (“free-swimming”) microbes attach to a surface to begin forming a biofilm.

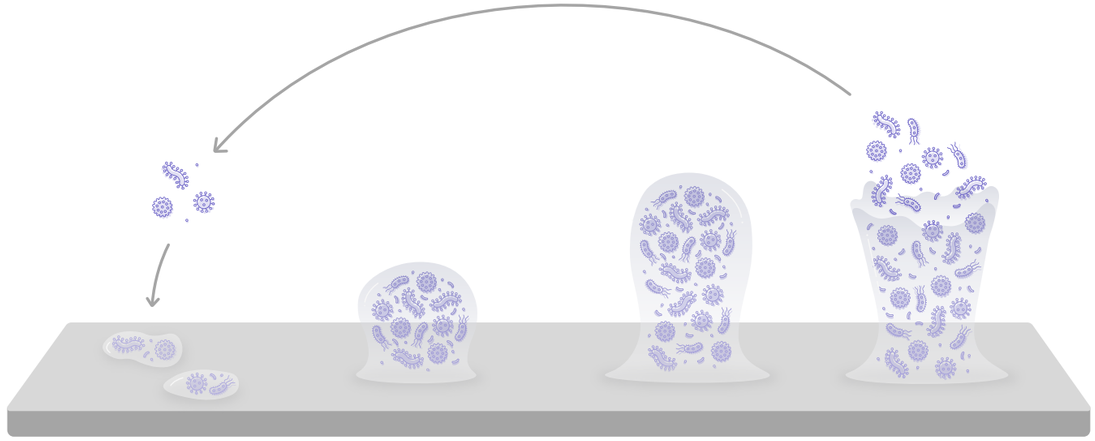
Inside the biofilm microorganisms are free to trade and spread antibiotic resistance genes.



Dry surface biofilms and Healthcare-Associated Infections.

Healthcare providers increasingly find certain stubborn pathogens are a constant presence on particular wards. Despite diligent disinfection, certain Gram-negatives, or emerging pathogens such as Candida auris, seem to create recurrent outbreaks with no clear cause. Emerging research shows us that dry surface biofilms may be the culprits[8,9].

These dry surface biofilms are incredibly hardy. When the surface is disinfected, microorganisms outside the biofilm are quickly killed. When microbiological samples are taken, the surface appears clean and disinfected. Unfortunately, those within the biofilm survive and recover within a matter of days, seeding free-floating microbes back into our environment.



Current technologies aren’t working

Emerging evidence suggests that traditional disinfectants are unable to eradicate dry surface biofilms.

Beware Biofilm! Dry biofilms containing bacterial pathogens on multiple healthcare surfaces; a multi-centre study[4].

Ledwoch et al. Journal of Hospital Infection. 2018;100(3).

This multi-centre study from the UK investigated the prevalence of dry surface biofilms on items including hand sanitising bottles, keyboards and patient folders from multiple wards across 3 hospitals. All items had been terminally cleaned before sampling. Upon swabbing, none of the sampled items grew viable organisms. However, when cuttings of each surface were placed in nutrient broth 95% (60/61) of terminally cleaned healthcare items were found to still harbour dry surface biofilms.

They used a combination of culture-based methods and Scanning Electron Microscopy (SEM) to confirm the presence of dry surface biofilms on items.

The results suggest that dry surface biofilms far more prevalent than previously thought and traditional sampling techniques are insufficient to detect their presence.

Presence of biofilm containing viable multiresistant organisms despite terminal cleaning on clinical surfaces in an intensive care unit[8].

Vickery et al. Journal of Hospital Infection. 2012;80(1).

In this initial study, authors investigated the presence of surface biofilms within an ICU after terminal cleaning with chlorine disinfectant.

After disinfection with chlorine, authors demonstrated dry surface biofilms on 5/6 sample sites.

Intensive care unit environmental surfaces are contaminated by multidrug-resistant bacteria in biofilms: Combined results of conventional culture, pyrosequencing, scanning electron microscopy, and confocal laser microscopy[10].

Hu et al. Journal of Hospital Infection. 2015;91(1).

An ICU at a tertiary referral hospital was terminally cleaned and decommissioned. Again the authors took environmental samples from bedding, surrounds and furnishings using cutting tools. Presence of biofilms were confirmed using culture, Confocal Laser Scanning Microscopy (CLSM) and SEM.

Despite two terminal cleans with chlorine-based disinfectant, biofilms survived in 91% (41/44) of samples. Multi-drug resistant bacteria were cultured from 52%.

Disrupting every layer of microbial defence

Clinell Peracetic Acid Wipes use patented technology to break down every layer of microbial defence.

A synergistic blend of peracetic acid, hydrogen peroxide and added detergents work to break down the biofilm matrix and kill the microorganisms sheltering inside.

Candida auris Dry Surface Biofilm (DSB) for Disinfectant Efficacy Testing[2].

Ledwoch & Maillard. Materials. 2019;12(8).

Background: Candida auris is an emerging fungal pathogen associated with a high mortality rate. Outbreaks caused by Candida auris are often difficult to resolve – despite repeated terminal cleans and decommissioning of wards. Given the evidence of dry surface biofilms surviving standard disinfection[8,10] – and the prevalence of biofilms on clinical surfaces[4] – the authors sought to assess the efficacy of various disinfectants against dry surface biofilms.

How do we define efficacy?

Often "efficacy" of a disinfectant is assessed purely in terms of log reduction – if we begin with a certain number of microorganisms, how many are removed or killed by the action of a disinfectant. However, the authors propose that log reduction alone is insufficient to reflect real-world use. They pose three metrics that, when taken together, give a more accurate reflection of performance in use – especially when assessing against dry surface biofilms. They are:

Log reduction – the number of microorganisms removed after treatment.

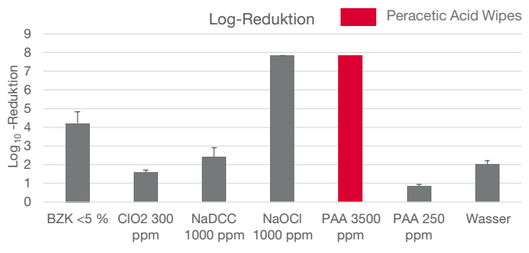
Regrowth – how long does it take the microorganisms to recover.

Microbial transferability – after treatment, how readily are the remaining organisms transferred from the surface to another.

Their reasoning was that high log reduction alone is meaningless if the biofilm recovers within 24 hours or if the remaining organisms are easily transferred to other surfaces. Good results in all three metrics are needed for a product to be efficacious. If a product produces a high log reduction but rapid biofilm regrowth and ready transferability, any outbreak cause by that biofilm will likely continue.

High log reduction does not correlate with better overall performance of the product. Two products produced a log reduction in excess of 7 log_{10} – Clinell Peracetic Acid Wipes and sodium hypochlorite (figure 1).

Figure 1. Log reduction produced by disinfectants against a dry surface biofilm of Candida auris.



Continued

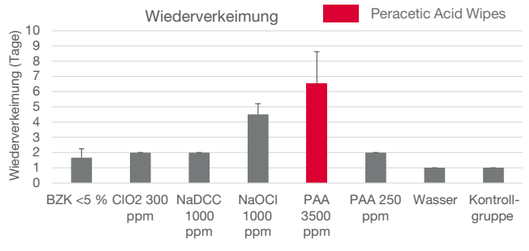
Both showed significantly longer regrowth time than the other disinfectants – **Clinell Peracetic Acid Wipes prevent biofilm regrowth for 6.5 days** (figure 2).

However, sodium hypochlorite did not significantly reduce microbial transferability (figure 3). In fact, sodium hypochlorite did not significantly outperform any disinfectant. Transferability was assessed by pressing the treated surface repeatedly into agar. High transferability suggests that, despite the high log reduction, dry surface biofilms treated with sodium hypochlorite are still able to seed viable organisms into the environment upon contact.

Clinell Peracetic Acid Wipes completely stopped any microbial transferability from the treated surface. Clinell Peracetic Acid Wipes were the only wipe to perform best in all criteria: Clinell Peracetic Acid Wipes produced a 7 log_{10} reduction, delayed regrowth for 6.5 days and were the only product to completely eliminate microbial transferability.

Clinell Peracetic Acid Wipes completely stopped any microbial transferability from the treated surface. Clinell Peracetic Acid Wipes were the only wipe to perform best in all criteria: Clinell Peracetic Acid Wipes produced a 7 log10 reduction, delayed regrowth for 6.5 days and were the only product to completely eliminate microbial transferability.

Figure 2. Number of days for regrowth after treatment. Assessed by turbidity change of growth media. Clinell Peracetic Acid Wipes delay regrowth for 6.5 days (±2.1).



Is a reduction in viability enough to determine biofilm susceptibility to a biocide[11]?

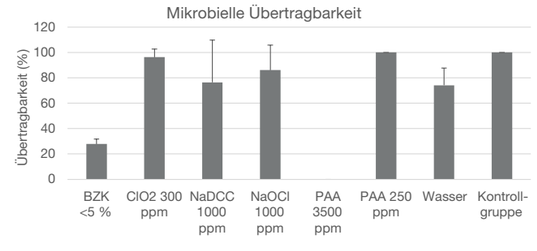
Ledwoch et al. Infection Control & Hospital Epidemiology – First View. 2021.

The same authors have furthered their research into dry surface biofilm models comprised of other species – in this case Staphylococcus aureus. At time this document goes to print, their latest publication is available through the online only 'First View' section of Infection Control & Hospital Epidemiology.

This time, the authors also assessed non-touch room disinfectant technologies (hydrogen peroxide vapour and cold atmospheric plasma). Neither technology could produce even a 1 log10 reduction – suggesting that mechanical wiping action is essential to combat biofilms. Whilst HPV or cold atmospheric plasma may have a role in environmental decontamination, these initial reports suggest they'll be unable to combat outbreaks sustained by dry surface biofilms.

Conversely, their initial results support the efficacy of Clinell Peracetic Acid Wipes, again using the metrics of log reduction, regrowth and microbial transfer.

Figure 3. Direct microbial transferability after treatment with disinfectants. Clinell Peracetic Acid Wipes completely prevented any microbial transference.



High-risk & hard-to-kill organisms

Different organisms exhibit differing tolerance to heat, humidity, radiation and chemical disinfection.

These differing tolerances are typically ascribed to differences in microbial structure (summarised on page 5)[3]. Many everyday disinfectants are effective against lower tolerance organisms – such as enveloped viruses or Gram-positive bacteria – but ineffective against mycobacteria, biofilms or spores.

Clinell Peracetic Acid Wipes have been proven effective against a raft of hard to kill organisms in laboratory and clinical studies.

Impact of antimicrobial wipes compared with hypochlorite solution on environmental surface contamination in a health care setting: A double-crossover study[12].

Siani et al. American Journal of Infection Control. 2018;46(10).

Objective: Assess the effectiveness of traditional two-step cleaning & disinfection using chlorine, compared with the introduction of one-step Clinell Peracetic Acid Wipes. Effectiveness would be assessed by comparing colony counts from environmental samples, ATP score and presence of important indicator species of microorganisms.

Methods: In this double cross-over study, the wards received either standard cleaning/disinfection (two-step detergent cleaning followed by chlorine solution disinfection) or one-step Clinell Peracetic Acid Wipes. The methods were allocated to sequential 3-months blocks so that each ward crossed over between the two cleaning/disinfection approaches, along with a baseline period and washout periods. A training programme for all staff involved with cleaning was delivered before both the standard cleaning/disinfection and disinfectant wipe phases.

Results: The introduction of Clinell Peracetic Acid Wipes were more effective than the two-step process using chlorine and resulted in a significant reduction in total aerobic count, total anaerobic count, and ATP score compared with baseline.

A pilot study to assess the effectiveness and cost of routine universal use of peracetic acid sporicidal wipes in a real clinical environment[13].

Saha et al. American Journal of Infection Control. 2016;44(11).

Objective: A short pilot study. Aiming to gain an initial understanding of the efficacy of Clinell Peracetic Acid Wipes for routine disinfection – rather than as a targeted response to outbreaks or high-risk organisms. Investigate the effect of their introduction on a number of clinically-relevant organisms in a real-world hospital environment.

Methods: Clinell Peracetic Acid Wipes were introduced for routine cleaning & disinfection in a 6-week, prospective, controlled study. A control ward continued with their current practice whilst the intervention ward introduced our Clinell Peracetic Acid formulation. Across the trail period, weekly samples were taken from high touch points around the two wards and processed for aerobic, anaerobic and *C. difficile*-selective growth.

Results: The authors found Clinell Peracetic Acid was more effective at reducing Gram-negative organisms in the environment. Similarly, despite an increase of *C. difficile* infections on the intervention ward, no *C. difficile* was isolated from the environment. Whilst the scope of this pilot study was limited, it appears to support use of an everyday disinfectant in concert with Clinell Peracetic Acid Wipes as an elevated intervention when concerned about high-risk or hard to kill organisms.

A systematic evaluation of a peracetic-acid-based high performance disinfectant[14].

Humphreys et al. Journal of Infection Prevention. 2013;14(4).

Objective: Evaluate potential of peracetic acid-based disinfectants as high-performance disinfectants in healthcare settings. Benchmark efficacy of peracetic acid by comparison with chlorine-based disinfectants.

Methods: The authors compared disinfectant activity of peracetic acid against both 1,000ppm and 10,000ppm free-active chlorine. Tests were conducted in clean and dirty conditions to assess the impact of organic load on each disinfectant.

Results: The efficacy of chlorine was significantly reduced by the presence of organic matter. In dirty conditions, compared to chlorine, peracetic acid provided significantly improved performance against both bacteria and spores. These results suggest that peracetic acid-generating products provide an improved alternative to chlorine.

Clinical and cost effectiveness of eight disinfection methods for terminal disinfection of hospital isolation rooms contaminated with Clostridium difficile 027[15].

Doan et al. Journal of Hospital Infection. 2012;82(2).

Objective: Compare the efficacy of 8 solutions for terminal cleaning and/or disinfection of a hospital room contaminated with *C. difficile* spores – an organism incredibly tolerant to chemical disinfectants. The authors also undertook an analysis of the cost-effectiveness of each solution.

Methods: A hospital room was seeded with *C. difficile* spores, and then 8 different disinfection methods were randomised. Disinfection with a 1000 ppm chlorine releasing agent was used as a reference method for comparison.

Results: Clinell Peracetic Wipes was one of only two methods that improved upon the disinfection level compared with 1,000ppm chlorine (along with hydrogen peroxide vapour). Clinell Peracetic Acid Wipes also came out as the most cost-effective approach to disinfection of a room contaminated with *C. difficile* spores when considering time and efficacy.

Efficacy of "sporicidal" wipes against Clostridium difficile[16].

Siani et al. American Journal of Infection Control. 2011;39(3).

Objective: *C. difficile* is a high-risk, hard to kill, clinically relevant pathogen. Many products make "sporicidal" claims based on EN testing but are ineffective in the real-world. The authors aimed to compare 10 wipes with sporicidal claims using a novel, standardised three-step methodology.

Methods: The first step evaluated the ability of each wipe to remove spores from a target surface. The second step evaluated whether the wipes would transfer spores back into the environment once contaminated. The final step involved assessing efficacy of the wipes against direct inoculation.

Results: Only 2 of 10 wipes were effective against *C. difficile* spores: Clinell Peracetic Acid Wipes and an unmedicated wipe soaked in solution containing 5,000ppm. However, Clinell Peracetic Acid Wipes removed significantly more *C. difficile* spores than chlorine ($p \leq 0.5$, ANOVA), making them the most effective product evaluated. Clinell Peracetic Acid Wipes were also the only product not to transfer spores back into the environment.

Tackling C. difficile with environmental cleaning[17].

Carter & Barry. Nursing Times. 2011;107(36).

Objective: An observational study examining the impact of the introduction of Clinell Peracetic Acid Wipes on the rate of C. difficile infection.

Methods: An observational study of C. difficile rates was carried out at an acute London trust between 2006 and 2010. Chlorine-based disinfection was changed to Clinell Peracetic Acid Wipes, and the rate of C. difficile infection monitored.

Results: The mean *C. difficile* rate per 1,000 patients fell from six to two following the introduction of the Clinell Peracetic Acid Wipes – the overall rate of *C. difficile* infection was reduced by 72%. Whist the study did control for changes in patient throughput, other important confounders, especially antibiotic use, were not monitored. Nonetheless, this study supports the incremental benefit of Clinell Peracetic Acid Wipes over chlorine solution for reducing rates of *C. difficile*.

A comparison of 5,000 ppm chlorine solution with peracetic acid wipes in reducing environmental contamination with Clostridium difficile in hospital rooms.

Fu-Chieh Chang, Chin-Chen Lin. Infection Prevention Society Annual Meeting 2017.

Objective: Compare standard disinfection approaches using chlorine solution to Clinell Peracetic Acid Wipes for tackling contamination with *C. difficile*.

Results: High levels of contamination were identified both before and after disinfection using chlorine solution: 18% of sites in 10 rooms remained contaminated with *C. difficile* after chlorine disinfection. In contrast Clinell Peracetic Acid Wipes virtually eradicated *C. difficile* (with only 3% of sites remaining contaminated after disinfection). Whilst it is not clear whether it was the improved disinfection process using wipes, or the differences in the chemicals used, the result is that the wipes delivered considerably improved disinfection compared with chlorine solution (combined with improved staff safety).

Epidemiology and control measures of an OXA-48-producing Enterobacteriaceae hospital outbreak[18].

Sivaramakrishnanet al. Infection Prevention in Practice. 2020;2(3).

Objective: Increased screening detected an outbreak of the OXA-48-like CPE at a London NHS Trust. The Infection Prevention & Control Team, alongside stakeholders from across the Trust, worked to resolve the outbreak. This paper details the microbiological methods that led to the detection of the outbreak, along with the interventions that brought about its resolution.

Methods: The IPC Team employed a multi-modal intervention, making sure to engage hospital senior management early to gain their support. Interventions included a strong 'ward presence' of the IPC Team – assisted by dedicated IPC 'Clinical Practice Educators' who visited confirmed CPE cases daily to advise healthcare staff on practical aspects of care. They also introduced deep cleaning protocols – including frequent surface disinfection with Clinell Peracetic Acid Wipes and terminal disinfection with Hydrogen Peroxide Vapour.

Results: The CPE outbreak was declared in January 2018. A series of interventions were introduced between January and April that year. May showed a marked decline in monthly cases, with the outbreak being declared over in July 2018. The authors demonstrated a rapid termination of a large CPE outbreak by bringing about timely, 'ward-based' interventions – pairing a 'step up' in disinfection products with interventions to affect behavioural change.

The advantages of wipes

Well formulated disinfectant wipes provide real-world benefits over disinfectant solutions.

The materials used in wipe construction have just as much impact on efficacy as the disinfectant that goes into it. Clinell products are specifically formulated to deliver an effective dose every time – eliminating the risk of user error and ensuring patients are protected.

Adsorption of active ingredients of surface disinfectants depends on the type of fabric used for surface treatment[19].

Bloß et al. J Hosp Infect. 2010;75(1):56-61.

The authors studied the effect of different wipe materials on surface disinfectant solutions. Specifically, they were interested in whether the active ingredients of the disinfectant would become trapped within the wipe material – a process known as “adsorption.”

Before and after exposure, the wipes were squeezed in a standardised way to remove the eluate – the liquid given off. After exposure to various materials (from white pulp and viscose to polyester), the authors found that certain wipe materials strongly adsorbed the active ingredients of various disinfectant solutions.

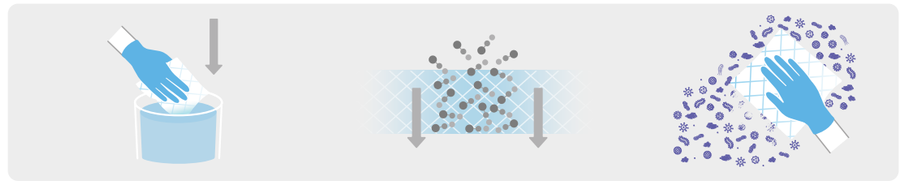
The authors concluded that selecting the wrong combination of disinfectant solution and wipe material could make disinfection efforts ineffective. They cautioned that selection of a wipe material was just as important as the disinfectant itself.

Clinell Peracetic Acid Wipes were the only wipe to perform best in all criteria: Clinell Peracetic Acid Wipes produced a 7 log10 reduction, delayed regrowth for 6.5 days and were the only product to completely eliminate microbial transferability.

An effective dose every time

Some wipe materials can trap the active ingredients of a disinfectant[19]. However, Clinell Peracetic Acid Wipes are formulated and tested to make sure the wipe material delivers an effective dose every time.

Dry wipe and solution

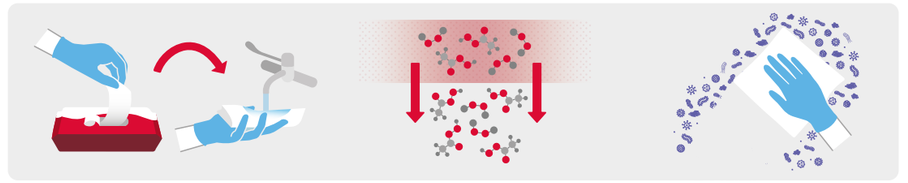


1. Dry wipe and disinfectant solution.

2. Active ingredients are trapped in the dry wipe.

3. Ineffective against miccroorganisms.

Clinell Peracetic Acid Wipes



1. Clinell Peracetic Acid Wipes are activated by water.

2. Wipe material and disinfectants formulated to deliver an active dose.

3. Effectice against hard-to-kill microorganisms.

Clinell Wipes improving practice

Unlike traditional, chlorine-based disinfectants, Clinell Peracetic Acid Wipes and our everyday disinfectant, Clinell Universal Wipes, require no pre-cleaning.

Added detergents in our patented formulations making them more effective in dirty conditions. By simplifying the cleaning and disinfection procedure, the evidence shows us that we can save staff time, increase the cleanliness of our environment and reduce the transmission of healthcare-associated pathogens.

Cleaning high touch surfaces of patients' rooms: make it easier, and it simply gets cleaner[20].

Martin et al. Open Forum Infectious Diseases. 2018;5(S1).

Objective: Examine the impact of introducing Clinell Universal and Peracetic Acid Wipes on cleaning compliance compared with chlorine solution on medical wards in an acute hospital.

Methods: A prospective intervention cross-over study examining the removal of fluorescent markers from the environment.

Results: Clinell wipes were significantly more likely to result in the removal of all fluorescent marks than the chlorine solution. Introducing Clinell Peracetic Acid Wipes & Clinell Universal Wipes resulted in improved adherence to room cleaning protocols, and staff stated that the wipes shortened the cleaning process.

Wiping out MRSA: effect of introducing a universal disinfection wipe in a large UK teaching hospital[21].

Garvey et al. Antimicrob Resist Infect Control. 2018;7(1).

Objective: Examine the effect of replacing a traditional two-step cleaning and disinfection process using chlorine with a single-step cleaning & disinfectant wipe (Clinell Universal Wipes).

Methods: The authors selected Clinell Universal Wipes to replace and simplify their existing, chlorine-based cleaning & disinfection process. They used a segmented Poisson regression model to detect any significant changes in the monthly acquisitions of MRSA and bacteraemias per 100,000 bed days from April 2013 - December 2017 across a UK teaching hospital.

Results: Introducing Clinell Wipes produced a 55% reduction in MRSA acquisitions. The authors attributed the result, in large part, to the simplification of their cleaning & disinfection procedures from their existing two-step process with chlorine to a single-step process using Clinell Universal Wipes. They found that moving to something simpler for users, such as Clinell Universal Wipes or Clinell Peracetic Acid Wipes can have a result.

Economic impact

Healthcare associated infections place a heavy burden on healthcare services worldwide.

The European Centre for Disease Prevention and control estimates over 4 million people per year acquire an HCAI in acute hospitals[22]. Whilst the USA's Centres for Disease Control & Prevention (CDC) estimates that, on any given day, 1 in 31 hospital patients and 1 in 43 nursing home patients has an HCAI.

In England, healthcare associated infections cost the NHS
£2.7 billion per year[23]

Modelling the annual NHS costs and outcomes attributable to healthcare-associated infections in England[23].

Guest et al. BMJ Open. 2020;10(1):1-11.

The authors sought to model the impact of HCAIs using data from NHS England. They constructed a model based on a combination of published data and clinical practice.

1 in 21
adult inpatients acquire a healthcare associated infection

1 in 58
frontline healthcare workers acquire a healthcare associated infection

Estimated to occupy
7.1 million
hospital bed days (21% of all bed days across NHS England per annum)

Accounts for
79,700
days of absenteeism from frontline staff

28,500
patients die as a result of their acquired infection

HCAIs cost NHS England
£2.7 billion
per year

Cost-effective interventions

By reducing the impact of HCAIs, we can ease the financial burden on our healthcare services.

There are several factors to consider when assessing the economic impact of a surface disinfectant for infection prevention.

Product cost per use

The unit cost of an intervention is often used when determining economic impact. However, when comparing different products with different methods of application, different surface coverages, etc. we should compare according to product used rather than per unit.

5x

Owing to their patented dual layer design, Clinell Peracetic Acid Wipes have 5x the surface coverage of a standard disinfectant wipe.

Product efficacy and the cost of infections

Specific pathogens cause persistent outbreaks and elongated stays for patients. Being able to reduce them can have a large financial impact. An effective intervention should be proven to reduce environmental contamination, acquisition of relevant pathogens and, ideally, rates of infection.

Tackling *C. difficile* with environmental cleaning[17]

Carter & Barry. Nursing Times. 2011;107(36).

This study examined the impact of introducing Clinell Peracetic Acid Wipes to replace chlorine in dealing with *C. difficile* – a spore-forming pathogen able to withstand most everyday disinfectants. Investigators found a 72% reduction in the rate of *C. difficile* infection upon introducing Clinell Peracetic Acid Wipes. When modelling the financial impact, they estimated that introducing Clinell Peracetic Acid Wipes saved their London teaching hospital £660,000 per annum.

Impact on compliance and staff time

An efficacious product is only useful if it's used regularly and correctly. An effective product should be both efficacious and encouraging of compliance. In particular, staff frequently cite the time taken to clean & disinfect as a common barrier to compliance.

Clinical and cost effectiveness of eight disinfection methods for terminal disinfection of hospital isolation rooms contaminated with Clostridium difficile 027[15].

Doan et al. Journal of Hospital Infection. 2012;82(2).

Investigators assessed 8 methods for terminal disinfection – including Clinell Peracetic Acid Wipes, several "sporicidal" disinfectants and chlorine. They found that only Clinell Peracetic Acid Wipes and Hydrogen Peroxide Vapour (HPV) improved on environmental cleanliness compared with 1,000ppm chlorine. Clinell Peracetic Acid Wipes were also calculated to be the most cost-effective intervention. Because Clinell Peracetic Acid Wipes don't require pre-cleaning (required for traditional, chlorine-based disinfectants) or increased turnaround time (as is required after use of HPV), Clinell Peracetic Acid Wipes were the most cost-effective solution in terms of staff time and product efficacy.

Material compatibility

Often overlooked, good material compatibility is essential for prolonging the life of your medical devices and healthcare equipment. Poor material compatibility can lead to environmental stress cracking, surface damage and premature failure.

Good material compatibility requires two key things:

- **Any medical device or healthcare surface needs to be able to withstand regular disinfection**
- **Any healthcare disinfectant should be formulated to be gentle on surfaces**

Clinell Peracetic Acid Wipes are formulated for exceptional compatibility. Their patented technology means they're active at a near-neutral pH, helping prevent potential corrosion and damage to surfaces seen with other peracetic acid-based products.

We work with medical device manufacturers to conduct thorough compatibility testing between our Clinell products and theirs.

To view our up-to-date Clinell Compatibility data, scan the QR code.

Frequently asked questions

Why are Clinell Peracetic Acid Wipes better than chlorine?

Clinell Peracetic Acid Wipes outperform chlorine-based disinfectants in several key areas:

- No pre-cleaning. Chlorine is inactivated by organic matter, meaning chlorine-based disinfectants require a surface to be pre-cleaned before disinfection. Clinell Peracetic Acid Wipes contain detergent which allow them to clean and disinfect in a single step – resulting in cleaner wards19 and reduced surface contamination12,15.
- More effective against hard-to-kill organisms. Introducing Clinell Peracetic Acid Wipes results in a reduction of hard-to-kill pathogens such as C. difficile surviving in clinical environments12,15, resulting in reduced rates of infection17.
- More effective against dry surface biofilms. Clinell Peracetic Acid Wipes are the most effective solution against dry surface biofilms2. When using chlorine-based disinfectants, we often see an initial high log reduction but, unfortunately, the biofilms are still able to transfer surviving pathogens into our environment and recover within a matter of hours. Clinell Peracetic Acid Wipes completely prevent transferability and delay growth for 6.5 days.
- No transference. The unique dual-layer construction of Clinell Peracetic Acid Wipes is able to trap microorganisms, preventing them from being transferred from a dirty surface to a clean one16.

What is the active concentration of peracetic acid?

Clinell Peracetic Acid Wipes produce a concentration of 3,500ppm of available peracetic acid[2].

How much water should I use?

Clinell Peracetic Acid Wipes were designed with our users in mind – we want to remove as many potential errors as possible. Specifically, they've been designed to make sure it's easy to add the correct dose of water for optimum activation.

Independent water-loading tests show that there's no significant difference between tap soaking times from 2 to 6 seconds, or from immersing in a 10-litre bucket for up to 6 seconds. Over-wetting does not readily decrease the activity of the wipe.

What is the surface coverage of Clinell Peracetic Acid Wipes?

Because of their unique construction, Clinell Peracetic Acid Wipes cover a much larger surface area than standard disinfectant wipes. A single Clinell Peracetic Acid Wipe can cover 3.0m2 in visibly soiled conditions or 4.5m2 in visibly clean conditions – 5x more surface coverage than a standard disinfectant wipe.

Continued

Will Clinell Peracetic Acid Wipes damage my surfaces?

Clinell Peracetic Acid Wipes have been formulated for exceptional surface compatibility. They're tested against common rubbers, plastics and metals to make sure they're safe for regular disinfection. We also work with medical device manufacturers to make sure Clinell products are safe for use on their equipment (see page 24 for more information).

Do they generate harmful end products?

The active ingredients break down into simple, non-toxic end products: vinegar CO2, oxygen and water.

Are Clinell Peracetic Acid Wipes acidic?

Actually no. Because they use patented technology to generate a blend of oxidative disinfectants only when they're needed, Clinell Peracetic Acid Wipes are active at a near-neural pH.

Most generic peracetic acid products are very acidic – they have a low pH. This helps the manufacturers make peracetic acid more stable for a longer shelf-life.

Clinell Peracetic Acid Wipes take a different approach: by manufacturing the product containing dry precursors and then activating the wipe with water at the point of use, Clinell Peracetic Acid Wipes are actually active at a slightly alkaline pH (pH 9.0-9.5).

Why are the wipes dry?

Peracetic acid can be very reactive. This makes it great for breaking down microorganisms and biofilms but can result in a short shelf life.

Clinell Peracetic Acid Wipes contain a patented blend of precursors that come air laid between our dual-layers of dry wipe material.

When exposed to water, these precursors react to generate our active ingredients – a synergistic blend of peracetic acid and hydrogen peroxide. By generating the active ingredients only when they're needed, Clinell Peracetic Acid Wipes benefit from a much longer shelf-life, better disinfectant activity and improved material compatibility.

Should I use Clinell Peracetic Acid Wipes instead of Clinell Universal?

Clinell Universal Wipes are an everyday cleaning & disinfectant product. They're effective against many of the most common causes of healthcare associated infections – including Gram-negative and Gram-positive bacteria, viruses and emerging fungal pathogens such as Candida auris.

Clinell Peracetic Acid Wipes are a high-performance cleaning and disinfectant product. They're primarily designed for tackling outbreaks, high-risk and hard to kill organisms. In particular, they're effective against some of the most resistant microbial categories: bacterial spores and those embedded in biofilms.

Clinell Peracetic Acid Wipes and Clinell Universal Wipes are complementary, being used together as part of a robust infection prevention policy. Typically, Clinell Universal Wipes are used for routine cleaning and disinfection, with the option to "step up" to Clinell Peracetic Acid Wipes in cases where extra coverage and performance is needed.

Product comparison

Key features

Ideal for daily disinfection	✓		
Ideal for outbreaks, high risk and hard-to-kill organisms		✓	✓
Powerful cleaning action	✓	✓	
Effective in dirty conditions	✓	✓	✓
Clinically proven to reduce Multi-Drug Resistant organisms	✓	✓	✓
Kills 99.999% of bacteria	✓	✓	✓
Kills 99.99% of viruses	✓ *Limited spectrum efficacy	✓	✓
Kills 99.99% of fungi		✓	
Kills 99.99% of yeast	✓	✓	✓
Kills 99.99% of bacterial spores		✓	✓
Effective against dry surface biofilms		✓	

Order info

Peracetic Acid Wipes
25 wipes per pack

Product code: CS25
NHS code: VJT113

Wipes Dispenser
Single unit

Product code: CS25D

To find out more, speak to your GAMA Healthcare Area Manager or visit **www.gamahealthcare.com**

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Use disinfectants safely.

Always read the label and product information before use.

Always follow medical equipment manufacturer's cleaning procedures and guidelines.

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