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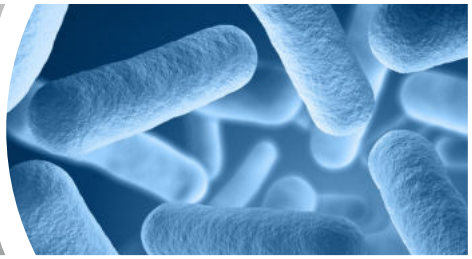
infection control solutions





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Why use Point-of-Use Filters
IN NEONATE UNITS

Newborns hospitalized in neonate units and other similar very high-risk hospital units have a limited immune system linked to their age of gestation and to the fact that they have a very low number of antibodies transferred by the mother. The need to protect these newborns from environmental contamination is accepted worldwide. For years, diverse ventilation systems and air treatment processes have been deployed to ensure the air quality, both in the rooms and in incubators, but the need to **control the water quality is a recent development**.

For many decades, the risk of infection in level III High-Risk Nurseries (HRNs) or Neonatal Intensive Care Units (NICUs) has been identified as very high, Gaines et al.,1996. Data was collected from 99 US hospitals with HRNs, participating in the Nosocomial Infection Surveillance System, from October 1986 through September 1994. 13,179 infections were documented. Bloodstream infections are the most frequent, then nosocomial pneumonia followed by gastrointestinal, eye, ear, nose and throat infections. The most common pathogens are, consistently, *Staphylococcus aureus*, Group B *Streptococcus* and Gram-negative bacteria. The first two microorganisms are not linked to possible waterborne transmission, but Gram-negative bacteria are increasingly cited in recent publications. Following a surveillance period of three years, Singh et al. identified an incidence rate of 17% in critically ill neonates, colonized by non-susceptible Enterobacteriaceae.

In the Netherlands, Van der Zwet et al. reported a total incidence of Health-Care Associated Infections (HAIs) occuring for up to 30% of all neonates in 2007. The data from Germany is quite similar, leading Geffers et al. to recommend preventive strategies to reduce infections in these high-risk infants.

The need for germ-free or sterile water both for the humidification of the air inside the incubators and for care is clear. There is a high possibility that these vulnerable newborns will be infected with waterborne, hydroropic **Gram negative bacteria such as *Pseudomonas aeruginosa***, which are able to grow inside **biofilms and withstand numerous biocides and antibiotics**. *Pseudomonas* colonizes water distribution networks, faucets, siphons and any humid environment (surfaces, linen, medical devices, etc.). This **bacterium is a formidable adversary for newborns**. Various papers that report HAI cases have linked the primary source of contamination in newborns to *Pseudomonas aeruginosa* present in the tap. The most famous outbreak occurred in Northern Ireland in 2011, and the subsequent investigations were published by Walker et al. in 2014. Sensor taps are often implicated, and this led the british authorities to publish DoH guidance in 2012, identifying *Pseudomonas aeruginosa* as an alert microorganism in NICUs (similar to France and Germany some years before) and recommending filtered water for all high-risk healthcare facilities.

Burkolderia complex cepacia* and *Stenotrophomonas maltophila have also been identified as a source of infection in neonates since they also cause infections in **adult Intensive Care Units** (ICUs) housing immunocompromised patients.

The results of routine analyses of drinking water in public water distribution systems indicate a low percentage of positive samples for *Pseudomonas aeruginosa* or *Legionella pneumophila* at very low concentrations. The hospital water distribution system may be seeded with these and other bacteria, where they encounter perfect conditions for their growth, unless there are adequate preventive measures in place. Traditional treatment involves introducing a disinfectant for example, chlorine or chloramine (according to local/national regulations in place) at the point where water enters the hospital's distribution system, to limit biofilm development within the distribution network. Even this treatment is not always effective at controlling the biofilm, since the distributed water at the point-of-use will always contain numerous waterborne microorganisms which may be harmful to neonates or patients with lowered immunity. They are called "opportunistic pathogens" and the bacteria cited above (for example, *Pseudomonas*, *Burkholderia*, *Stenotrophomas sp* et al., are all opportunistic and very dangerous because they can cause severe waterborne Healthcare Acquired Infections (HAI). Therefore, the water quality is not germ-free, even after a disinfection treatment, and may induce isolated HAIs or outbreaks.

This underlines **the importance of a high level of water quality** while caring for neonates, and extra care should be taken when rinsing all medical devices for these newborns with low immunological defences, to avoid the risk of pneumonia, bacteria and septicemia.

It is also essential to consider the risk of infection due to mold, even if the air quality is exemplary. A study published by Anaissie et al. (2001 and 2003) into *Aspergillus* species and *Fusarium* species highlights the incidence of fungal infections despite the widespread use of air filtration systems, suggesting the presence of other hospital sources for these fungi. In the study published in 2003, fungi were recovered in 70% of 398 water samples, illustrating again the presence of opportunistic pathogens in non-filtered water.

The conclusion is, therefore, that it is essential to secure the water quality at the point-of-use in sensitive hospital wards to prevent **waterborne infections**. Trautmann was the first to publish in 2001, and to demonstrate the efficacy of PoUFs in ICUs. In his study, the use of filters produced bacteria-free water at all **points-of-use and a progressive reduction in the number of colonizations/infections, from between 5 – 10 initially, to 0 - 1 each month at the end of the study**. Some researchers highlighted the lack of statistical data to support this study. So, in 2008, following a longer observation period, the group published a study clearly evidencing the efficacy of the PoUFs.

Simililar findings were published by Vianelli et al., 2006, after installing filters at all points-of-use (faucets and showers) in a hematological ward.

Since then, more and more wards in **Europe have used PoUFs to reduce the bacterial and fungal content of water used for in healthcare, and to comply** with the quality criteria required by French water guidelines (Guide de l'Eau, 2005) i.e. "Bacteriologically Controlled Water" (BCW). Warris at al., 2010, also highlighted the excellent results of PoUFs for the retention of fungi.

For **neonatal units, this is a national standard of care required by the majority of European countries**. The absence of control of the water quality in such units would be considered as a failure in the event of an healthcare acquired infection, and the hospital would be considered as guilty by any expert and court.

The increased surveillance and water quality control in wards caring for patients identified as at risk and high risk is covered by the WHO "Water Safety Plan" framework. Its application inside the health care settings is absolutely essential and the use of point-of-use filtration of water inside neonatal units, caring for the most fragile hospitalized patients in terms of low immunity, marks an undisputable progress in recent years.

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About AQUATOOLS

AQUATOOLS is a French company specializing in the production of advanced solutions for water hygiene, in particular anti-legionella and all-germ point-of-use filters for healthcare facilities and non-medical establishments open to the public (hotels, accommodation, campsites, etc.).
Thanks to sustained investments in Research and Development and close collaboration with scientific experts, AQUATOOLS has quickly established itself as a key player in the point-of-use filtration sector.
The exceptional quality and performance of our filters position us as a market leader in France and a leading player on the international scene, with subsidiaries opening in the United States in 2017, in the United Kingdom in 2023, and in Germany in 2024. Committed to sustainability, we are determined to develop responsible practices that reflect our deep commitment to social responsibility and the environment, as evidenced by our recent distinction with the EcoVadis gold medal.