Microbiological surveillance – where do we stand?

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Microbiological surveillance is an important quality assurance tool in endoscopy and have been established in many countries for more than 20 years [1]. The aim of microbiological surveillance is to check the quality of endoscope reprocessing, to confirm the reprocessing quality or to identify possible weak points at an early stage and to provide information about possible risks. Microbiological surveillance can also give indications of possible defects in endoscopes and washer-disinfectors, so that you can react at an early stage.

In outbreak management, microbiological surveillance is a helpful tool to better understand the situation and find the actual cause that may have led to the transmission of pathogens. Publications on outbreaks in GI endoscopy usually describe the situation in one institution and can only be a snapshot.

In reviews the data evaluation from published outbreaks is a challenge because the reprocessing methods are subject to national differences and have changed over the years. The comparison of microbiological surveillance programmes is very difficult because methods of sampling, the time of sampling, the number of channels checked, the type of sampling solution used, the cultivation methods (filtration vs centrifugation) and the interpretation of the results show extreme variations [1, 2]. More homogeneous data are available when the outbreaks are evaluated at national level [3].

When microbiological surveillance programmes are developed and tested, this is usually done in one institute with a limited range of endoscopes and over a limited period of time.

The present work by Pineau is a multi-centre evaluation in France over the impressive period of 17 years. The evaluation is based on the recommendations of the French guidelines [4], which were adapted over the course of the study to the new established methods for duodenoscope sampling [5]. The study of Pineau reflects the situation across France by including all endoscopy departments in private and public clinics [6]. Due to the national character, endoscopes from different disciplines could be evaluated, which differed in endoscope types, manufacturers, design and channel geography. Due to the large number of clinics involved and the wide range of variations of endoscopes involved, a really complete picture of the reprocessing situation in France was created. The sampling performance was the responsibility of one institute that operates nationwide and used uniformly trained personnel with a uniform method protocol. As a result, there are no institute-related variations here either. Due to the impressive number of 90311 samples and the uniform sampling in 490 private and public clinics in France, extensive homogeneous data is available. In this way, trends and critical points can be derived. What do we learn from the publication?

Improvement of reprocessing quality

Pineau showed the positive effect of microbiological surveillance on the quality of endoscopy reprocessing. The rate of detected contaminations has improved continuously over the past 17 years (19.7 in 2004 to 13.0 % in 2021 at the action level; from 27.8 % in 2004 to 21.1 % in 2021 – action plus alert level). The contamination rates are consistent with other national publications [1–3]. It is interesting to see that the overall microbial quality of Gastroscopes, Colonoscopes and Duodenoscopes has improved in the 17 years of observation while contamination rates of Bronchoscopes and EUS Scopes has increased. The study could not explain this effect. But it underlines the necessity to bring the focus to the entire variation of reprocessed endoscopes. In recent years the focus was projected on duodenoscopes. It is important to consider that possible errors can be derived from the germs found.

Timing of microbiological surveillance

Bacteria can be cultivated more easily if sampling is not carried out immediately after finishing the reprocessing cycle. Therefore, GESA-GENSA [8] and CTINILS [4] recommend microbiological surveillance at the earliest 12 or 6 hours after reprocessing. This was taken into account by Pineau. Sampling directly after endoscope reprocessing would have the risk of false negative results.

Staff training

Pineau indicated that specially trained personnel performed the sampling of endoscopes. This is an important aspect for the practical implementation of microbiological surveillance. Sampling should be carried out jointly by specially trained endoscopy and hygiene staff so that the construction of the respective endoscope, in particular the complex channel configuration, is well known and professional endoscopy handling is guaranteed; on the other hand the required hygiene expertise for sampling and culturing is needed.

Aseptic techniques during sampling are important. This includes the use of sterile sampling equipment, the use of PPE with sterile gloves and the disinfection of the environment prior to sampling in clean work areas. It is advisable to carry out the sampling with two persons to ensure aseptic sampling and to avoid recontamination from the environment. The latter would lead to false positive results.

More intensive sampling of critical components

Since the 2000 s, duodenoscopes have been the focus of attention due to reported outbreaks with multidrug-resistant germs after ERCP in the US and Europe. In a Dutch national wide study, 22 % of duodenoscopes showed contamination [3]. In the present study, 8 % of duodenoscopes were at the action level and 17.2 % including the alert level [6]. Under pressure from the FDA, endoscope manufacturers developed removable disposable distal caps that made cleaning the albarran elevator easier [9]. More intensive methods for sampling at the elevator lever have been established [4, 5]. These methods included increased flushing and brushing activities.

While duodenoscope contamination decreased over the years, Pineau showed an increase in contamination of ultrasound endoscopes (EUS) and other high-risk endoscopes. This underlines the considerable need for staff training and awareness when dealing with complex endoscopes. Endoscopy staff need to follow manufacturer´s recommendations which often is a problem when reprocessing staff is working under time pressure [10]. Single-use components would also be advantageous for these endoscopes. Guidelines should not only focus on the elevator mechanism at duodenoscopes, but also on sampling critical components of other endoscopes in general.

Improved sampling methods

In the past, microbiological sampling was described with the pure rinsing of saline solution (NaCl 0.9 %) [11]. Pineau modified the rinsing solution to better dissolve contaminants. The Tween 80 lecithin-based solution is more efficient than saline solution in detecting contamination in endoscopes [1, 12].

Bacteria can react under stress (e. g. disinfectant residues, drying or heat) with a reduced metabolic state (VBNC: Viable but non-culturable status), which can make cultivation more difficult. Therefore, guidelines and authors of studies recommend to add a neutralizer to sampling solutions [1, 11].

Studies showed that the use of brushes (flush-brush-flush method) and/or an improved flushing techniques (flush-suction-flush method) can significantly improve the recovery rate [1, 3, 13]. Pineau used the intensified flush-suction-flush method to better loosen residuals by turbulence effects. Rauwers and Wehrl demonstrated a better recovery rate by using the flush-brush-flush method [3, 13]. The higher recovery rates reduce the risk of false-negative results because inadequately reprocessed endoscopes are more likely to be detected, which improves the safety of patients and staff [13].

After sampling Pineau used that membrane filtration method before the entire sample volume was incubated for 5 days in agar plates. A review of Alfa et al also concluded that the filtration technique improves the culture sensitivity [1].

The knowledge of these improved methods should be considered when national and international guidelines will be updated.

Interpretation of results

According to the French guidelines, Pineau differentiated between different action and alert levels. There are great variations in national guidelines concerning acceptable number of germs, action and alter levels [1, 4, 5, 11]. But there is a worldwide consensus that the presence of indicator germs is the exclusion criterion (“Cutoff”) to continue the use of the sampled endoscope. In case of contamination with indicator germs, it is the responsibility of the clinical service provider to take the suspect endoscope out of service until corrective actions have been taken and satisfactory results have been achieved [13]. In the case of automated reprocessing, the automated endoscope washer–disinfector and the water used in reprocessing should also be tested at the same time as the endoscopes, in order to identify the possible cause of infection [13].

It might be helpful to include more detailed guidance in national guidelines how to interpretate results and to manage the relevant actions [1].

Conclusion

Microbiological surveillance is a helpful and efficient tool of control and evaluate the quality of endoscope reprocessing. The results can be used to find the source of infections and to identify weak points and insufficiencies. New methods for sam-

pling should be taken into account when national and international guidelines will be updated.

Competing interests

The authors declare that they have no conflict of interest.

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