Proposal to use a new testing protocol to improve the cleaning of surfaces

Following their recent article in *Pathology in Practice* which proves the relationship between air contamination and surface contamination, Andrew Kemp and Denise Hanson ask how can this knowledge be used to improve cleaning, and reduce potential cross contamination and microbial resistance to disinfectants?

There is a saying throughout industry: 'If you can measure it, you can improve it.' In the case of the disinfectant and hand sanitiser industry, it could be: 'If you don't measure it, there is no need to spend any time, effort, or money improving it.'

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Background

For as long as I have been studying surface contamination, no one has yet routinely tested the effectiveness of their cleaning regimes or disinfectants to an extent that would be acceptable as evidence in any other industry. In many hospitals around the world, cleaning is still routinely tested by the majority of healthcare institutions using the mark one eyeball.[1] How can this be in 2026? Why is this the case, and why is it considered acceptable, when we know it is of little value?

For other healthcare institutions, and certainly in the food industry, total ATP (adenosine triphosphate) measurements are considered an acceptable measure. This should seem as perplexing to the reader as it does to the authors, when we know how inaccurate these measurements are.[2]

There can be no doubt that surfaces play a significant role in cross infection/ cross contamination,[3,4] and now it is also proven they have a measurable effect on the air passing over them.[5,6] In which case, it would not be beyond expectation that we should regularly check not just how we clean, but test how efficiently we clean, and that includes the efficacy of the disinfectants we use.

We know for instance that the efficacy of hand sanitisers can change when applied to the skin as compared to the results on a laboratory bench,[7] yet we do not test to see if there is an efficacy change when disinfectants are used in different environments; and on different surfaces, we simply accept the bench top results. Why? Is it because the regulators use this as their measure of efficacy?

In addition, given that there is a year-on-year significant increase in antibiotic resistance linked to disinfectant resistance,[8] and that this is seen as a major health issue, why has there been little or no improvement in testing for the build-up of disinfectant resistance?

Is it just that we are too lazy to be bothered to test, or is there something else standing in the way of progress?

Current doctrine

In order to understand the reasons why, we have to look at what tests have been available, and the reasons they have not been used extensively to test surfaces.

The pros and cons of currently available tests were looked into in a recent paper.[2] In order for a test to be adopted widely for use, there are a number of requirements for what could be considered an ideal test.

1 Fast: must be in real time, so that dangerous CFU levels and species can be identified quickly, and dealt with before

they become a problem
2 Accurate: must have a level of confidence that the results are correct within an acceptable margin of error
3 Simple: ideally staff can test their own areas of work responsibility. Whilst specialist equipment is required, it should be simple to learn to use
4 Inexpensive: if tests are expensive, they will not be used regularly. From a global perspective, in countries where they are cost prohibitive, it unlikely they will be done at all.

In addition, for each of the currently available test methods, there are no standards to determine acceptable levels of bioburden for surfaces. These would obviously be different dependent on the risks associated with the area being tested, the bacterial species and numbers of live microbes. There would of course be a different standard in a hospital operating theatre, as compared to a general ward, or the hospital administration offices.

The cost of testing, with a low expectation of a result, and especially in light of the time taken to get a result from already busy laboratories, has proven to be enough to ignore the obvious need to understand surface contamination levels and the efficacy of cleaning regimes.

For the moment then, without any definitive study data, the common-sense approach should be to assume that the lower the bioburden in both air and on surfaces, the better it is for patients and staff. In light of the recent publication of data showing a clear correlation between air contamination and surface contamination,[5,6] and with the addition of a new testing technology, Rapid Chemical Colour Change (RCCC),[9] which indicates levels of live bacterial contamination, it is now possible to fulfil most of the ideal test criteria set out above.

Proposed new regular testing regime

We are now able to test the air 20cm above surfaces to get an approximate value for the microbial contamination on a surface (10:1 surface CFU counts to air particle counts between 0.5 and 1 micron). This is sufficiently accurate to be able to check using the RCCC test. If contamination is sufficient to warrant further investigation, it will be simple and inexpensive to identify the areas of highest contamination, which will therefore indicate the areas where a surface culture swab is most likely to produce a result.

The flow chart in Figure 1 shows the newly recommended testing regime for hospitals and food manufacturing. The fact is it can be adapted for any environment, based on the risk assessment of the area to be cleaned.

As the individual tests are simple to perform, low in cost, and the results are in real time; when compared to what has previously been available, the questions that now require your own answers are:
1 Which surfaces should be tested?
2 How often should surfaces be tested?
3 What results are acceptable?
4 When should the test results be a cause for concern/ intervention?
5 Who in your team will conduct tests and maintain the results log?

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Discussion and conclusions

It has never been in the chemical industry's interest to develop tests for surface disinfectants; the status quo suits it. This means there is a minimal impetus to research and develop new, more effective products, the old cash cows keep the money rolling in year on year. This situation has not been challenged by the healthcare industry or government regulators, possibly because many of the largest chemical manufacturers 'help' the regulators to write and police the industry.[10] This allows the status quo to be maintained and makes it extremely expensive and difficult for new technologies to emerge. It is in effect, the fox being left in charge of the chicken coup.

In the recent past there has been an opportunity for the UK government to help improve the requirements for surface testing, especially in critical high-risk areas. The resultant NHS Improvement document[11] does recommend cleaning audits. However, even without the knowledge of what was about to become available for surface testing, this would have been significantly improved by recommending external auditors who examine not only visual standards, but the cleaning protocols and equipment used. The recommended practice in the document is, at best, of no clinical value, and is not based on any data or evidence. In short, it was a poor attempt at producing guidance by the department of NHS Improvement, probably due to it collaborating with large industrial cleaning companies. This was then, a missed opportunity to produce something

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of real value to environmental cleaners, and a new tool for infection prevention and control staff. Disappointingly, it provides little or no value to either group.

As a result of this poor guidance, it is the authors' view, that the government can't be trusted to regulate the cleaning industry. It is therefore time for industry leading bodies to grasp the nettle and produce their own standards for training and education of cleaning staff, for testing of surfaces (and possibly air), and disinfecting chemicals / sanitisers in use; in addition to the required bench-top tests. It would also be helpful if the cleaning industry had approved independent laboratories outside the hospital environment that can be used by the rest of the industry.

It is now in the reader's gift to make a difference. The simple introduction of the flow chart in Fig 1 along with an inexpensive test methodology, means hospital staff can now take control of their own areas of work to monitor cleaning, without relying on an overworked and underfunded infection control team. Poor results can be fed back to facilities management and infection control, helping with potential prevention of outbreaks, early detection of microbial resistance, and therefore early interventions. PP

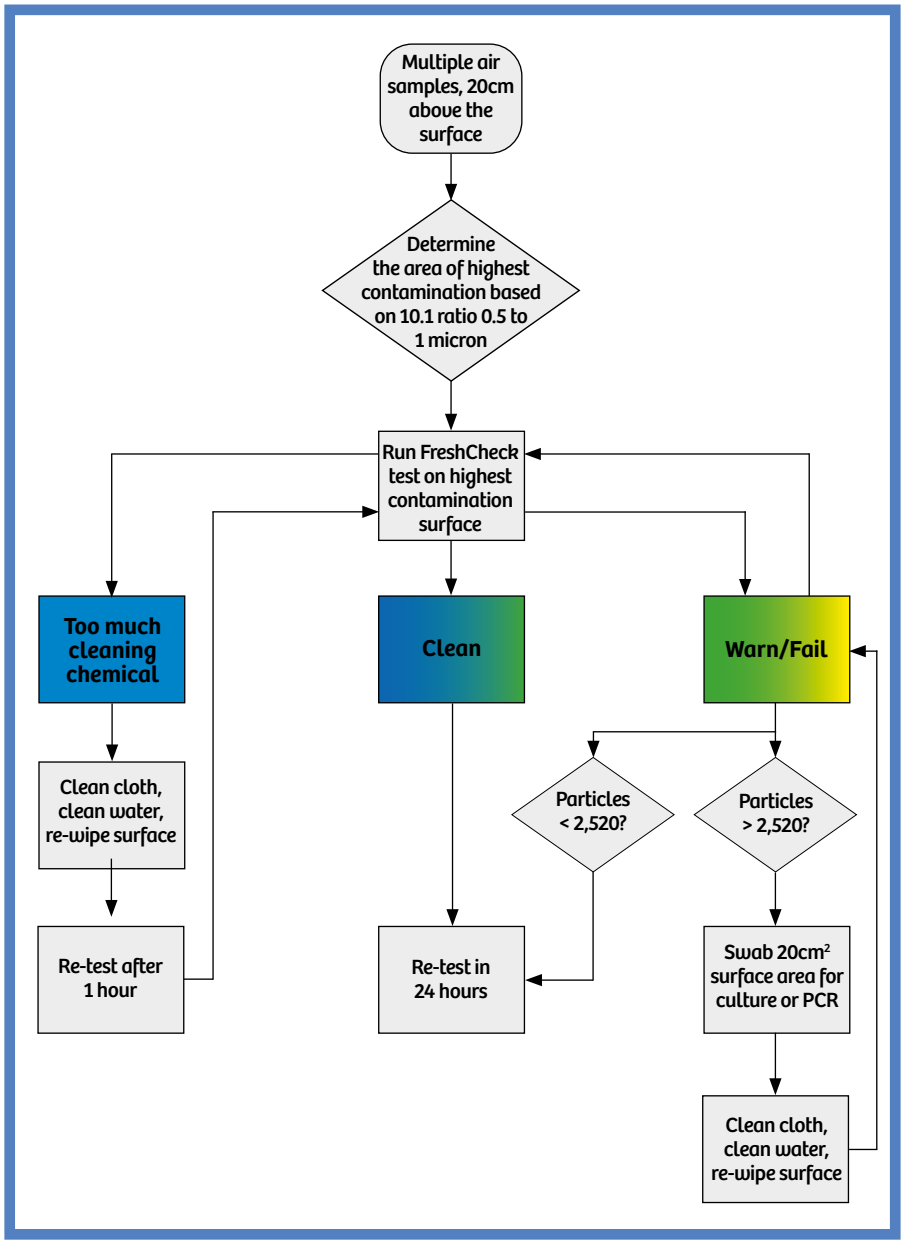

Fig 1. Recommended testing regime for hospitals and food manufacturing.

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