



Evaluating the need for hygiene behaviour change in homes and everyday lives to prevent the spread of infections and combat antimicrobial resistance (AMR)

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ABSTRACT

Antimicrobial resistance (AMR) is a serious threat to global health. It is on the brink of undermining modern medicine if appropriate strategies, including those for infection prevention, are not prioritized. This article explores evidence that supports the value of better hygiene practices in our homes and everyday lives. A more focused approach to hygiene based on risk assessment (known as Targeted Hygiene) will play an essential part in preventing infections in order to reduce antibiotic prescribing and reduce the spread of resistant bacteria in home and community settings. This also has value for COVID-19 prevention.

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INTRODUCTION

The public is being urged to be more focused on hygiene practices such as hand washing to help prevent the spread of COVID-19, but there remains confusion about what effective hygiene behaviour really means. With antimicrobial resistance (AMR) set to claim 10 million lives per year by 2050 if no action is taken,¹ greater understanding is needed of the role of hygiene in the prevention of infection transmission in homes and everyday life. Implementation of appropriate behaviour change strategies is essential to ensure that hygienic practices are appropriate to the urgent public health issues we currently face, which include COVID-19 as well as AMR.

OVERUSE OF ANTIBIOTICS IN CLINICAL PRACTICE

Resistance to commonly-used antibiotics means that even minor infections and simple surgeries can become life-threatening. It is estimated that rates of resistance to commonly-used antibiotics could exceed 40–60% in some countries by 2030.² One of the main drivers of the rise in AMR is the overuse of antimicrobials in the treatment of infections – using antibiotics where they are not needed at all or are ineffective. During the current pandemic, researchers have become concerned that despite COVID-19 being a viral disease, the response is driving increased antibiotic usage. This may have an adverse impact on attempts to control AMR through antibiotic

stewardship.³ Antibiotics do have a role in treating bacterial co-infections associated with COVID-19, but evidence suggests that there has been inappropriate prescription of antimicrobials as well as large numbers of people self-medicating in a misguided attempt to protect themselves from the virus. This practice is especially prevalent in developing communities.⁴

AMR BACTERIA OUTSIDE HEALTHCARE SETTINGS

It has been recognized for decades that the spread of AMR strains within hospitals contributes to rising levels of AMR infections. It is only more recently that evidence has shown that increasing amounts of antibiotic resistant strains are also circulating in the community.⁵ Data show that infected or colonized patients discharged from healthcare settings can remain persistent skin carriers of methicillin-resistant *Staphylococcus aureus* (MRSA), or faecal carriers of enterobacteria strains that carry multi-drug resistant (MDR) factors (e.g. New Delhi metallo-beta-lactamase 1 [NDM-1] or extended spectrum beta-lactamase [ESBL] enzymes). Many community-onset infections are associated with recent discharge from a healthcare setting.^{6–10}

Factors affecting the spread of MDR bacteria into home and everyday life settings are complex. MRSA is probably the most important MDR bacterium to

transition from healthcare settings to the community. The ease of transfer of MRSA from hospitals to the home, via healthcare workers and others in contact with hospitals, has been demonstrated in multiple studies.⁶⁻¹⁰ This is clearly illustrated by a study¹¹ in which significant levels of community and hospital strains of MRSA were recovered from high-frequency touch surfaces (door handles, toilet seats, reception areas, public washrooms, corridors and lifts) in public areas in the community and in London hospitals, suggesting cross-contamination between the two settings. Once in the home, MRSA can then colonize and/or cause infection among family members.¹²⁻¹⁴

THE NEED FOR IMPROVED HYGIENE IN HOMES AND COMMUNITY SETTINGS

The main drivers for rising levels of AMR include, on the one hand, overuse and misuse of antibiotics in medicine and agriculture – including unregulated over-the-counter sales – and on the other, poor infection prevention and control in healthcare facilities, combined with sub-optimal hygiene and sanitation in communities. Combined, these add to the global spread of resistant bacteria or resistance genes. While it is assumed that antibiotic prescribing is the major contributor, Collignon and Beggs¹⁵ argue there is a growing body of evidence pointing to contagion (i.e. spread) being the major – but frequently under-appreciated and neglected factor – driving the increased prevalence of AMR.

As outlined above, increasing evidence suggests that tackling AMR is not just about infection prevention control in hospitals but is also dependent on what the public do in their own homes and everyday life settings, such as offices, schools, shopping centers and on public transport. Effective hygiene behaviour in home and community settings can reduce AMR in one of two ways; first by preventing spread of infections and thereby reducing the need for antibiotic prescribing, and second by reducing the spread of AMR strains and resistance determinants across community settings. The increased levels of antibiotic prescribing associated with treatment of COVID-19 patients shows the importance of hygiene in home and community settings to reduce public demand for antibiotic treatments.

In a recent position paper developed by the Global Hygiene Council (GHC) and published in the September 2020 edition of the *American Journal of Infection Control*,¹⁶ a group of experts in hygiene and AMR set out the evidence supporting the view that better hygiene in our homes and everyday lives plays an essential part in tackling AMR.

According to a 2020¹⁷ review of 29 intervention studies designed to increase hand-hygiene and environmental disinfection in settings likely to include children, a positive impact on infection rates was demonstrated in 20 out of 29 studies involving hand hygiene and in two studies involving environmental disinfection. Other studies involving enhanced handwashing^{18,19} and/or environmental hygiene^{20,21} additionally indicate reductions in antibiotic prescribing.

One of the aims of the GHC paper was to review current hygiene practices in homes and everyday life to ensure that hygiene guidance given to the public is appropriate to the urgent public health issues we currently face. In the paper, the experts set out evidence showing that to minimize the spread of infections and of AMR strains in home and community settings, a more focused approach to hygiene, based on risk assessment, is needed. The principles of such a risk management approach, known as Targeted Hygiene, are set out in the sections below.

TARGETED HYGIENE – FOCUSING ON RISKY TIMES AND PLACES

Since 1997, the International Scientific Forum on Home Hygiene (IFH) has been developing an approach to infection prevention in home and everyday life based on risk management, which has come to be known as Targeted Hygiene.²² Targeted Hygiene focuses hygiene practices on places and at times when harmful microbes are most likely to be spreading, in order to break the chain of infection and reduce the risk of exposure to harmful microbes. This contrasts significantly with historical approaches equating hygiene with eradicating dirt, which has been incorrectly regarded as the main source of harmful microbes.

Microbiological data evaluating the spread of harmful microbes suggests there are nine key moments during our daily lives when harmful microbes are most likely to be spreading such that we can become exposed and infected.²³ These include handling and eating food; coughing and sneezing; touching surfaces frequently touched by others; handling dirty clothing; and caring for infected family members.

During these 'moments', hygiene measures need to focus on the critical surfaces most likely to spread harmful microbes, including the hands; hand and food contact surfaces; and cleaning cloths. Another key moment for hygiene is when we use the toilet and bathroom, particularly where our hands contact surfaces frequently touched by others, such as tap handles; door handles; toilet seats; and toilet flush handles, which should be regularly cleaned and disinfected. Other frequent hand contact surfaces such as TV remotes; shared mobile devices and computers; door handles; stair rails; and kitchen surfaces where people are handling and preparing food should also be regularly disinfected. For respiratory infections such as cold and flu, and norovirus, spread of infection may be airborne and good ventilation is important. Recent events suggest that this should also include social distancing wherever possible and use of face coverings.

An important aspect of Targeted Hygiene is hygienic cleaning, to ensure that pathogenic microorganisms on critical surfaces are reduced to a level where they are no longer harmful to health – thereby preventing ongoing spread.^{24,25} In many situations, physical removal may be sufficient but, in some cases, particularly hand and food contact surfaces which cannot be rinsed, a disinfectant may be needed.

CHANGING HYGIENE BEHAVIOUR

In 2017, a study conducted in Cape Town, South Africa, evaluated the impact of Targeted Hygiene. The study compared the impact of hygiene education alone, and education in combination with hand washing with soap at critical times; bathing at least three times a week; cleaning/disinfecting household surfaces at critical times; and proper waste disposal. The study reported that children under five years of

age (from the education-only households) were 2.5 times more likely to experience gastrointestinal illness and 4.6 times more likely to experience respiratory tract illness (HR 4.6, 95% CI 1.97, 10.54)²⁶ than those from households that implemented the additional Targeted Hygiene measures (hazard ratio [HR] 2.5; 95% CI 1.17, 4.91).

In getting the public to adopt a targeted approach to hygiene, one of the things that needs to be overcome is the extent of public misunderstanding about hygiene: what it is and how it differs from cleanliness. A 1998-2017 IFH survey of media coverage²⁷ suggests we still largely see hygiene as synonymous with cleanliness aimed at eradicating dirt – inappropriately regarded as the main source of harmful microbes.

In 2018, the Royal Society of Public health (RSPH) carried out an online poll of 2000 people in the UK.²⁷ A key objective was to determine how closely their understanding of hygiene risk aligns with Targeted Hygiene, i.e. do they target their hygiene practices in the places and at the times that matter most. For key moments such as handling food, using the toilet, coughing and sneezing, and caring for pets, actions were well or fairly well correlated with an understanding of the risk of not performing a hygiene action. However, in some cases respondents failed to understand what were the risky 'places/surfaces' likely to spread infection in these situations.

For example, there was relatively good awareness of risks associated with not washing hands after handling raw meat (76%) or after using the toilet (57%), which correlated with more than 70% of people saying they always did so at these important times. By contrast, only a relatively low number of people recognized the well-established risks of spread of infection via contaminated cleaning cloths (37%) and acted accordingly (22%). Additionally, although microbial risk assessment of nine key moments suggests floors are not a 'critical' surface for spreading harmful microbes, up to 64% thought that not using an antibacterial or disinfectant to clean the kitchen and bathroom floors was high/medium risk, and 62% reported always/often using disinfectant in these situations.

CONCLUSION

Currently, nearly 130 countries have finalized AMR national action plans, yet almost all focus has been on infection prevention in healthcare facilities, with limited reference to community settings.²⁸ As we have seen, controlling the spread of infections and resistant bacteria in hospitals cannot be achieved without concurrently implementing infection prevention strategies, such as Targeted Hygiene, in community settings.

As detailed in the GHC evidence-based report,¹⁶ extensive data supports the need for wider promotion of hygiene behaviour change in the community. This could significantly reduce the prescribing of antibiotics and prevent the spread of resistant bacteria.

However, promotion of hygiene behaviour change to enable us to tackle issues such as COVID-19 and AMR will not be effective alone. We must also work to change public understanding of hygiene and the need to adopt an evidence-based Targeted Hygiene approach, focusing on the times and places harmful microbes are most likely to spread.

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