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Clean hands reduce the burden of disease

Each day, more than 27 000 children under the age of five years die, mostly from preventable infections and almost all in countries with limited resources.¹ Three-quarters of these deaths occur in sub-Saharan Africa and south Asia; among the leading causes are pneumonia and diarrhoeal disease.

In today's *Lancet*, Stephen Luby and colleagues² report the effect of hand-hygiene promotion on childhood infectious diseases in a low-income population in Karachi, Pakistan. Fieldworkers visited at least weekly to distribute free soap and educate households, particularly mothers, to encourage handwashing. Control households were supplied with educational material for children that was unrelated to infectious disease prevention or hand-hygiene.

Soap and education decreased impetigo by 34%, diarrhoea by 53%, and pneumonia by 50%. Diarrhoea reduction³ was consistent with previous pooled estimates.⁴ Disease duration was shorter, thus probably reducing the duration of infectiousness for household contacts. Children were 56% less likely to consult a health-care practitioner for diarrhoea and 26% less likely to be hospitalised.³ The overall incidence of respiratory diseases was markedly reduced, especially during the winter. As expected, the more severe the malnutrition, the higher the incidence of diarrhoea and pneumonia; handwashing promotion was effective, with consistent decreases in the incidence of both diseases in all groups of children, independent of nutritional status. Plain and antimicrobial soap was also compared in the intervention

group: both were equivalent, consistent with previous reports.⁴

The effect of hand-cleansing with soap and water is biologically plausible.⁴ Although compliance with hand-hygiene practices was not directly measured, average soap use, a possible surrogate marker,⁵ increased more than three-fold.³ The water used for drinking and handwashing in these communities is heavily contaminated with faecal organisms,⁶ but hand-cleansing with soap improves mothers' hand cleanliness even when contaminated water is used⁷ or hands are dried on clothing.³ Clearly, direct contact between households is an important mode of transmission, even for diseases resulting partly from droplet transmission. Thus household hand-cleansing interrupts transmission of pathogens sufficiently to reduce diarrhoea and respiratory diseases in infants unable to clean their hands. A larger effect could have been expected if mothers had been encouraged to wash infants' hands.

Luby and colleagues' study was not powered to show a possible reduction in childhood mortality from diarrhoea or pneumonia. Preventing mild upper respiratory illness reduces the risk for subsequent lower tract infection and pneumonia, whether viral or bacterial in origin, or bacterial superinfection, a major complication of influenza and measles in low-income countries. Undoubtedly, reducing the incidence of pneumonia and severe diarrhoeal disease would save millions of lives on a larger scale, at least in high-risk populations.^{1,4} In Karachi, the death rate from diarrhoea³ was almost 80%

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Soap and water for all

lower than the diarrhoea-specific death rate for children in similar communities.⁸

Promotion of appropriate hand hygiene is complex.⁹ Successful promotion in health-care settings requires system change, education and motivation of caregivers, leadership, administrative support, and, in some instances, empowerment of patients.^{5,9,10} Multimodal interventions have more chance of success than programmes focusing on a single element and have sustained effects.^{5,9-11} The Karachi intervention was multimodal with intensive ongoing education and encouragement, distribution of free soap, and focused group discussion.

Cost-effectiveness and sustainability are important elements of any hand-hygiene promotion.^{5,11,12} As emphasised by Luby and colleagues, and observed for health-care workers,¹¹ changing hand-cleansing habits and behaviour takes time. The effectiveness of handwashing promotion on diarrhoeal diseases was only apparent after 8 weeks, but remained obvious later.³ Whether the behavioural change will last remains to be seen. The relatively low cost of soap in Karachi settlements (US\$0.17–0.25 a bar, around \$1 a week) should be viewed in the context that almost half the population studied had a weekly household income of less than \$15. Whether buying soap would be a priority over other vital items is unknown.

A limitation of the Karachi intervention is that it was done in settlements where access to water was not problematic.³ WHO's Water for Life 2005–2015

initiative¹³ makes access to water and sanitation an international priority, and effective alternatives to soap and water handwashing deserve further research.^{5,7}

Handwashing promotion raises the issue of the public-private partnership approach successfully used in The Central American Handwashing Initiative¹⁴ to reduce diarrhoeal disease in children. Hand hygiene is also an intrinsic part of three of the six targets of the US Institute for Healthcare Improvement's high-profile 100 000 Lives campaign.¹⁵ Clean Care is Safer Care is the slogan of the first Global Patient Safety Challenge, a core component of WHO's World Alliance for Patient Safety launched in 2004.¹⁶ The Challenge targets the prevention of health-care-associated infections worldwide and features hand-hygiene⁷ improvement as its major focus.

In Boston, hand cleansing decreases respiratory illness transmission at home in families with young children attending day care centres.¹⁷ In nurseries in developed countries, hand hygiene reduces respiratory and gastrointestinal diseases; in classrooms, the rate of absenteeism; in hospitals, morbidity, mortality, antimicrobial resistance spread, and use of health-care resources,^{5,10-12} and in Karachi and similar resource-poor settings, it might save lives.

The time has come to shout from the roof tops that hand-hygiene promotion should be a worldwide priority for public health and health care, and I call on policymakers, medical and nursing schools, chief medical and executive officers, and all health-care workers and community members with the potential to be a role model,¹⁸ to help highlight, support, prioritise, and fund research and intervention to improve hand-hygiene behaviour.

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I thank Florian Pittet for the photo. I declare that I have no conflict of interest.

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Abdominal injury due to child abuse

Abdominal injury in children might follow non-intentional trauma including road-traffic accidents, falls, and bicycle handlebar and lap-belt injuries. It can result from physical abuse, and after head injury, is the second most common cause of death. The incidence of inflicted injury in children with abdominal trauma ranges from 4% to 15%.¹ Earlier work has drawn attention to the range of abdominal injuries after abuse. Abdominal injuries include rupture or haematoma to hollow organs^{2–4} (stomach, small bowel, including duodenum and rectum), pancreatic injury⁵ and unexplained pancreatitis, solid-organ lacerations, or contusions (liver, spleen, kidney), and injury to major blood vessels (mesenteric vessels are especially vulnerable).

Because such cases are uncommon, published work consists of case reports or small series often focused on a particular type or pattern of injury. In today's *Lancet*, using the established methodology of the British Paediatric Surveillance Unit, Peter Barnes and colleagues from south Wales have assembled a cohort of 20 children over 2 years with abusive abdominal injury confirmed at a child protection case conference.⁶ Most cases, as with most life-threatening physical abuse, were aged under 5 years.

Barnes and colleagues used a comparison group, without a stated protocol to attempt exclusion of abuse, 112 children who sustained abdominal injury following a road-traffic accident and 52 after a fall. Most were older children who sustained solid viscus injury. This type of injury can also follow abuse, and falls are the most usual

explanation offered for abusive injury by carers. It would certainly be helpful, therefore, to know more about the fall group, especially the five cases with a gut injury. A review by Huntimer et al⁷ found no reports of falls on stairs resulting in small intestinal perforation. Conversely, no falls on stairs were identified as the cause in 312 cases of perforation of the small intestine, most being the result of motor-vehicle accidents and child abuse. However, the kind of fall in the comparison group is not specified.

The mortality of the abused group (30%) was lower in Barnes and colleagues' than in a study by Cooper et al (45%).⁸ Inclusion of pathologists and surgeons in the British Paediatric Surveillance Unit reporting system might have increased the numbers of (fatal) cases. Increased awareness and improved treatment might be factors, which explain the apparent improvement in mortality. Of six who died, four had a head injury. In some cases, a head injury may be the focus for concern in the acutely injured child leaving the abdominal injury unsuspected and undetected.

Clinical research into child maltreatment is poorly funded and difficult to do. Publication of details of individual cases, which assists clinicians in recognising and diagnosing such cases, is increasingly difficult. The child could be identified leading to legal action or reports to the General Medical Council. Consent for publication is unlikely as parents may be the perpetrators. Case-report style information of the clinical features was understandably not included by Barnes and colleagues.

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