

# Five-step hand hygiene programme for students with mild intellectual disability: abridged secondary publication

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## KEY MESSAGE

The simplified five-step hand-washing procedure is more effective than the World Health Organization seven-step hand-washing procedure in terms of improvement in hand-washing quality and absenteeism rate in children with mild intellectual disabilities.

Hong Kong Med J 2022;28(Suppl 3):S41-2

HMRF project number: 13121452

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## Introduction

School-age children with intellectual disabilities (ID) are more vulnerable to infectious diseases because of difficulties to follow procedures involving proper hand washing.<sup>1,2</sup> Frequent hand-to-mouth and close contact activities without proper hand washing place school-age children with ID at greater risk of acquiring infection.<sup>3</sup> Most school-age children with ID have limited cognitive ability to recognise their health problems, describe their symptoms, and express their needs to others. The Centre for Health Protection recommends that targeted hand hygiene programmes be implemented in special schools for children with ID to prevent the spread of infection in the early stages of an outbreak.<sup>3</sup>

Children in school settings are 18 times more likely to contract pathogens than those staying at home.<sup>4</sup> School-based hand-washing programmes are an important strategy to reduce the spread of illness.<sup>5</sup> The World Health Organization seven-step hand-washing procedure is commonly used in special education school settings.<sup>6</sup> We simplified it to a five-step procedure by rubbing palms and fingers at the same time and by eliminating the wrist-rubbing procedure. Thus, the five steps are rubbing (1) between fingers, (2) backs of hands, (3) backs of fingers, (4) fingertips, and (5) thumbs. We aimed to evaluate the simplified five-step procedure in terms of improvement in the quality of hand washing and reduction in school absenteeism in students with mild ID.

## Methods

This quasi-experimental pilot study used a pre-test and post-test design, with a control group and a sustainability test. It was conducted over 12 weeks from 26 February to 30 May 2014 and consisted of four phases: (1) programme development, (2) programme validation, (3) feasibility testing,

and (4) sustainability assessment (4 weeks post-intervention).

The simplified five-step hand-washing programme used multimedia visualisation teaching strategies. The World Health Organization seven-step hand-washing programme with standard teaching strategies was used as the control group.

Two special schools were selected based on convenience sampling. The schools were similar in terms of characteristics and socioeconomics. Neither school had ever participated in any simplified hand-washing programme. Both schools had full-time school nurses and only enrolled children with mild ID without any physical challenges. A total of 140 students with mild ID (70 students per school) was the recruitment target. The inclusion criteria were those aged 6 to 15 years with mild ID (IQ score of 50–69) who were able to follow simple instructions and understand the training materials. Exclusion criteria were moderate-to-severe ID (IQ score of  $\leq 49$ ) and inability to comprehend and remember the instructions and training materials.

A validated fluorescent stain rating test was used to quantitatively assess the quality of hand washing, with scores ranging from 0 to 3.<sup>7</sup> Direct observation of hand-washing practices was conducted by school nurses using a validated checklist. A sustainability assessment was conducted at 4 weeks after the completion of the programme. The 12-month absenteeism rate was acquired.

The Mann-Whitney *U* test was used to compare the outcomes between the intervention and control groups from pre-test to immediately post-test. For the sustainability assessment, the fluorescent stain ratings at immediately post-test and at 4 weeks after the completion of the programme were compared using the Wilcoxon Signed Ranks test. The efficacy of the programme in reducing school absenteeism was evaluated by comparing the one-year averaged sickness-related school absenteeism before and after

the intervention.

## Results

A total of 155 students (112 boys and 39 girls) aged 6 to 16 years with mild ID were recruited in the intervention (n=78) and control (n=73) schools. Both samples were matched.

In direct observation, by the end of the first 2 weeks, more students in the intervention school than in the control school (45% vs. 18%) were able to wash their hands spontaneously without prompting.

In the fluorescent stain rating test, students in the intervention school had a significant increase in the hand-washing quality from pre-test to post-test in terms of the dorsum and palm aspects in both hands: left dorsum (+1.05,  $P<0.001$ ), right dorsum (+1.00,  $P<0.001$ ), left palm (+0.98,  $P<0.001$ ), and right palm (+1.09,  $P<0.001$ ), with a greater overall increase compared with students in the control school (+1.03 vs +0.34,  $P<0.001$ ). Older students (secondary school form 1 to 3) performed hand washing better than younger students (primary school year 1 to 6) in the three time points.

In the sustainability test, 25 (32%) students in the intervention school were randomly selected at 4 weeks after the completion of the programme, the fluorescent staining rating of the 25 students at 4 weeks was not significantly different from that of the intervention group at immediately post-test in terms of the left dorsum (-0.04,  $P=0.82$ ), right dorsum (-0.06,  $P=0.67$ ), left palm (-0.08,  $P=0.72$ ), and right palm (-0.04,  $P=0.73$ ).

The intervention school had a significantly lower absenteeism rate than the control school in the same year ( $0.0167\pm 0.033$  vs  $0.028\pm 0.034$ ,  $P=0.04$ ).

## Discussion

Multimedia visualisation teaching strategies such as video modelling with visual prompts including lyrics and posters have been integrated into our simplified hand-washing programme.<sup>8,9</sup> Both the intervention and control groups had a significant increase in the hand washing quality from pre-test to post-test, with a greater increase in the intervention group ( $P<0.001$ ). This indicates that the programme is effective in enabling students with mild ID to learn proper hand-washing procedures. Our findings support the use of the simplified five-step hand-washing programme in students with mild ID in special school settings. Our findings have important implications for the prevention of infectious disease outbreaks in the early stages that are of concern to the public health sector.<sup>10</sup> Quantitative estimates of the efficacy of hand hygiene interventions and feedbacks from school nurse and teachers for programme implementation may inform resource allocation for infection prevention and control plans for the target schools, eventually benefiting the school community.

## Conclusions

The simplified five-step hand-washing procedure is more effective than the World Health Organization seven-step hand-washing procedure in terms of improvement in hand-washing quality and absenteeism rate in children with mild ID.

## Funding

This study was supported by the Health and Medical Research Fund, Food and Health Bureau, Hong Kong SAR Government (#13121452). The full report is available from the Health and Medical Research Fund website (<https://rfs1.fhb.gov.hk/index.html>).

## Disclosure

The results of this research have been previously published in:

1. Lee RL, Leung C, Tong WK, Chen H, Lee PH. Comparative efficacy of a simplified handwashing program for improvement in hand hygiene and reduction of school absenteeism among children with intellectual disability. *Am J Infect Control* 2015;43:907-12.

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