Reviewer's report

Title: Hand hygiene instruction decreases illness-related absenteeism in elementary schools: a prospective cohort study

Version: 1 Date: 22 July 2011

Reviewer: Mary-Louise McLaws

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This study reports a hand hygiene intervention in school for grades Pre-Kindergarten to Grade 8. The intervention is a random (on Grade within each school) to an active arm teaching with instructions bi monthly and a passive arm. Both arms receive hand sanitizer and soap and water and hand hygiene posters.

I would like to commend the authors for undertaking this important public health program and I have listed revisions to improve the manuscript:

Abstract – the abstract always has a word limit and it’s difficult for authors to give readers sufficient methodological information so they aren’t negatively critiquing it without opening the full manuscript:

1. Readers who are not from the northern hemisphere could be given in a few words why October to May were chosen (includes your influenza season, no long student breaks or whatever).

2. Inform the reader of the illnesses included in the rate (6th line of methodology change to something like ‘All absences were collected and only absences related to diarrhoea and influenza or ILI illness were used to establish rates’).

Background

3. Hands are one mode of transmitting infectious diseases others include saliva, droplet and airborne particle transmission (the latter two are especially important for respiratory disease transmission). Replace ‘the primary’ with ‘an important’.

4. Paragraph 2, sentence 2. provide references.

5. Paragraph 2, 3rd-4the sentence – “suggested to reduce” is not entirely informative given Nandruo-Bus found a significant (P=0.002) reduction (but not by gender) while Master et al results could not reach significance. The success or failure of interventions may be complex related to confounding as well as the intervention itself; we know it’s the alcohol in the ABHR that is the active agent that kills microorganisms and that some ABHR have a long acting action. In the 4th sentence studies using alcohol based hand rub (ABHR) have been lumped with handwashing (Guinan et al) and non alcohol based sanitizer (Dyer et al) without informing the readers of possible cause for the effect (i.e. non alcohol based sanitizer may be less effective in a larger trial than the action of washing with soap and water; there is strong evidence that ABHR is more effective than nonABHR). An important confounder is the incorrect use of ABHR when hands are visibly dirty or sticky as organic material on soiled hands prevents the active
agent of the ABHR to penetrate and kill microorganisms.

6. Paragraph 2, 2nd last line. Please modify as ABHR/sanitizers are not an alternative to handwashing when hands are soiled or sticky.

Methods

7. Move reference to Table 1 into Results.

8. In 1994 FDA reclassified benzalkonium chloride as tentatively safe and effective – has this changed? Can the authors give a brief explanation why ABHR was not used?

9. Figure 1 shows “When to Use Hand Sanitizers:” and illustrates ‘after using the bathroom’ which is in contradiction to the Methods on Page 5 last paragraph sentence in parenthesis) but importantly this is contraindication of correct use (sanitizers will not actively kill microorganism on dirty hands.

10. Were children instructed that it was not to be used on sticky/visibly soiled hands?

11. Figure 2 could be given as dot points in Methods or in a box in the Methods.

Statistical analysis

12. See results for potential confounding.

13. Incidence density: the rate of absenteeism is given as % of students. This assumes that at any one observation period (such as a month) the denominator is stable (which it may be with exception of influenza season). A superior method that adjusts for changes in the denominator (if there was a change by month) is to use incidence density for each reporting period using number of exposed days (ie total student days) to give a rate= number of absentees for the month/total number of student days for the month.

Results

14. Participant characteristics, 2nd and 4th sentences please reword “Data from grades... were not used in analysis...for a final sample of...” as this was not clear and the wording was unusual. Change “for a final” to “giving a final sample of”

15. The removal of 109 absences is a total of 12% which indicates a possible internal validity issue (possible selection bias is based on a rough rule of thumb of #2% loss). Please mention in the Methods if you examine these children to determine whether they are no different for potential biases such as English, ethnicity, length of absence, month of absence? If not please mention in the Conclusion this was a limitation.

16. Demographics are usually given to indicate potential confounders and generalizability. A variable is only a confounder when it fulfils 3 rules (roughly: not equally distributed between exposure groups; not part of the hypothesis; proxy or direct cause of the outcome). If you do not wish to control for confounding but wish to present the findings as being applicable to diverse schools then remove the totals in the Results (Table 2a/2b). Otherwise to aggregate the schools and present total (Both schools) you will first need to test for confounding and if it exists then controlled for it by simple stratification (and you cannot give a total
rate but leave as 2 distinct schools) or use a MLR (controlling for whichever is an important confounder e.g. ethnicity, low income and limited English) then you can present the results as a total. In addition, when comparing results within Walsh School across intervention/control arms limited English (21.2%) may be a confounder (not distributed between active/passive arms). Did you examined this variable as a potential confounder across the grades (this can be done using stratification by each potential confounders)? Did you check if ethnicity is a potential confounder within Alcott School.

17. Another important confounder is vaccination rate for influenza. Can you give vaccination coverage for the intervention/control arms and by school.

18. Figure 3 needs a legend.

Conclusion

19. Mention should be made of important limitation of the study; non alcohol based product used; students may have siblings at home who may be a source of infection. The antimicrobial action of non alcohol based sanitizers and ABHR are severely affected by the presence of organic material – could children with soiled/sticky hands have used the product.

20. In 1994 FDA benzalkonium chloride was tentatively classified as safe and effective – has this changed?

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**

'I declare that I have no competing interests'