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The Safe Home Care Project: Promoting the health & safety of the Home Care Workforce

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and
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Funded by
National Institute for Occupational Safety & Health (NIOSH)
Centers for Disease Control and Prevention (CDC)
Describe the Safe Home Care Project as a community resource for Safety in Home Care

Discuss safe cleaning and disinfection in home care and impacts on the health of clients and aides.
Safe Home Care Project

- Started in 2004,
- To protect & promote the occupational health & safety (OSH) of the home care (HC) workforce by:
  - Working with our community partners – home care industry, government and social services partners to:
    1. Assess the risks & benefits of a wide range of OSH conditions
    2. Develop & disseminate public health interventions
Safe Home Care
Research & Technical Assistance

- Needlesticks and other sharps, blood exposures
- Musculoskeletal strain
  - Preventing Low back injuries
- Infection prevention and respiratory health
  - Safe and effective cleaning & disinfection
- Safety
  - Preventing fire hazards
  - Slips, trips, falls
Demand for home care is growing and there is already a workforce shortage

- Most want to be cared for at home – aging in place
- HC jobs are among fastest growing occupations in U.S.

The work of home care is becoming more complex

- Advances in technology making complex care possible at home
- More living at home with multiple chronic illness
- Medicalization of home care
• **H & S increases recruitment and retention**
  • reducing turnover & training costs

• **HC aide & nurse safety is closely linked to client safety**
  • Safe sharps usage, storage and disposal
  • Home environmental air quality
  • Slip, trip, fall and other musculoskeletal strain prevention

• **Ability to deliver high quality care**
  • Ensuring continuity of care
  • Familiarity with the care plan
  • Good relationships, effective communication
Safe Home Care Survey on benefits and challenges to H&S

Quinn et al. AJPH 2009; OEM 2016

Method: Cross-sectional Survey

Study population of HC aides: n=1,249

- Agency-employed aides (n=634)
- Client-hired aides (n=615)

HC visits collected: n=3,484
Home care aides report high job satisfaction & benefits of work organization

<table>
<thead>
<tr>
<th>Job satisfaction</th>
<th>All Aides n=1249</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree</td>
</tr>
<tr>
<td></td>
<td>n</td>
</tr>
<tr>
<td>I get the respect I deserve</td>
<td>1064</td>
</tr>
<tr>
<td>My work contributes to improving client’s health</td>
<td>1117</td>
</tr>
<tr>
<td>I would recommend this job to a friend</td>
<td>1094</td>
</tr>
<tr>
<td>I probably or definitely will NOT leave my job</td>
<td>1035</td>
</tr>
<tr>
<td>I continue to work in my current job because:</td>
<td></td>
</tr>
<tr>
<td>I enjoy caring for others</td>
<td>1069</td>
</tr>
<tr>
<td>I have a flexible work schedule</td>
<td>781</td>
</tr>
<tr>
<td>I can work independently</td>
<td>747</td>
</tr>
</tbody>
</table>
# Infectious Agents, Cleaning & Disinfecting Chemical Use

**Most Recent Visits (N = 3,484)**

<table>
<thead>
<tr>
<th>Infectious Agents</th>
<th>Cleaning &amp; Disinfecting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feces</td>
<td>Clean Bathroom/kitchen 80%</td>
</tr>
<tr>
<td>Incontinence</td>
<td>Bleach Use 25%</td>
</tr>
<tr>
<td>Infectious Disease</td>
<td>Ammonia use 8%</td>
</tr>
<tr>
<td>Pet Waste</td>
<td></td>
</tr>
<tr>
<td></td>
<td>10%</td>
</tr>
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</table>
**Examples of Product Ingredients with respiratory hazard potential**

Focus Groups, Markkanen et al. 2015

- **Sensitizers**
  - quaternary ammonium compounds (benzalkonium chloride)
  - amine compounds, and
  - Fragrances

- **Irritants**
  - bleach (sodium hypochlorite)
  - hydrochloric acid
  - alkaline agents (ammonia and sodium hydroxide)
1. Are “Green” C&D products better for respiratory health than bleach, other conventional products?

2. Are “Green” C&D products effective in removing harmful microorganisms in the home?
Safe HC Microbiology Study in 46 Homes

- Measure bacteria and biological soil
  - *Total Count*
  - *Staphylococcus aureus*: MSSA and MRSA strains
  - *Clostridium difficile* (C. diff) identification

- on common eight household touch points
  - Kitchen (4): sink, counter, faucet, floor
  - Bathroom (4): tub/shower, faucet, toilet seat, floor

- Determine how effective conventional and “green” (environmentally-friendly) cleaners are at reducing the micro-organisms and soil
ATP Bioluminometer:
To measure organic soil
Safe HC Microbiology Study:
Sampling Procedure
Safe HC Microbiology Study: Main findings

- Both products removed micro-organisms including *Staphylococcus aureus* from sampled surfaces.

- Bleach-containing product removed somewhat more soil:
  - Statistically significant for only 1 surface.

- *Staphylococcus aureus* found in seven homes (out of 46):
  - One strain methicillin resistant (MRSA)
  - Six strains methicillin susceptible (MSSA).

- *Clostridium difficile* was found in one home on the 1st visit but not on the 2nd visit.
While the need for C & D is increasing, many products also can cause respiratory illnesses, including asthma.

- Increased asthma & other respiratory illnesses have been documented among healthcare workers, home care aides & domestic cleaners.

Quinn, Henneberger & NIOSH NORA Working Group, AJIC 2015
Simulated Bathroom in exposure assessment lab
Air monitoring during cleaning
Chlorine gas exposure profile during a typical cleaning session with bleach product (1-5% sodium hypochlorite)

Lindberg et al. in preparation

![Chlorine exposure profile: participant 15 (1st 20 minute session)](chart.png)
65% of aides conducted a bathroom cleaning session where the airborne chlorine exposure exceeded the OSHA ceiling limit.

Lindberg et al. in preparation
C&D Conclusions

- Common C&D products are complex mixtures of volatile organic compounds
  - Airborne concentrations after typical home cleaning can exceed indoor environmental quality guidelines

- Typical home care C&D practices using a spray product containing bleach (1-5% by weight sodium hypochlorite) can produce over-exposure to chlorine, a respiratory irritant

- Other respiratory irritants found

- Green cleaner generated fewer airborne irritants, lower concentrations
Cleaning Tips for Clients with Asthma or Allergies

In-service training curriculum for home care aides
Thank you from the Safe Home Care Team!
Please visit our website: http://www.uml.edu/safehc
Major Article

Cleaning and disinfection in home care: A comparison of 2 commercial products with potentially different consequences for respiratory health

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Background: Home care aides perform personal care and homemaking services in client homes, including cleaning and disinfection (C&D). Although C&D are performed to remove soil and dirt, they are increasingly performed for infection prevention. Major C&D products contain respiratory irritants. The study compared two commercial products for C&D effectiveness on common household surfaces in senior homes.

Methods: Two C&D visits were conducted in 46 senior homes. One visit applied a bleach-containing cleaning product and the other applied an environmentally preferable product. Before and after C&D, the study team performed microbiological measurements on surfaces and collected soil and wipes samples for total bacterial counts, Staphylococcus aureus, and Clostridium difficile identification.

Results: Both products removed macroorganisms from tested surfaces. 2 strains of Staphylococcus aureus and Clostridium difficile were isolated. Both products removed 85% or more of soil and environmental contaminants, although results were statistically significant for only 1 surface.

Conclusions: The study showed similar, nonidentical, C&D performance for 2 cleaning products with potentially different consequences for respiratory health. Additional research is needed to develop robust recommendations for safe, effective C&D in home care.

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Safe HC Microbiology study publication available open access at:
http://www.ajicjournal.org/article/S0196-6553(17)31139-2/fulltext
Respiratory health effects measurements

Spirometry,
Symptoms Questionnaire
and eNO
Airborne Exposure Monitoring

**Quaternary Ammonium Compounds**
- High airflow sampling pump (5-15 ml/min)
- Samples for Quats
- 37 mm Cassette, Teflon (PTFE) filter

Leland Legacy Pump (SKC)

**Total Volatile Organic Compounds (TVOC)**
- Photoionization Detector (PID)
- 10.6 eV lamp
- Resolution: 1 ppb
- Measures TVOC
- Datalog
- Response time 3 secs

**Dräger Pac® 7000**
- Electrochemical Sensor
- Selective to Cl₂ gas
- Resolution: 10 ppb
- Portable
- Datalog (10 secs)

**Entech Canister**
- 450 ml Silonite® coated MiniCans™
- Allows recovery of VOCs with GC-MS
- Very low detection limits
- Integrated Flow Controller-cc/min

20 Volatile Ingredients

**Leland Legacy Pump (SKC)**

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20 Volatile Ingredients
C& D Research in Progress

Airborne C&D Exposure assessment
- Quantify exposure to 20 ingredients
- Exposure-response analysis

Microbiology Assessments
- In lab: Goodyear et al., J Applied Microbiology, 2015
- In elder housing: Goodyear et al. AJIC 2017
TVOC Concentrations during cleaning with 3 C&D products & water

TVOC exposure profile: participant 15 (1st 20 minute session)

- Tub/Shower
- Toilet
- Sink
- Survey

10 second average TVOC (ppb, isobutylene equivalents)

Elapsed time (min:sec)
Cleaning efficacy

(% of soil removed)

Similar for Bleach and Green cleaner.
Do-it-yourself (DIY) product did not perform as well.

Goodyear et al., J Applied Microbiology, 2015.
Disinfection efficacy

Removal of E coli (light grey) and S. aureus (dark grey) was similar using Bleach & Green cleaner. Do-it-yourself (DIY) product did not perform as well.

Goodyear et al., J Applied Microbiology 2015.