

A program of research in progress:

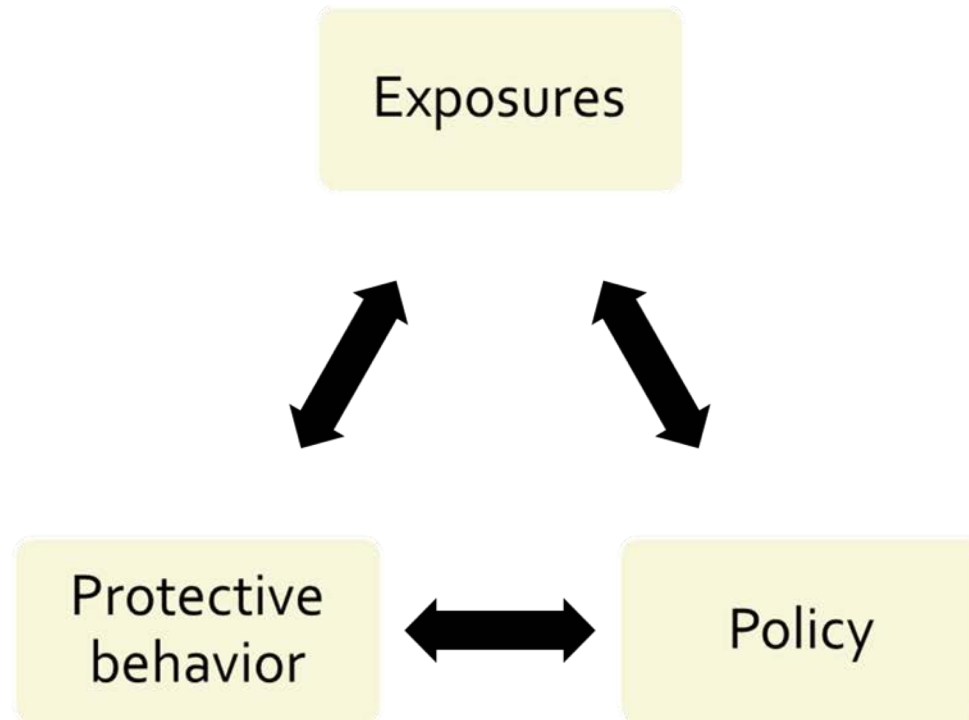
# **Understanding and minimizing occupational and environmental exposure to carcinogens**

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**Duke University School of Nursing**  
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# My background

- BS in Community Health Education, Spanish language and literature concentration, CHES- University of Maryland
- MPH in Health Behavior and Health Education, Gillings School of Global Public Health, University of North Carolina at Chapel Hill (UNC)
- ABSN- UNC
- 13 years of clinical and administrative experience in inpatient hematology/oncology- UNC
- PhD with an oncology cohort- University of Utah
- Postdoc focused on interventions- UNC
- Assistant Professor- Duke University School of Nursing

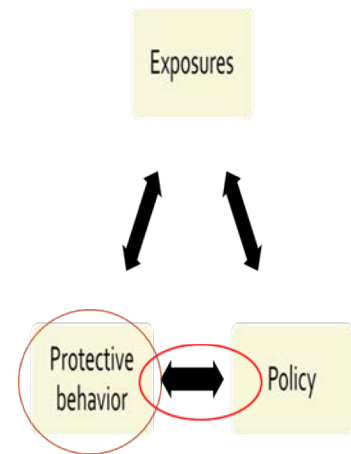
# Framework for my program of research



# Pesticide protective behaviors of Latino migrant and seasonal farmworkers

Aim 1: Compare and contrast **observed and reported behaviors** of Latino migrant and seasonal farmworkers to those mandated to be taught in EPA's Worker Protection Standard

Aim 2: Identify Latino migrant and seasonal **farmworkers' perceived barriers and strategies to counter barriers** to using the behaviors mandated to be taught in EPA's Worker Protection Standard



Funded by: ACS Doctoral Degree Scholarship in Cancer Nursing, T32 Pre-doctoral Interdisciplinary Training in Cancer, Caregiving, & End-of-Life Care, Jonas Nurse Leader Scholarship, Frederick Lawson Scholarship (Utah)





# Findings: Observed vs. Self-Reported Behavior (Mandated)

Behavior	All of the time Yes	Some or most of the time Sometimes	Never No	Wilcoxon test
<b>Clothing</b>				
<b>Wearing closed shoes * 3 type</b>				
Observed	65	6	0	-.378 (p=.705)
Reported	66	5	0	
<b>Wearing socks **</b>				
Observed	11	0	2	.000 (p=1.00)
Reported	70	1	0	
<b>Wearing long sleeves</b>				
Observed	<b>64</b>	6	1	<b>-2.197 (p=.028)</b>
Reported	<b>69</b>	1	1	
<b>Wearing long pants</b>				
Observed	70	1	0	-1.414 (p=.157)
Reported	71	0	0	
<b>Washing</b>				
<b>Washing hands before eating***</b>				
Observed	7	0	34	<b>-4.768 (p=.000)</b>
Reported	<b>65</b>	4	2	
<b>Washing face before eating</b>				
Observed	0	0	41	<b>-4.542 (p=.000)</b>
Reported	<b>46</b>	15	10	
<b>Washing hands before drinking****</b>				
Observed	0	7	62	<b>-4.064 (p=.000)</b>
Reported	<b>41</b>	15	15	
<b>Washing face before drinking</b>				
Observed	0	0	69	<b>-1.896 (p=.058)*****</b>
Reported	<b>31</b>	18	22	



# For more information about this study...

**Walton, A. L.,** LePrevost, C., Wong, B., Linnan, L., Sanchez-Birkhead, A., & Mooney, K. (2016). Observed and self-reported pesticide protective behaviors of Latino migrant and seasonal farmworkers. *Environmental Research*, 147, 275-283.

**Walton, A.L.,** LePrevost, C., Wong, B., Linnan, L., Sanchez-Birkhead, A., Mooney K. (2017). Pesticides: Perceived threat and protective behaviors among Latino farmworkers. *Journal of Agromedicine*, 22(2):140-147.

**Walton, A.L.,** LePrevost, C.E., Linnan, L., Sanchez-Birkhead, A., Mooney K. (2017). Benefits, Facilitators, Barriers and Strategies to Improve Pesticide Protective Behaviors: Insights from Farmworkers in North Carolina Tobacco Fields. *International Journal of Environmental Research and Public Health*, 14 (7):E677.

# Working with outreach workers and farmworkers to improve handwashing.



Researchers



Outreach Workers



Farmworkers





# Development of a handwashing educational toolkit

Focus groups & web-based surveys with farmworker health outreach workers



Contains pesticide residue activities using fluorescent tracer

One-on-one and group discussion questions

Trainers' guide in English and Spanish detailing the learning objectives, supplies needed, and step-by-step instructions

**Walton, A.L.**, LePrevost, C., Thomas, G., Rockers, M.J., & Lipscomb, A. (2019). A Handwashing Educational Toolkit: The Product of a Dynamic Partnership among a Student, Faculty Member, and Community Organization. *Journal of Higher Education Outreach and Engagement*, 23(2): p.108-116

Funded by: North Carolina Farmworker Health Program

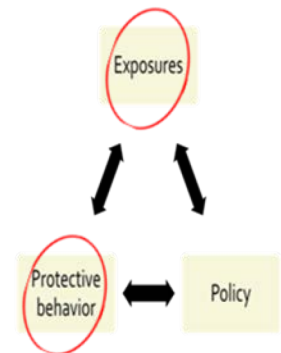
# Next steps- toolkit evaluation

Community partner-led user satisfaction survey

Researcher-led measurement of pesticides on hands

Can we measure pesticides on farmworkers' hands using hand wipes?

Does washing hands decrease the amount of pesticides we measure?



Funded by: Southeast Center for Agricultural Health and Injury Prevention (CDC-NIOSH)

# Data collection- Fall 2019



Participants wiped the whole hand with a sponge moistened in alcohol and then wiped each finger and the palm of the same hand with a second sponge

Both sponges were placed in the same jar for storage and analysis



# Field work-Practical Challenges

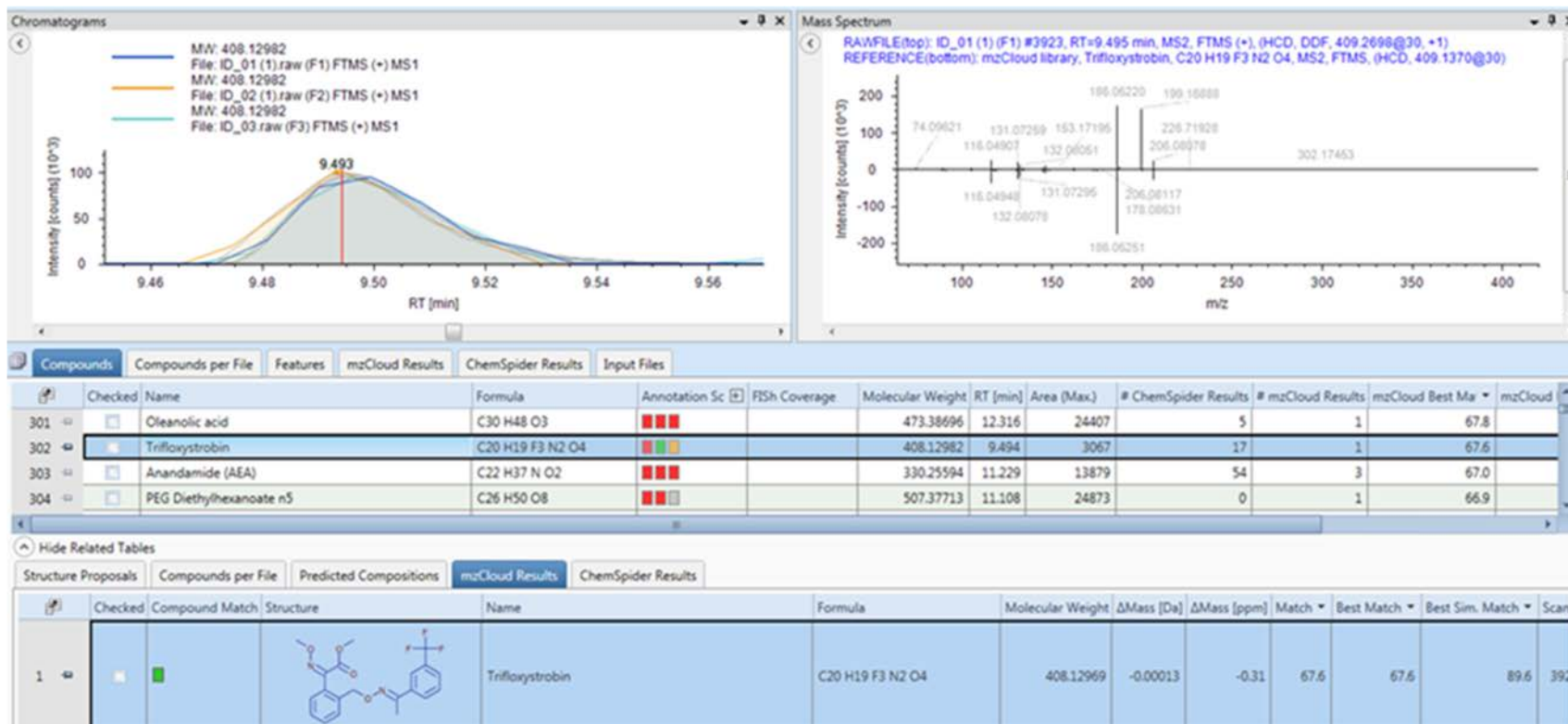
Difficulty wetting sponges with alcohol in high heat

Contamination of sponges due to wind, dust

Excessive amount of time required to prepare sponges in field



# We are still learning what pesticides are on farmworkers' hands





# Next steps

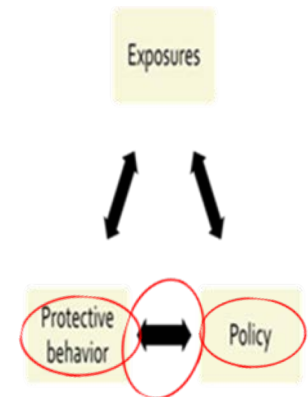
- Complete measurement of pesticides on hand wipe samples we have already collected
- Use hand wipe samples to measure differences in pesticide levels for farmworkers who have been trained using the toolkit and those who have not

# A different path



# How I became involved in this work

- Clinical Nurse IV in Oncology Clinical Practice Group
- Reviewed hospital policy regarding safe handling of hazardous drugs; worked to make changes
- **Walton, A. M.**, Mason, S., Busshart, M., Spruill, A., Cheek, S., Lane, A., Sabo, K. & Taylor, A. (2012). Safe handling: Implementing hazardous drug precautions. *Clinical Journal of Oncology Nursing*, 16(3), 251–254. PMID: 22641316
- Invitation to work on state policy NC HB644
- Legislation passed 2014
- Nursing representative to NCDOL for 1 year
- National Congressional briefing
- So many questions emerged!





# Antineoplastic drug exposure

- **Acute effects-** skin rashes, allergic-type reactions, hair loss, nausea
- **Adverse reproductive outcomes-** congenital malformation, miscarriage, sub-fertility
- **Cancer risk**



# Postdoctoral Fellowship Study

Exploratory, multi-method study utilizing observation, verbally-administered questionnaires, and interviews.

NAs are willing to participate in research

There is room for improvement in the PPE used by NAs when handling AD contaminated excreta (Observed use of double gloving, chemotherapy gowns, and face shields was low; use of plastic-backed pads when flushing excreta was high)

NAs have insights to improve training, education, and use of PPE in the workplace.

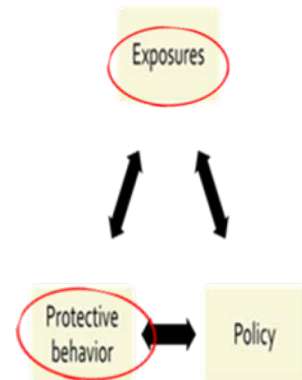
\***Walton, A.L.**, Kneipp, S., Linnan, L., Asafu-Adjei, J., Douglas, C., Leff, M. & Rogers, B. (2019). Nursing Assistants' Use of Personal Protective Equipment Regarding Contact with Excreta Contaminated with Antineoplastic Drugs. *Oncology Nursing Forum*, 46(6): 689-700.

Funded by: T32 Postdoctoral Fellowship in Interventions to Prevent and Manage Chronic Illness, North Carolina Occupational Safety and Health Education Research Center Pilot Grant (CDC- NIOSH)

# Examining surface contamination with antineoplastic drugs in inpatient oncology: a pilot study (1/18-12/18)

Aim 1: Describe inpatient oncology surfaces most contaminated with antineoplastic drugs

Aim 2: Characterize staff personal protective equipment (PPE) use and factors that influence its use



\***Walton, A.L.**, Bush, M., Douglas, C., Allen, D., Polovich, M., Spasojevic, I. (2020). Surface Contamination with Antineoplastic Drugs on Two Inpatient Oncology Units. *Oncology Nursing Forum*, 1; 47(3):263-272. PMID: 32301937

Funded by: DUSON CNR pilot

# Study overview

Unit 1: Inpatient Medical Oncology

Unit 2: Inpatient Bone Marrow Transplant

Invited nursing staff to take a survey N=28

Sampled 2 rooms/unit where patients were receiving cyclophosphamide and/or etoposide (samples=34)

Sampled shared areas where PPE use was not expected, did these twice (samples= 36)

Samples per unit=70

Total= 140

# Measures

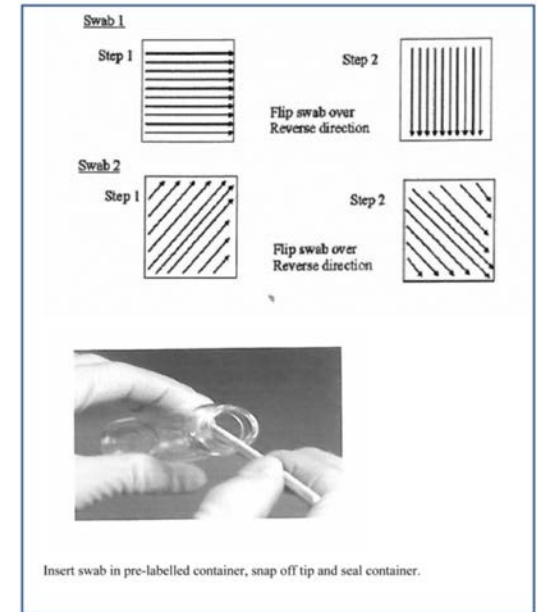
Adapted version of “PPE Use and Predictive Factors Survey”

Two swabs

methanol/ acetonitrile/ water solution  
wiped horizontally and vertically

average SA=180cm<sup>2</sup>

Analyzed by liquid chromatography-mass spectrometry



# How many samples were detectable/quantifiable?

	Cyclophosphamide n=140			Etoposide n=139		
	Shared n=72	Room n=68	Overall	Shared n=72	Room n=67	Overall
<b>ND</b>	27%	15%	21%	72%	35%	54%
<b>D</b>	22%	13%	18%	18%	13%	16%
<b>D&amp;Q</b>	51%	72%	61%	10%	52%	30%



# What were those levels?

Level ng/cm <sup>2</sup>	Cyclophosphamide n=86	Etoposide n=42
	D&Q	D&Q
0 – 0.05	74%	81%
0.05-0.1	6%	12%
>0.1	20%	7%

# Most contaminated areas in patient rooms

Rank	Cyclophosphamide	Etoposide
#1	Toilet seat*	Toilet seat
#2	Remote control	Floor below IV pole
#3	Toilet seat	Toilet seat*
#4	IV pole	Floor below IV pole
#5	Doorknob to restroom	Doorknob to restroom

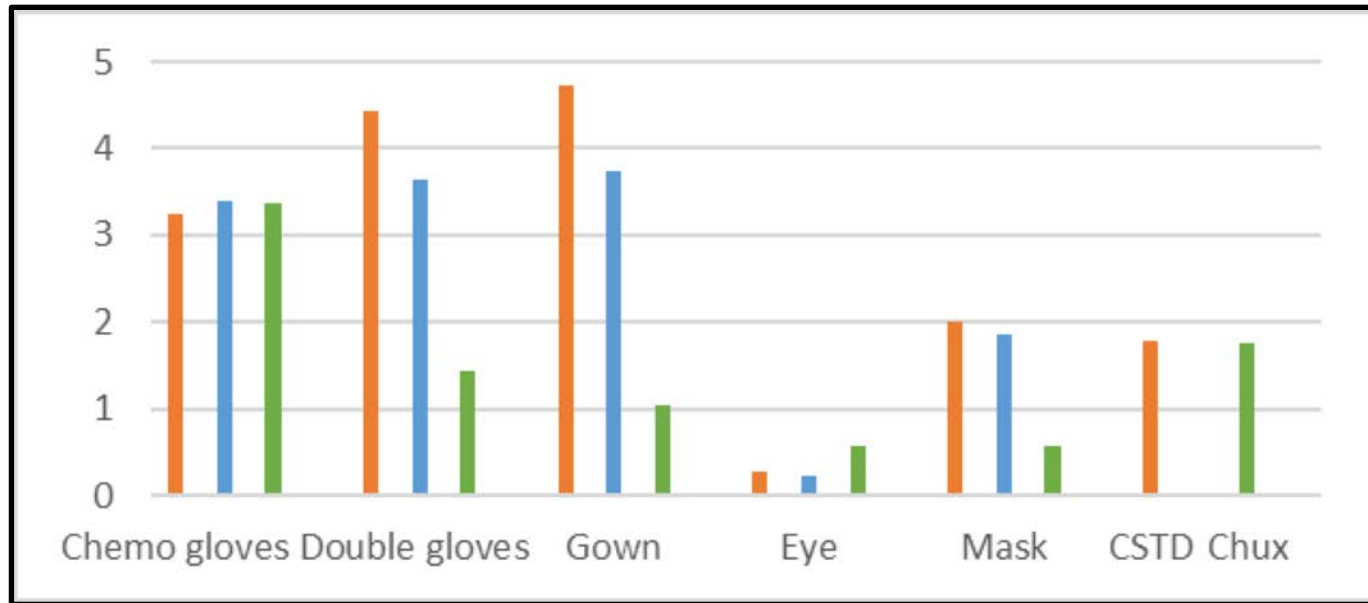
\*same toilet in same room

# Most contaminated areas in shared areas

Rank	Cyclophosphamide	Etoposide
#1	Floor near common desk	Floor in front of pharmaceutical waste bin
#2	Floor near entry staff locker room**	Med fridge handle
#3	Floor in front of pharmaceutical waste bin	Common phone
#4	Floor near entry to break room	Floor in personnel lounge/bathroom
#5	Floor near entry staff locker room**	Floor near entry to break room

\*\* same location, 2 different days

# Aim 2: Describe PPE use



0	Never
1	1-25%
2	26-50%
3	51-75%
4	76-99%
5	Always

Administration

Chemotherapy Waste Disposal

Handling Excreta

# Exploratory: Is PPE use related to these predictive factors?

- Workplace safety climate is the only factor moderately associated with PPE use ( $r=0.46$ ,  $p \leq 0.05$ )
- There were no relationships on Unit 1
- PPE use was significantly positively related to self-efficacy ( $0.59$ ,  $p \leq 0.05$ ) and workplace safety climate ( $0.82$ ,  $p \leq 0.05$ ) on Unit 2



# Some interesting findings

- Levels of contamination on toilet seats; implications for patient and family education
- No CSTD in use; some respondents reported use during administration
- Workplace safety climate matters
- In 1/3 of the patient administration surfaces tested in which the patient received only one drug of interest, the other drug was found (17/51); implications for cleaning.

# U.S. Pharmacopeia (USP) General Chapter <800> enforceable 12/1/19

Information about “standards for safe handling of hazardous drugs to minimize the risk of exposure to healthcare personnel, patients and the environment”

–Population

Standards are for “all healthcare personnel who receive, prepare, administer, transport or otherwise come in contact with hazardous drugs ....”

# What's in USP <800>?

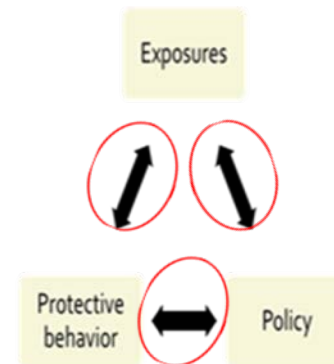
- Personnel and practices
- Receiving/storage
- Compounding environment
- Compounding processes/procedures
- Spills/cleaning/disposal
- Medication administration and protective equipment

# More USP <800> recommendations

- Baseline and routine surface wipe sampling as a measure of containment\*
- Preparing for costs, anticipating resources
- Medical surveillance
- Alternative duty
- Hazardous drug working group/ HD compliance officer

# NIOSH R21 (resubmission) USP <800> focus

- What impact does extent of implementation of USP <800> have on surface contamination?
- **Aim 1. Identify USP <800> practices associated with the lowest extent of surface contamination.**
- **Aim 2. Identify workplace safety climate and activity-specific PPE use practices associated with the lowest extent of surface contamination.**



# One impact of COVID-19

Exposures



Protective  
behavior



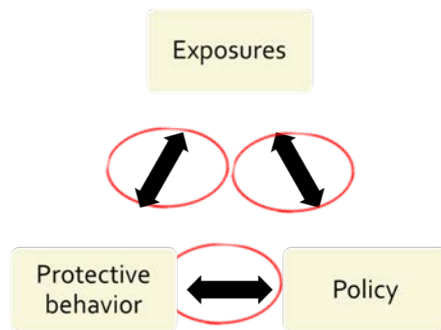
Policy

- ONS published interim guidelines for PPE use related to supply challenges during COVID-19
- Did these guidelines and/ or public awareness of PPE use change contamination levels in the two oncology units?
- Re-sampling all 140 inpatient surfaces, second survey of staff (application NC OSHERC)
- Data to inform intervention focused on PPE



# Duke Cancer Institute Pilot 2021-2022

Examining occupational exposure risks and the efficacy of toilet seat covers and routine discharge cleaning in minimizing antineoplastic drug contamination



# Specific Aims of DCI Pilot:

1. Test whether plastic backed pads over the toilet while flushing (experimental condition) are more efficacious than regular flushing (control condition) in minimizing AD contamination on toilet seats and on other bathroom surfaces
2. Explore and test the efficacy of the current discharge cleaning method and agents to remove AD contamination from toilet seats and other bathroom surfaces.

# Duke School of Medicine Core Facility Voucher Grant 2021

## Using Silicone Wristbands to Assess Nurses' Exposure to Antineoplastic Drugs: A Feasibility Study



- 1) Is wearing a silicone wristband acceptable to nurses?
- 2) Can silicone bands detect four antineoplastic drugs [ADs] to which the nurses were exposed?

# Translation of Research to Practice

ONS/HOPA Joint Position statement safe handling of hazardous drugs:

<https://www.ons.org/sites/default/files/2019-08/Safe%20Handling%20Aug%202019.pdf>

Q& A: [https://www.ons.org/sites/default/files/2020-03/ONS\\_HOPA\\_ToiletFlushing.pdf](https://www.ons.org/sites/default/files/2020-03/ONS_HOPA_ToiletFlushing.pdf)

Safe Handling Chapter in Chemotherapy and Immunotherapy Guidelines and recommendations for Practice, 2<sup>nd</sup> Edition

Co-Editor 4<sup>th</sup> Edition Safe Handling of Hazardous Drugs text for ONS

# Questions



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