

Facial Protective Equipment use by home care providers during the COVID-19 pandemic

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To Prevent Influenza!

Do not take any person's breath.
Keep the mouth and teeth clean.
Avoid those that cough and sneeze.
Don't visit poorly ventilated places.
Keep warm, get fresh air and sun-
shine.
Don't use common drinking cups,
towels, etc.
Cover your mouth when you cough
and sneeze.
Avoid Worry, Fear and Fatigue.
Stay at home if you have a cold.
Walk to your work or office.
In sick rooms wear a gauze mask
like in illustration.

Review of the literature

- Studies of FPE use by health care workers – CINAHL & MEDLINE
 - (“compliance or adherence”) AND
 - (“personal protective equipment” or “facial protective equipment” or “masks” or “respiratory protection” or “N95 respirators” or “eye protection” or “universal precautions” or “ routine practices”)
- Screening Criteria
 - Pertain to the use of FPE (eye protection, masks, respirators)
 - By health care providers (doctors, nurses, paraprofessional care providers, therapists and dieticians)
 - Published in English from 2005 – May 2021
- 74 articles met our criteria

Reported rates of adherence vary by context

- Outpatient medical centres, primary care in North America & the UK
~20-29% self-reported adherence (Ward 2006, Turnberg 2008, Wise 2011)
- North American & UK Hospitals
<50% - 62% self-reported adherence (Chor 2012, Nichol 2013, Rozenbojm 2015, Kinlay 2015)
- Hong Kong, Taiwan, Singapore hospitals
~70-96% self-reported mask adherence (Chor 2012)
up to 97% mask adherence with direct observation (Chiang 2008, Chau 2010).
50% eye protection compliance with direct observation (Chau 2010)

High-ID contexts

- Hospitals with infectious disease specialty & expectation
 - 94-94% adherence to N95s in Brazil TB hospitals (Galdino, 2015; da Silva, 2015)
 - 100% adherence to N95s and Eye Protection by HCWs working with MERS patient in Thailand Infectious disease Institute (Wiboonchutikul 2016)
- Epidemics
 - H1N1 – Thai HCWs interacting with patients suspected to have H1N1 ~74% mask adherence (Chokephaibulkit 2013)
 - SARS (Shigayeva 2007)
 - 77% overall FPE compliance by Canadian HCPs with patients with SARS
 - 94% respiratory protection adherence; 74% eye protection adherence
 - Adherence improved as epidemic progressed: 35% of shifts in March to 97% in June

COVID-19 Pandemic

Near-perfect adherence

- To masks – Hong Kong (100%), Oman (97%), hospitals (Wong 2020, Al Abri 2021)
- To mask and/or face shield use - Nigeria hospitals & primary care (99%) (Okoi 2021)
- To masks/respirators and eye protection Saudia Arabia & Italian hospitals (Albaqawi 2021, Ippolito 2021)

Mixed adherence

- UAE hospitals: 78% adherence to masks; 51% to eye protection (Bani-Issa 2021)
- US Healthcare Institutions: 42-86% adherence to PPE, depending on state and activity (Darwish 2021)
 - Hospital OR FPE Adherence - Q1, 2020: 83% (audits); Q2, 98%; Q3, 57% (pts COVID-tested before procedures (Sartori 2021).
- Ethiopia: hospital had 67% mask adherence seeing clients (*76% had one available*) (Hailu 2021); across both hospitals & health centers, 35% adherence to masks; 15% to eye protection (Atnafie 2020)
- Congo hospitals ~50% wearing masks consistently; ~54-56% when caring for patient with respiratory symptoms (Michel-Kabamba, 2020)

Organizational Factors Promoting Adherence

- **Ready access to required FPE** (Chiang 2008, Mitchell 2012, Hu 2012, Nichol 2013, Zelnick 2013, Rozenbojm 2015, Adams 2020, Barratt 2020, Al Abri 2021)
- **Training and clarity on policy regarding FPE use** (Ward 2006, Shigayeva 2007, Turnberg 2009, Martel 2013, Nichol 2013, Zelnick 2013, Seale 2015, Waheed 2017, Fix 2019, Barratt 2020, Chughtai 2020, Al Abri 2021)
- **Organizational support for health & safety, including**
 - **staff perceptions of organizational, supervisory & peer support** (Ward 2006, Turnberg 2009, Nichol 2013, Fix 2019, Barratt 2020)
 - **positive communication practices surrounding health & safety** (Ward 2006, Nichol 2013, Rozenbojm 2015)
 - **role modeling & instructional feedback from supervisors & management** (Ward 2006, Turnberg 2009, Hu 2012, Woith 2012, Seale 2015, Zinasta 2018)
 - **Support for changing work practices** (Brouwer 2014)

Individual factors

- Role – generally nurses report higher compliance than doctors (Turnberg 2009, Mitchell 2012, Chor 2012) but not in all contexts (Michel-Kabamba 2020)
- Tenure in role – greater experience tends to increase compliance (Mitchell 2012, Rozenbojm 2015, Bani-Issa 2021)
- Race/ethnicity (Adams 2020)
- Frequency of FPE use (Nichol 2013)
- Positive attitudes toward FPE use, including feeling protected by it (Yang 2011, Hu 2012, Mitchell 2012, Martel 2013, Chughtai 2016, Fix 2019, Barratt 2020)
- Risk perception (Shigayeva 2007, Seale 2015, Brouwer 2014, Chapman 2017, Zinatsa 2018, Sartori 2021)
- Absence of personal barriers
 - Comfort* (e.g. fit, heat) – (Baig 2010, Mitchel 2012, Martel 2013, Zelnick 2013, Brouwer 2014, Chughtai 2016, Fogel 2017, Barratt 2020, Chughtai 2020, Prakash 2020)
 - Visual clarity (Bryce 2008, Barratt 2020, Chughtai 2020, Prakash 2020)
 - Interference with care (Chughtai 2020, Hines 2020)

Application to home care?

- Existing literature has strong focus on hospital environments
- Only one study (Adams 2020) focused on home care
 - survey of 353 US home care nurses, pre-pandemic
 - High overall level of IPC adherence (88%) – lowest for eye protection (69%)
 - Supply availability was positively associated with adherence.
 - More in-home barriers (clutter, dirty environment, poor patient hygiene) were negatively associated with adherence

Determinants of home care nurse's and PSWs' adherence to FPE use

A Wave 2 snapshot



To explore factors influencing FPE adherence ...

- In home care
- By PSWs and nurses
- In the context of the COVID-19 pandemic

Adapt existing facial protection questionnaire



Pilot test questionnaire with home care PSWs & nurses



Pilot study at one agency



Multi-agency study



Adapt existing
facial protection
questionnaire



Pilot test
questionnaire with
home care PSWs &
nurses



- Simplify language
- Focus on droplet transmission to match public health advice & education
- Briefest possible consent form

Questionnaire Items

Adherence to
recommended FPE use
(6 questions)

Demographics & work
patterns
(15 questions)

Individual factors:
knowledge, exposure
history, risk perception,
personal barriers
(42 questions)

Environmental factors:
availability, convenience,
media coverage
(8 questions)

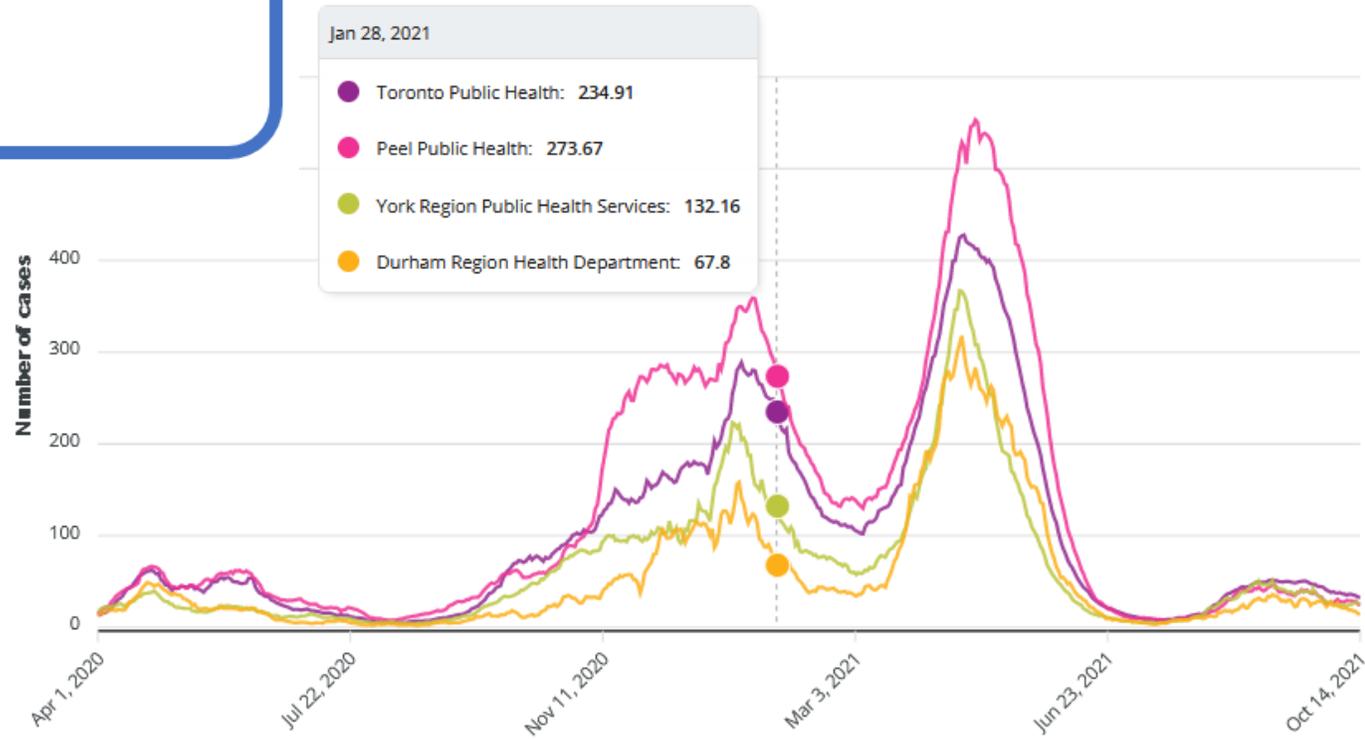
Organizational factors:
support for H&S, job
hinderances, training,
communication
(23 questions)

Other comments?

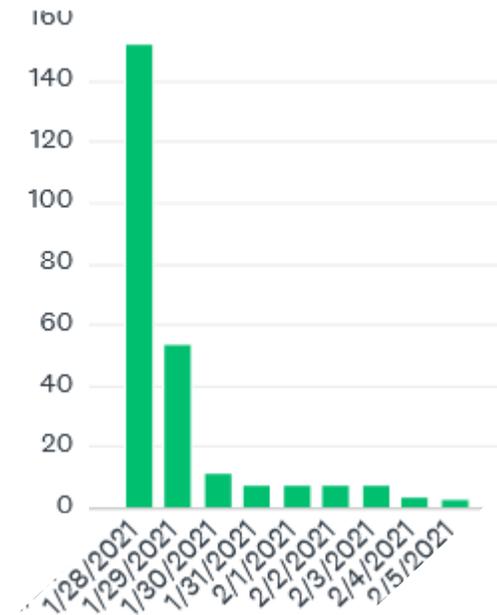
Pilot study at one agency



Cases per 100,000



259 providers started the survey; 199 completed it



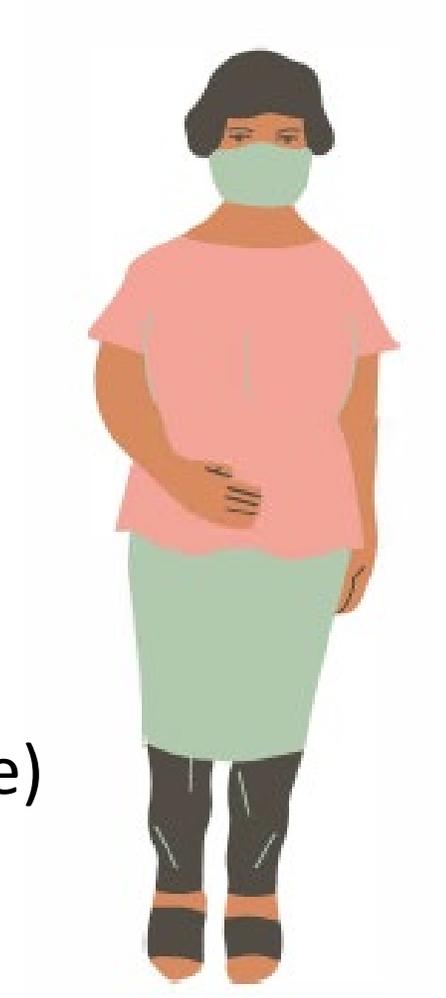
Pilot study at one
agency



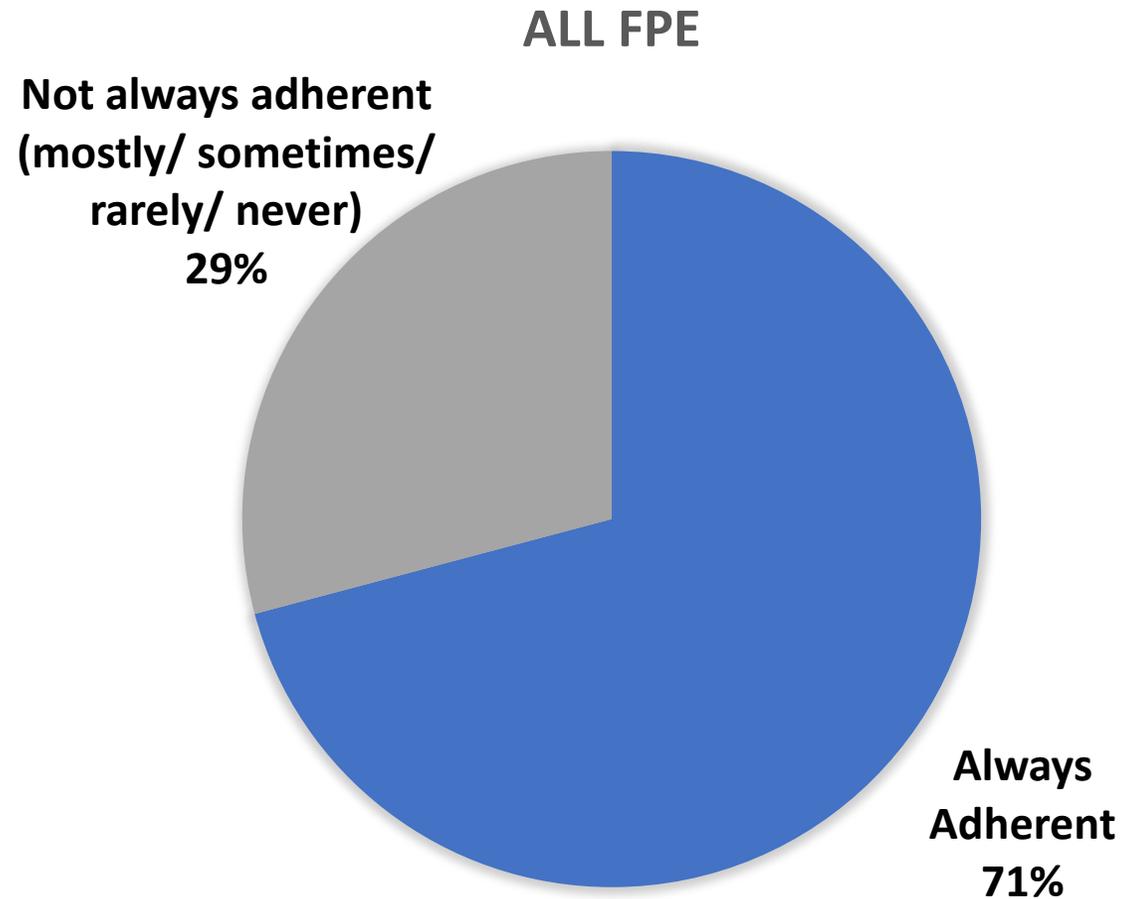
n=199: 140 PSWs (70%), 59 nurses (30%)

Respondents were...

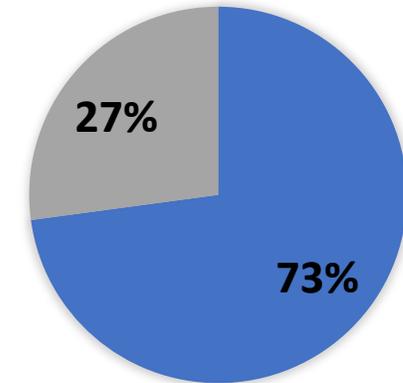
- 92% female
- Age 44 ± 10 years (mean \pm SD)
- Mostly employed FT (84%; 34 ± 11 h/week)
- Relatively experienced (9.3 ± 7.7 years in role)



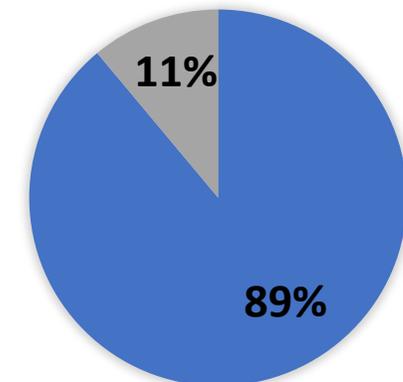
Self-reported Adherence



EYE PROTECTION



SURGICAL MASK



High levels of environmental & organizational supports were reported for both groups

	Variable	Level	Always Adherent (/141) n (%)	Not Always Adherent (/58) n (%)	P-value (chi-square)
Environmental	Access to FPE at work	High	129 (91.5%)	52 (89.7%)	0.89
	Convenience of FPE at work	High	123 (87.2%)	48 (82.8%)	0.55
	Media influence	Yes	124 (87.9%)	47 (81.0%)	0.29
Organizational	Received training	Yes	119 (84.4%)	46 (79.3%)	0.51
	Organizational support for health and safety	High	102 (72.3%)	40 (69.0%)	0.76
	Job hindrance due to FPE	Low	112 (79.4%)	44 (75.9%)	0.71
	Communication + Support (peer, sup & org)	High	91 (64.5%)	35 (60.3%)	0.69

The only significant factors (bivariate) were demographic & individual

	Variable	Level	Always Adherent (/141) n (%)	Not Always Adherent (/58) n (%)	P-value (chi-square)
Demographic	Highest Education**				0.01
		Diploma/Certificate	124 (87.9%)	42 (72.4%)	
		Bachelors/Masters/ Doctoral	17 (12.1%)	16 (27.6%)	
Individual	Perceived efficacy**	High	135 (95.7%)	47 (81.0%)	0.00
	Knowledge of recommended FPE use*	High	78 (55.3%)	21 (36.2%)	0.02
	Perceived occupational risk*	High	96 (68.1%)	30 (51.7%)	0.04
	Pre-COVID mask use with suspected or diagnosed client**	Not always	22 (15.6%)	21 (36.2%)	0.00
	Pre-COVID eye protection use with suspected or diagnosed client**	Not always	30 (21.3%)	25 (43.1%)	0.00

Non-significant individual variables

Variable	Level	Always Adherent (/141) n (%)	Not Always Adherent (/58) n (%)	P-value (chi-square)	
Individual	Mode of travel to work includes			0.82	
	Driving	94 (66.7%)	37 (63.8%)		
	Public Transit	57 (40.4%)	29 (50.0%)		
	Walking	27 (19.1%)	13 (22.4%)		
	PPE use prior to COVID-19 (March 2020)	Frequent	17 (12.1%)	9 (15.5%)	0.67
	PPE use since COVID-19 (March 2020)	Frequent	141 (100%)	56 (96.6%)	0.08
	Knowledge of transmission	High	137 (97.2%)	55 (94.8%)	0.42
	Exposure at work (self)	Yes	63 (44.7%)	29 (50.0%)	0.60
	Exposure at work (others)	Yes	43 (30.5%)	18 (31.0%)	1.00
	Relationship to known exposed individual				
	family	12 (8.51%)	6 (10.3%)	0.89	
	friend	15 (10.6%)	5 (8.62%)	0.86	
	colleague	23 (16.3%)	5 (8.62%)	0.23	
	other	22 (15.6%)	9 (15.5%)	1.00	
	Personal barriers to using any FPE	High	78 (55.3%)	39 (67.2%)	0.16
	Personal barriers to using a mask	High	120 (85.1%)	52 (89.7%)	0.53
	Personal barriers to using eye protection	High	85 (60.3%)	39 (67.2%)	0.45
	Personal barriers to using a face shield	High	110 (78.0%)	51 (87.9%)	0.16

Multivariate model

Variable	est.	SE	p	adjusted Odds Ratio (95%CI)
Highest Education**	1.41	0.54	0.01	4.37 (1.49, 12.82)
Perceived FPE efficacy***	2.11	0.66	0.00	9.15 (2.39, 35.08)
Knowledge of recommended FPE use**	1.01	0.41	0.01	2.7 (1.2, 6.11)
Perceived occupational risk**	1.43	0.47	0.00	4.12 (1.57, 10.77)
Personal barriers to using a face shield*	1.12	0.57	0.05	0.71 (0.27, 0.84)
Pre-COVID mask use with suspected or diagnosed client	0.03	0.84	0.97	3.18 (1.08, 9.39)
Pre-COVID eye protection use with suspected or diagnosed client	-0.38	0.70	0.59	1.94 (0.7, 5.39)

***p<0.001, **p<0.01, *p<0.05

NS vars: gender, age, role, hours worked, mode of travel, pre-COVID PPE use, Knowledge of transmission, Exposure at work (self/others), access to FPE at work, convenience of FPE at work, training, media influence, organizational support, job hinderances, organizational support & communication

Discussion

- Adherence was very high, despite a stringent definition
- Organizational & environmental factors were NS
 - proportion of responses indicating needs were well-met was very high
 - single employer studied
 - reduced influence of organizational factors for lone workers?
- Individual factors dominated
 - Lower adherence by those with lower perception of FPE efficacy, less knowledge of recommended use, lower perceived occupational risk and occupational barriers to face shield use
 - Lower adherence with higher level of education – insufficient data to explain

Adapt existing facial protection questionnaire



Pilot test questionnaire with home care PSWs & nurses



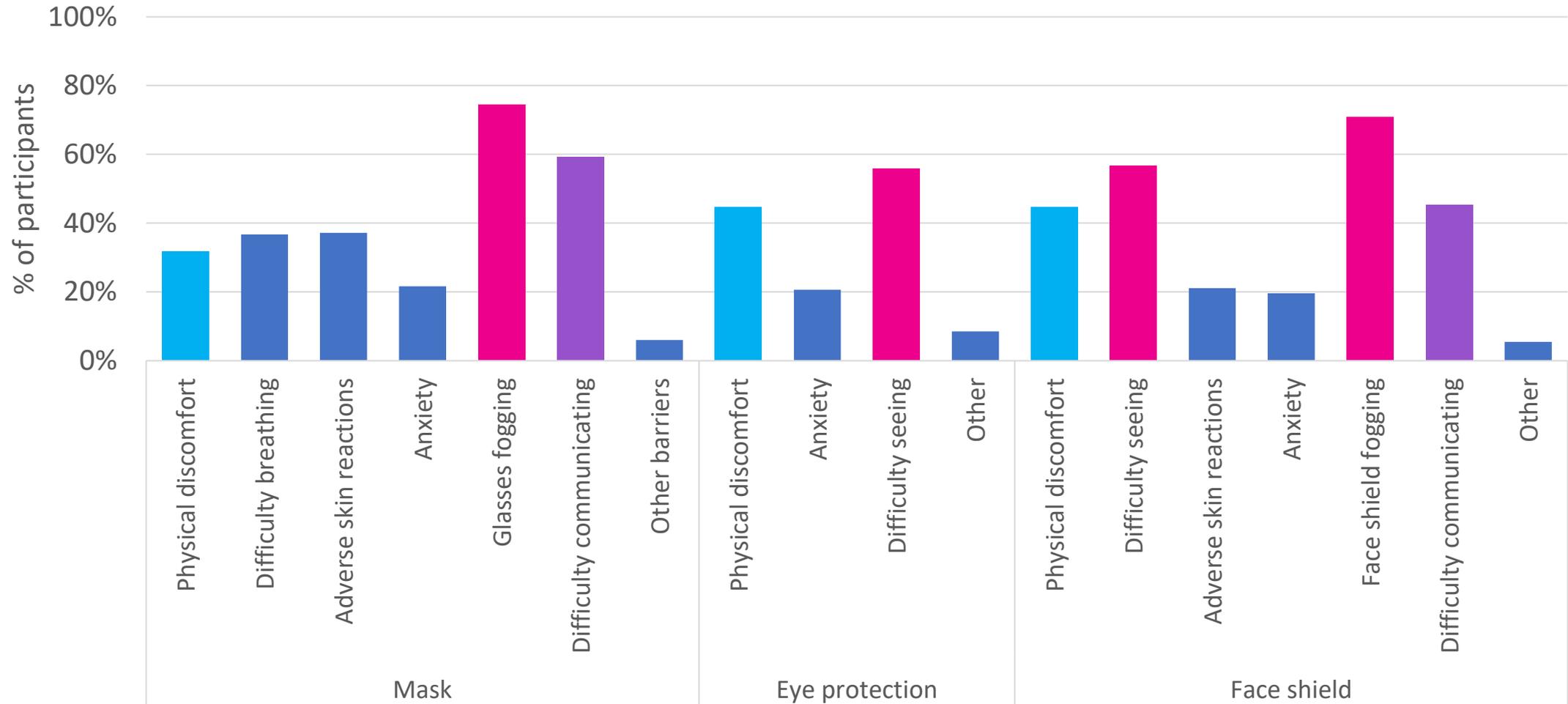
Pilot study at one agency



Multi-agency study



87% reported **visual** barriers to using FPE

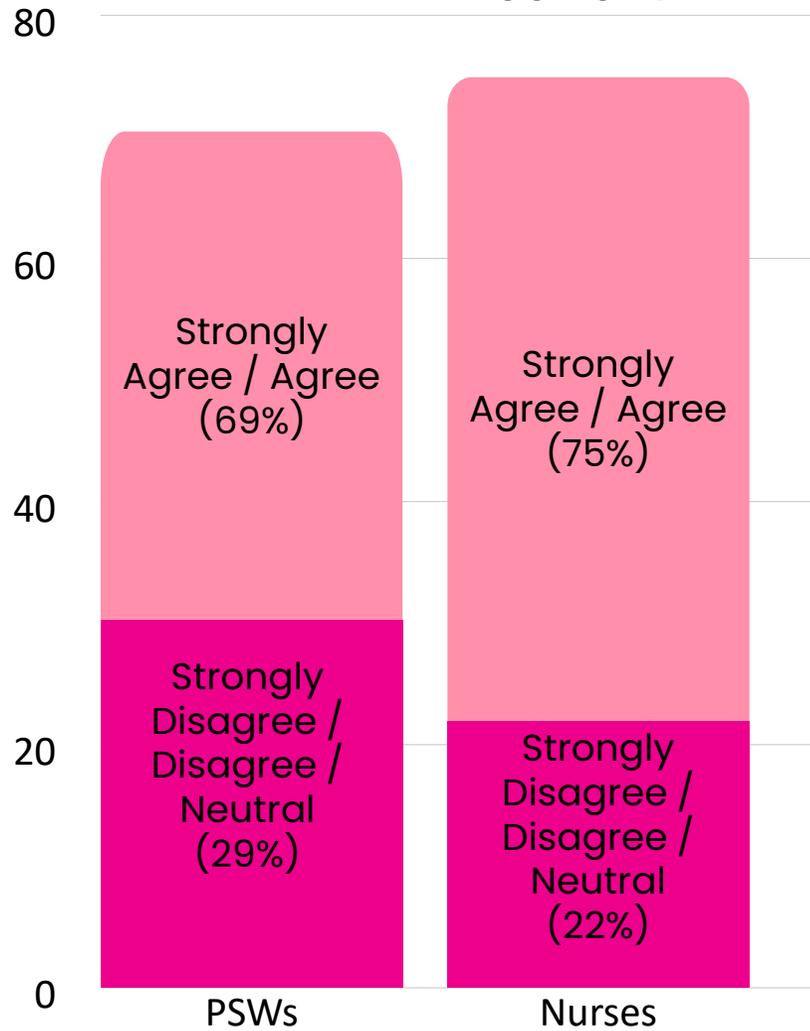


Facial Protective Equipment Anti-Fogging Solutions for Homecare Providers



VHA Home HealthCare
Research and Innovation
2021

“Wearing a face shield makes it harder to do my job due to:
Face shield fogging up”



Potential Solutions



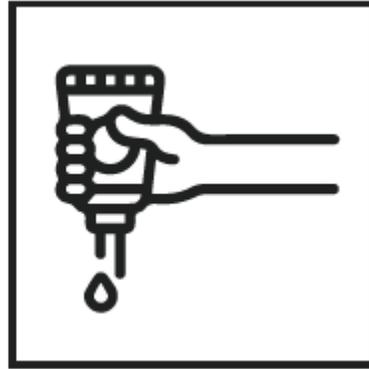
Potential solutions were found online & through conversations with athletes who experience fogging face shield in sports (hockey, ringette)

Test Conditions

Prepare shield



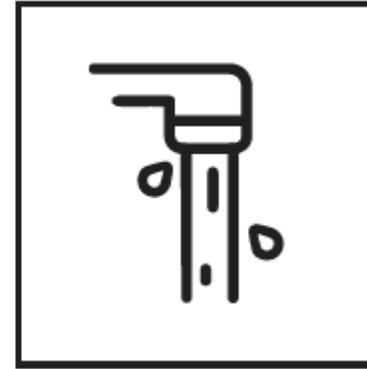
Wipe off dust



Rub product into
each side of shield
(1 min/side)



Let sit for 1 min



Rinse



Air-dry



Test in a hot, steamy shower environment

The shield was worn for 5 minutes, along with a mask, while the shower was running at a warm temperature

Sample Results

From left to right: Dove beauty bar, Aveeno Body wash, Speedo Anti-fog goggle spray, Control



Trial 1



Trial 2



Trial 3

Results

Solution	Trial 1		Trial 2		Trial 3
→ Baby Shampoo	4	DISINFECT AND AIR DRY	4	DISINFECT AND AIR DRY	4
→ Head & Shoulders	3		2		1
→ DAWN Dish Soap	4		4		4
DAWN Dish Soap Solution	4		3		1
Rain-X Anti-Fog Glass Treatment	5		3		1
GEAR AID Anti-Fog Gel	2		1		1
ATTITUDE Hand Soap	3		3		1
JAWS Quick Spit Antifog Gel	3		4		1
EK USA Cat Crap Anti-Fog Spray	3		2		1
Speedo Anti-Fog Goggle Spray	3		2		1
→ Aveeno Body Wash	4	4	4		
→ Dove Beauty Bar (Soap Bar)	2	2	1		
→ Portable Neck Fan	5	5			



Top anti-fogging solutions



Baby Shampoo

\$4.87 for a 300 mL bottle

\$0.0162/mL



DAWN Dish Soap

\$2.77 for a 479 mL bottle

\$0.0057/mL



Aveeno Body Wash

\$8.97 for a 532 mL bottle

\$0.0169/mL



Portable Neck Fan

Average price: \$20.502

Removed from consideration due to IPAC concerns

Further testing

Top 3 solutions

- The top 3 solutions were re-tested

Solution	Trial 1	Trial 2	Trial 3
Live clean Baby shampoo	4	4	4
DAWN Dish Soap	4	3.5/4	3.5/4
Aveeno Body Wash	4	4	4



30-minute shower testing for top 3 solutions

- A new face shield was prepared with the top 3 solutions, and tested for 30 minutes

Solution	Initial	5 mins	10 mins	15 mins	20 mins	TURNED SHOWER OFF	30 mins
Live Clean baby shampoo	5	4.5	4.5	4	4		4
DAWN Dish Soap	5	4.5	4.5	4	4		4
Aveeno Body Wash	5	4.5	4.5	4	4		4



Further Testing

Dilutions of DAWN dish soap

- Further testing was done by diluting the DAWN dish soap to 60% and 30%

Solution	Trial 1	Trial 2	Trial 3
Full strength DAWN dish soap	5	5	3.5/4
60% dilution	4.5	4	2.5
30% dilution	3.5	3/2.5	1.5

Alternative Dish soaps

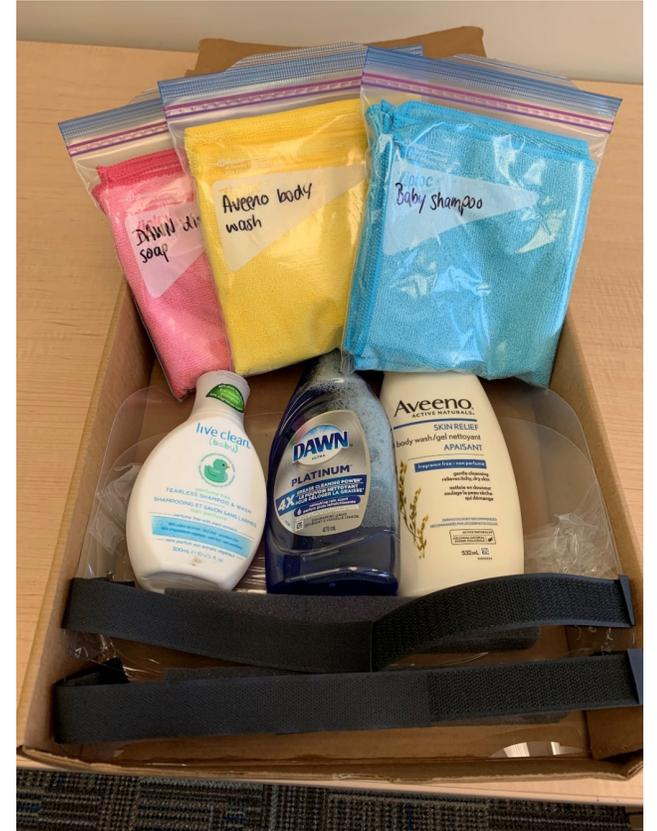
- 2 other major dish soap brands (PalmOlive and Sunlight), were tested alongside the DAWN dish soap

Solution	Trial 1	Trial 2	Trial 3
DAWN dish soap	4.5	4	3.5
Palmolive	4.5	4	2.5
Sunlight	4.5	4	2.5



Field Testing by Providers

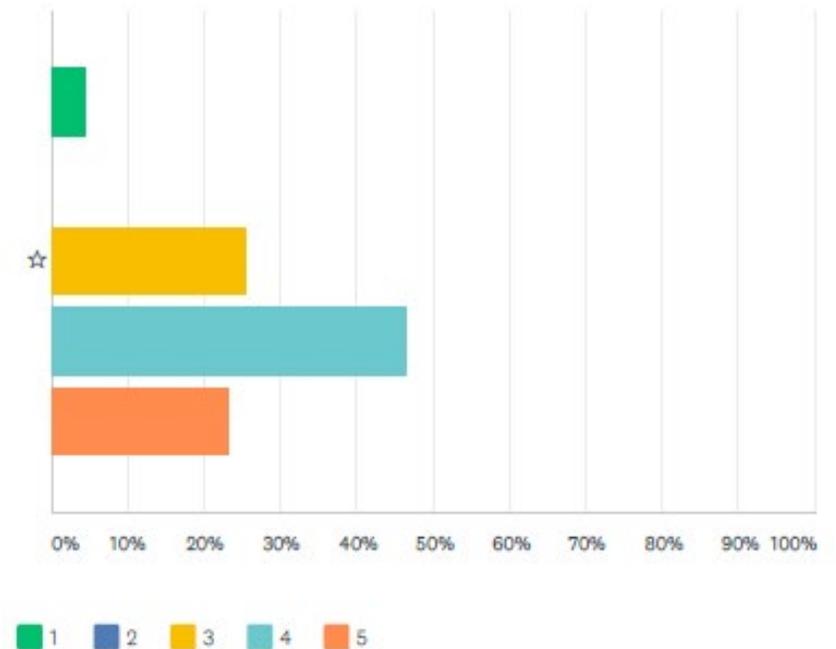
- 10 providers (8 PSWs and 2 Nurses) tested out the top 3 products out in the field
- Testers were provided with microfiber cloths, a bottle of each of the 3 products, and their choice of face shields and/or goggles
- Testers shared their feedback through surveys, emails and group meetings



Provider Findings

- Testers met to share their experiences with each solution and any tips for using them.
- Most providers found the solution fairly convenient to use
 - easiest to apply before leaving home
- 8/10 providers would recommend and plan to continue using the solutions

Q17: How convenient was the application process? (1 being not convenient and 5 being very convenient)



Provider Findings

- Most providers ranked *Dawn dish soap* and *LiveClean baby shampoo* as their top solutions



- One provider preferred Aveeno bodywash; the others found it stickier and harder to work with



In their own words

"The dish soap (Dawn) is so easy to use. I work in a retirement home and after applying it once it lasted for a full 8-hour shift with 4 showers. There were no problems, just a very light fog at the end of a hot shower." - Veronica Foisy



"The baby shampoo (Live Clean) is a great option and lasts for up to 2 client showers for me! This depends on how actively you are involved, the shower water temperature and the airflow in the shower." - Roma Liang



"I am happy to share with you the product that I have tried and tested in an extremely hot shower (feels like a sauna - closed door and window, with a fan and portable heater). The baby shampoo (Live Clean) gives clear vision for up to 3 clients." - Joie Francisco



“I CAN SEE CLEARLY NOW THE FOG IS GONE!”

“If you need to apply the solution quickly on the go, try using some diluted product (about 1 part product to 5 parts water) in a little spray bottle. It’s convenient and takes 1/4 of the time – but you will need to reapply for each client”



Chrissy Froude

We lab tested 14 anti-fogging products for face shields and goggles then field tested the 3 most effective options. Our PSW and nursing testers recommend that you use Dawn dish soap or Live Clean baby shampoo to help you see clearly during client care.

With proper disinfecting between uses, this application should let you see clearly for 2-4 client visits. Questions? email askcovid-19@vha.ca.

Stop face shield and goggle fogging with these five steps...

We lab tested 14 anti-fogging products for face shields and goggles then field tested the 3 most effective options. Our PSW and nursing testers recommend that you use **Dawn dish soap** or **Live Clean baby shampoo** to help you see clearly during client care.

Instructions

Steps for applying the products to eye protection for anti-fogging:



Step 1

Wipe down eye protection with a clean microfibre cloth to make sure there is no dust.



Step 2

Rub the product onto each side thoroughly for about a minute using fingers or microfibre cloth.

Face Shield use a nickel-sized amount (½ tsp), and for **Goggles** use a dime-sized amount (¼ tsp)



Step 3

Let the product sit on the eye protection for about a minute.



Step 4

Rinse the eye protection with warm water until it is clear.



Step 5

Air dry eye protection or wipe lightly with a clean, fine microfibre cloth.

With proper disinfecting between uses, this application should let you see clearly for 2-4 client visits.

Questions? email askcovid-19@vha.ca.



"I CAN SEE CLEARLY NOW THE FOG IS GONE!"

"The dish soap (Dawn) is so easy to use. I work in a retirement home and after applying it once it lasted for a full 8-hour shift with 4 showers. There were no problems, just a very light fog at the end of a hot shower." - Veronica Foisy



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Information card available from

<https://www.vha.ca/research/safer-teams/solutions-to-prevent-fogging-of-face-shields-and-goggles/>

Anti-fogging starter kits



EXCELERATOR

The latest developments from VHA and the communities we serve

"I can see clearly now the fog is gone!"
Field testing project finds solutions for foggy eye protection for frontline health care workers

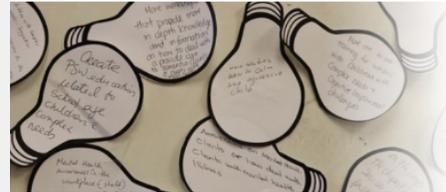


For well over a year, frontline home care staff have been wearing extra personal protective equipment (PPE) while providing care to keep everyone safe during the COVID-19 pandemic. VHA Home HealthCare (VHA)'s Research team surveyed Personal Support and Nursing staff to find out about their experience providing care while wearing masks and either face shields or goggles. Nearly 70% of the PSWs and nurses who responded shared that their goggles and face shields regularly get foggy and that this makes it harder to do their job.

"The Research team is committed to creating knowledge that will enable Better Care for our clients, and lead to Safer Teams of providers" says Emily King, Manager, Research Operations at VHA. "When we realized so many



Sharing our findings



SAFER TEAMS

VHA RESEARCH

SOLUTIONS TO PREVENT FOGGING OF FACE SHIELDS AND GOGGLES

What's the challenge?

Nearly 70% of the PSWs and nurses who responded to an online survey told us that wearing a face shield makes it harder to provide safe, quality care because their facial protective equipment (FPE) including face shield, fogs up. Additionally, over 50% reported difficulty seeing when they wear goggles. Fogging of FPE is particularly common for homecare providers while assisting their clients with showers and during other high-exertion activities that increase body temperature and sweating. While environmental solutions like leaving a door or window while showering a client are helpful solutions, they are not always practical.

Based on findings from the pilot study, [Determinants of nurse's and personal support worker's adherence to facial protective equipment in a community setting during the COVID-19 pandemic](#), utilizing materials that reduce visibility issues while wearing FPE would also decrease personal barriers to FPE use in homecare.

There is a clear need for solutions to reduce fogging of face shields and goggles, to enable care providers to see clearly while using this vital infection prevention equipment.

What did we do?

14 products with anti-fogging potential were identified through online community forums and consultation with athletes who have experience with face shield fogging. Treatment products ranged from common household items like shampoo and dish soap to car glass cleaners and specialized anti-fogging solutions. These products were evaluated for their effectiveness in preventing fogging of a face-shield through two phases of testing:

Hospital News™

www.hospitalnews.com

October 2021 Edition

Finding solutions for foggy eye protection

By Tracey Turriff

For well over a year, frontline home care staff have been wearing extra personal protective equipment (PPE) while providing care to keep everyone safe during the COVID-19 pandemic. Through a survey to learn about the experience of Personal Support and Nursing staff providing care while wearing masks and either face shields or goggles, VHA Home HealthCare (VHA)'s Research team discovered that nearly 70 per cent of the PSWs and nurses who responded indicated that their goggles and face shields regularly get



foggy and that this makes it harder to do their job. "Our goal is create knowledge that will enable better care for our clients and lead to safer teams of providers"



INFECTION CONTROL 2021

I CAN SEE CLEARLY NOW THE FOG IS GONE

says Emily King, Manager, Research Operations at VHA. "When we realized so many of our nurses and PSWs couldn't safely provide care because they couldn't see what they were doing, we knew we needed to find a solution." "The dish soap Dawn is so easy to use," says PSW Veronica Foisy. "I work in a retirement home and after applying it once it lasted for a full eight-hour shift with four showers." And PSW Coach Jole Francisco shared "I have tried and tested the product in an extremely hot shower. The baby shampoo (Live Clean) gives clear vision for up to three clients."

Based on these field tests by personal support and nursing staff and their recommendations to their colleagues, we then set about sharing and scaling this solution.

"Financed by VHA's Ideas to Innovation Fund, we rolled out over 2,200 anti-fogging kits to our front line teams," says Head of Innovation Engagement, Pam Stoikopoulos.

"The response has been very positive," Emily adds. "So far most people are telling us that this solution is working for them. We expect health care providers at other organizations are also experiencing these issues and we hope this will help them as well."

All the findings are available on the VHA Research website at www.vha.ca/research/safer-teams/solutions-to-prevent-fogging-of-face-shields-and-goggles. Our partners at the Centre for Research Expertise in Occupational Disease (CREOD) are also helping to spread the word. Further information is also available by reaching out to researchhelp@vha.ca.

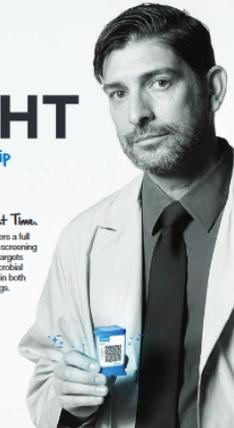
Tracey Turriff is the Senior Communications & PR Manager, VHA Home HealthCare.



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