



## Short Report

# Health Science Students as PPE Coaches in the Emergency Department — a Pandemic Pilot Project

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## SUMMARY

PPE is an integral part of reducing transmission of COVID-19. We assessed a 5-week pilot project of utilising health science student volunteers as PPE coaches in the adult and paediatric emergency department (ED) during the pandemic. PPE coaches were provided with training, PPE checklist, area for written observations, and feedback surveys. Overall, correct PPE use improved over time. Coaches felt safe, that training was adequate, and part of the team. Factors that contributed to project effectiveness included institutional support, role clarification, and continuous feedback from staff. Our findings support the utilisation of students in IPC projects.

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## Introduction

Since the start of the COVID-19 global pandemic, increased emphasis has been placed on the importance of appropriate personal protective equipment (PPE) usage to reduce disease transmission as it has repeatedly been shown to be used incorrectly in health care environments. In a recent study, as many as 50% and 100% of health care workers made mistakes in donning and doffing PPE respectively. [1] Current research cites many barriers to proper use, including

but not limited to: lack of management support, lack of inclusive training, changing protocols, and lack of communication of new protocols. [2] Infection prevention and control (IPC) initiatives that support direct observation and timely feedback for healthcare workers are currently considered gold standard. [3,4].

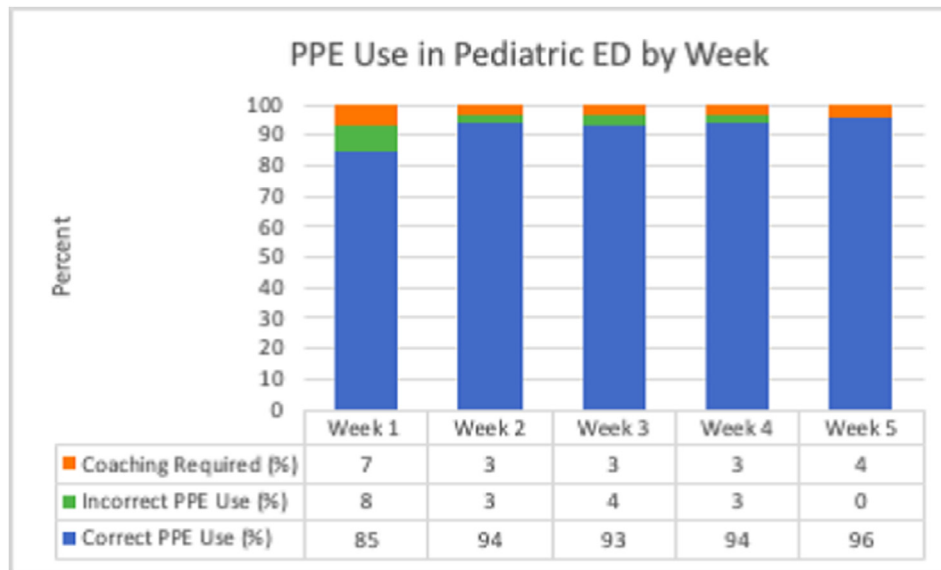
Health science students have previously been involved in IPC initiatives and participation in these roles has generated important data, as well as augmented the students' education. [5,6] When health science students were pulled from clinical duties due to the COVID-19 global pandemic, we created a five-week pilot project which saw health science students acting as PPE coaches within the adult and paediatric emergency department (ED) in the Jim Pattison Children's Hospital located in Western Canada. This novel and reciprocally beneficial

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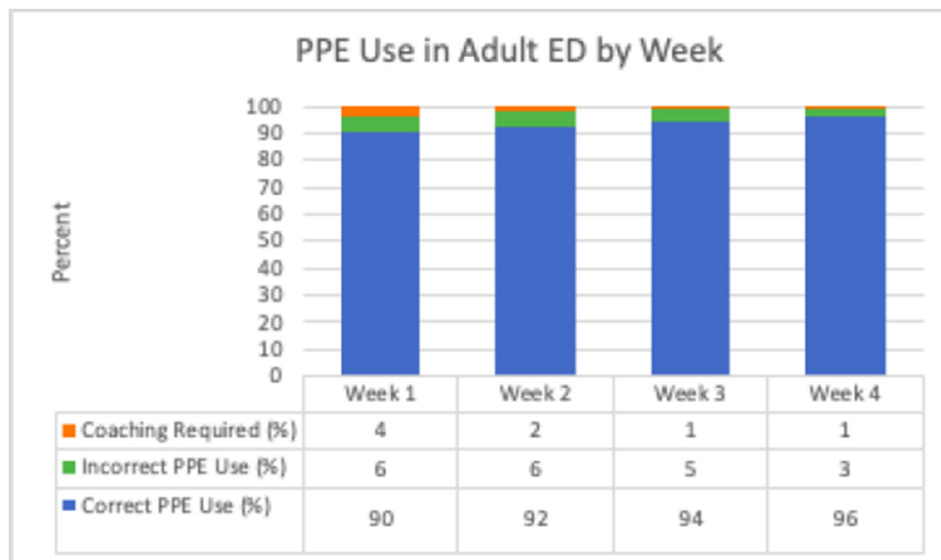
**Table I**

PPE use in pediatric ED by week. Note: Increase in correct use from Week 1 - Week 2 was statistically significant ( $p = .03$ )



**Table II**

PPE use in adult ED by week.



quality improvement (QI) pilot project, evaluated the following questions:

1. What patterns were observed regarding PPE use?
2. What factors contributed to effectiveness of coaching from the perspective of the coaches and the pilot team leads?
3. What changes were recommended both formally and informally to optimise the coaching process?

4. Was the coaching process effective in increasing proper PPE usage?

**Methods**

A total of 12 students, seven from Medicine and five from Rehabilitation Sciences (Physical Therapy) were recruited by email and 11 participated in the pilot study. Before starting,

students were asked to review PPE resources in preparation. [7–9] All PPE coaches attended a three-hour interactive training session which included a lecture by IPC and practice donning, doffing and peer coaching. Coaches unfamiliar with the Emergency Departments were given a tour of the facility and provided with contact information should they have questions later on.

Coaches signed up for one of two daily 5.5-hour shifts in either the paediatric or adult EDs, with a target frequency of one shift every four days. During the first week, the shifts were in the paediatric ED only, as an initial pilot. Coaches were given their own bright yellow T-shirt, indicating their role. Coaches provided verbal feedback and information on PPE practices using laminated cue cards (Appendix A), while social distancing. Coaches also collected data and observations using a simplified 10-point donning/doffing checklist (Appendix B). On the checklist, "Incorrect PPE use" was defined as incorrect PPE order and/or failure to use the appropriate PPE on the checklist. One exception discussed in training was the order of gown and mask. The standard PPE order taught was gown before mask. However, coaches were asked to take into consideration that some staff were familiar with gowning in the theatre in which the order is mask before gown. "Required coaching" was defined as steps in which staff needed to ask the coach how to put on appropriate PPE and/or times when the coach had to step in to help direct or provide fundamental feedback.

Repeat online surveys (Appendix C) were emailed to coaches during the second and fifth weeks to assess student experience, to allow for timely evaluation and modifications as needed. The survey was created by a team of medical education, emergency medicine, quality improvement, and IPC representatives. No relevant validated survey was available and due to shortened timelines, it was not piloted, but it was assessed for face validity. Questions were formatted using open-ended questions and a 5-point Likert-scale.

Data was collated and analysed. The early and final survey results were compared using means for the Likert scale results and theming for qualitative responses. The frequencies of correct donning/doffing (10 steps) were compared by week using chi-square analyses. Coaching comments/observations were categorised by theme. Informal feedback by ED staff and the research team were also collected.

As a quality improvement initiative, this project was deemed exempt from ethics review by the University of Saskatchewan Research Ethics Board.

## Results

### Checklist

There was a total of 534 observations in the adult ED and 349 observations in the paediatric ED. In paediatrics, correct PPE usage increased significantly from 85% in the 1st week to 94% in the 2nd week,  $X^2(1, 211)=4.53, P=0.03$ . After that, there were no further significant increases over the remaining weeks. Increases over time were not statistically significant for adult ED (Mean correct use=94.5%) (see Table I and II).

The most common incorrect PPE use was not donning gloves last (paediatric=23/349, 6.9%; adult=56/534, 10.5%). The second most common incorrect PPE use was incorrect hand hygiene before donning (paediatric=21/349, 6.0%; adult=49/

534, 9.2%) and no hand hygiene after doffing gloves in the paediatric ED (21/349, 6.0%).

### Observations

Common themes observed and recorded by PPE coaches in both ED's included staff wearing PPE outside patient rooms (69), improper gown tying (42), gloves not fully over gown cuffs during donning (35), entering patient room without appropriate PPE (23), leaving patient room door open (11), contamination when opening/closing patient room door (9), and bringing a stethoscope and other items into the patient room (9). Informal feedback from coaches did not indicate instances of staff declining coaching.

### Survey

Response rate was 64% (7/11) for the early survey and 55% (6/11) for the final survey. Students found training to be sufficient throughout the pilot (early mean=4.57, SD=0.49, final mean=4.25, SD=0.83). Overall, students felt more a part of the ED team over the course of the pilot (early mean=3.29, SD=0.88, final mean=4.25, SD=0.83). This difference had a large effect size (Cohen's *d*) of 1.12. Written responses indicated observations and learnings from coaches:

*Health care staff are more aware of their PPE with us around*

*I learned a lot about how intimidating it can be to provide feedback, especially to those with more experience than you, but there are ways to do it effectively.*

*There is good uptake from the vast majority of the staff; the training provided to coaches before their shifts is effective and is reinforced with on-shift reminders.*

Strengths of the pilot included adequate training, identifying t-shirts, staff receptiveness, and prior notice to ED staff; while areas of improvement included more training on coaching techniques and providing feedback, clarifying best PPE practices, and a modification of shift scheduling early in the pilot.

## Discussion

Direct observation of IPC protocols has been suggested to be the only reliable way to capture all intervention opportunities, and has the additional benefit of generating knowledge of unforeseen qualitative issues. Barriers to ideal use include hefty time consumption, and lack of skilled staff trained in patient care as healthcare professionals. [3] The COVID-19 pandemic created a unique circumstance where skilled and trained health care students with ample time were able to unlock these barriers and implement a novel pilot project aiming to increase knowledge and safety of healthcare providers.

In addition to categorising correct or incorrect PPE usage on the checklist, students were able to make many general observations regarding IPC behaviours. Noting them allowed departments to better understand IPC gaps in behaviours. For example, one of the main protocol breaches was observed to be staff wearing PPE outside of proper clinical areas. This was not something the pilot project sought to record specifically, but this information will be shared with the participating

departments so that resources can be utilised effectively in correcting this behaviour.

We identified several factors that we believe contributed to the effectiveness of coaching. Institutional support is instrumental in implementation of any IPC programmes. [2] There was clear, efficient communication surrounding the purpose and presence of this programme in the emergency departments, such that when students arrived to shift, they were welcomed and utilised. Additionally, role clarification and relationship building are essential in any coaching relationship. [10] Having the students wear bright yellow identifying t-shirts likely helped in this regard. Students felt they were contributing to the pandemic response and helping their local healthcare team, and this internal motivation was thought to contribute to the success of coaching. Finally, the consistency of volunteers for the duration of this pilot may have contributed to the success, as it would have reinforced learning through continuous follow-up and feedback to staff.

Early feedback from students regarding the shifts revealed that adjusting the times to better align with busy periods in the EDs, and shortening shifts from 5.5 to 4 hours would better keep students engaged. As we gained this feedback in the second week of the pilot, the schedule or the remaining weeks was adjusted to fit these suggestions, with positive feedback from students on the final survey. We believe adaptability of this structure was beneficial.

While we were able to identify many areas of success for this pilot project, we also identified areas for improvement. Preparation for shifts could have been augmented with training specifically for donning/doffing requirements for aerosol generating medical procedures, appropriate usage of reusable PPE (masks, goggles), and variations of IPC-approved PPE practices that are commonly used by physicians, as well as the rationale for their use. Challenging thinking and assumptions is revered as an instrumental part of a coaching methodology, [10] and theoretical knowledge on the rationale behind certain IPC procedures would likely have helped students be more comfortable challenging ingrained behaviours of staff that were not IPC-approved. Additionally, communication skills are instrumental to the delivery of the coaching. Most of the volunteers had training in this from their respective academic programmes, however, not all did. Additional training in this to cover all students participating in the pilot may have increased its efficacy.

Some physicians provided informal feedback to the project team regarding concerns of medical students feeling uncomfortable giving honest feedback for fear of being reprimanded on future assessments (many ED physicians teach and evaluate student rotations and exams). This would be in line with what some of the literature suggests. [6] Informal feedback from students suggested that this was not consistently the case in this study, but perhaps did play a role for some students. As the participants represented different colleges and different years, perhaps level of training and prior experiences impacted students' comfort with providing honest feedback.

Numerous limitations were identified in this study. The study was a single centre study, which involved a small number of student participants. The design of the study may have affected which health care workers were observed as observers were not present in the EDs 24 hours each day, and they were not everywhere in the EDs at all times. There was also no mechanism in place to prevent repeat observation of

individuals, or reversely to ensure all ED staff were observed at least once over the course of this project. Observers may also have varied in personal interpretation of the checklist, specifically differentiating between the checklist sections listed as 'incorrect usage' and 'requires coaching'. Additionally, the survey presented to the students was limited itself with a small number of participants to begin with, compounded by a low response rate, which may have produced a sampling error. Furthermore, the nature of direct observation and immediate feedback inherently creates an observer bias, where behaviours while being observed/coached may not be what would have been found if a covert observer model had been used. Finally, we are unable to conclude that any improvements in appropriate PPE usage were directly related to our pilot project, as staff may have developed better PPE practices through repetition or increased situational awareness related COVID-19. However, we felt that in times of crisis such as a pandemic, coaching may be needed not only as a developmental tool, but also as a continuous support where fear, fatigue, and stress impede optimal performance.

Overall, and perhaps most importantly, proper PPE usage improved in both adult and paediatric emergency departments over the duration of this pilot. We hope this demonstrates the adequacy of student involvement, as opposed to solely fully trained healthcare providers, in projects such as this and supports future involvement of students in IPC projects.

## Ethics statement

As a quality improvement initiative, this project was deemed exempt from ethics review by the University of Saskatchewan Research Ethics Board.

## Credit author statement

**Jennifer Wong:** Data Curation, Formal Analysis, Writing-original draft, Writing-review & editing; **Megan Gallagher:** Writing-original draft, Writing-review & editing; **Jill Friedt:** Conceptualization, Data curation, Investigation, Methodology, Project administration, Writing-review & editing; **Krista Trinder:** Formal analysis, Writing-review & editing; **Meredith McKague:** Methodology, Project administration, Writing-review & editing; **Katherine Stevenson:** Conceptualization, Methodology, Resources, Writing-review & editing; **Vicki Cattell:** Conceptualization, Methodology, Resources, Supervision, Visualization.

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## Conflict of interest statement

The authors do not have any conflicts of interest to disclose.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.infpip.2021.100139>.

## References

- [1] Kwon JH, Burnham CA, Reske KA, et al. Assessment of healthcare worker protocol deviations and self-contamination during personal protective equipment donning and doffing. *Infect Control Hosp Epidemiol* 2017;38(9):1077–83. <https://doi.org/10.1017/ice.2017.121>.
- [2] Houghton C, Meskell P, Delaney H, et al. Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: a rapid qualitative evidence synthesis. *Cochrane Database Syst Rev* 2020;4(4). <https://doi.org/10.1002/14651858.CD013582>.
- [3] World Health Organization. WHO guidelines for hand hygiene in health care. 2009. [https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906\\_eng.pdf;jsessionid=84B7DC81D9B363149A27E125123EF80F?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44102/9789241597906_eng.pdf;jsessionid=84B7DC81D9B363149A27E125123EF80F?sequence=1). [Accessed 5 June 2020].
- [4] Government of Saskatchewan. Rapid training and ongoing coaching for appropriate PPE use. 2020 [cited 11 Jun 2020], <https://publications.saskatchewan.ca/#/products/104739>.
- [5] Thompson D, Bowdey L, Brett M, Cheek J. Using medical student observers of infection prevention, hand hygiene, and injection safety in outpatient settings: A cross-sectional survey. *Am J Infect Control* 2016;44(4):374–80. <https://doi.org/10.1016/j.ajic.2015.11.029>.
- [6] Pan SC, Lai TS, Tien KL, Hung IC, Chie WC, Chen YC, et al. Medical students' perceptions of their role as covert observers of hand hygiene. *Am J Infect Control* 2014;42(3):231–4. <https://doi.org/10.1016/j.ajic.2013.09.032>.
- [7] Government of Saskatchewan. Personal Protective Equipment (PPE) - Donning and Doffing, <https://www.saskatoonhealthregion.ca/about/IPColicies/20-150.pdf> 2020 [cited 03Sep 2020].
- [8] Government of Saskatchewan. PPE/Infection Prevention and Control: Section E Posters, <https://www.saskhealthauthority.ca/news/service-alerts-emergency-events/covid-19/PPE-infection-prevention-control/Pages/Home.aspx#Posters> [cited 03 Sep 2020].
- [9] Government of Saskatchewan [internet]. PPE/Infection Prevention and Control: Section F video, <https://www.saskhealthauthority.ca/news/service-alerts-emergency-events/covid-19/PPE-infection-prevention-control/Pages/Home.aspx#Video> [cited 03 Sep 2020].
- [10] Forbes. The key to effective coaching. 2010. <https://www.forbes.com/2010/04/28/coaching-talent-development-leadership-managing-ccl.html#10033c6938e0>. [Accessed 29 September 2020].