



## Perioperative personal protective equipment stewardship (POPPiES)

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### To the Editor,

The coronavirus disease (COVID-19) pandemic has caused a global shortage of personal protective equipment (PPE).<sup>1</sup> Meticulous monitoring of use and innovative approaches to allocation are required.<sup>2</sup> Institutions must quickly develop tracking and conservation strategies to ensure continued protection of healthcare workers.<sup>3</sup> We present a stewardship process for N95 mask and respirator allocation that can be rapidly expanded to include all PPE.

Our initiative involved Perioperative Services at the Hospital for Sick Children, Toronto, Ontario. Approval of SickKids Research Ethics Board was not required as no personal health information was accessed. No monitoring of PPE use was present at baseline, and no standardized PPE conservation plans were in place. On 31 March 2020, we developed a database of masks, face shields, and visors used by all perioperative healthcare personnel. Personal protective equipment data were collected per procedure. Isolation precautions and COVID-19 status (positive, negative, possible) were recorded. We instituted a rapid series of Plan-Do-Study-Act (PDSA) cycles to optimize mask distribution, recording, and reporting with a view to future expansion for gowns, gloves, and other important equipment (Figure). Our goal was to integrate perioperative consumption and supply data with hospital daily store reports. Success would be determined by adequate supply

of N95 respirators, early identification of local shortages, prompt response to restock items, lack of equipment diversion, and consistency of data collected.

Root-cause analysis and diagnostics on the first PDSA cycle identified that six different distribution points allowed individuals to acquire multiple masks from separate sources. Despite hospital-wide mandatory fit-testing, few operating room (OR) staff knew or recalled their N95 fit size. Clear guidance for PPE requirements relative to case or COVID-19-risk stratification was lacking.

Our team was assembled within 24 hr from local safety coaches, nurse educators, supply managers, and a research coordinator. Our process delivered > 95% compliance in data recording sustained by the project team. Implemented strategies included:

1. Daily unit huddles with multidisciplinary case-based consensus for PPE use<sup>4,5</sup> and aerosol-generation as primary discussion points.
2. Daily consumption data identified that 3M 8210 (3M Canada, London, ON, Canada) accounted for 55–62.5% of daily N95 use. In week one, mean daily 8210 respirator use was 21 masks, increasing to 33 in week two with changing case complexities. When compared with local and hospital inventory, 8210 supplies would have lasted 4.3 to 6.6 days. We procured extra 8210 supplies from hospital stores based on case-scheduling for the upcoming week.
3. Future consumption by case complexity was modelled.
4. Minimum ongoing N95 requirements were calculated taking into account possible reallocation and redistribution of N95 equipment within and between hospitals

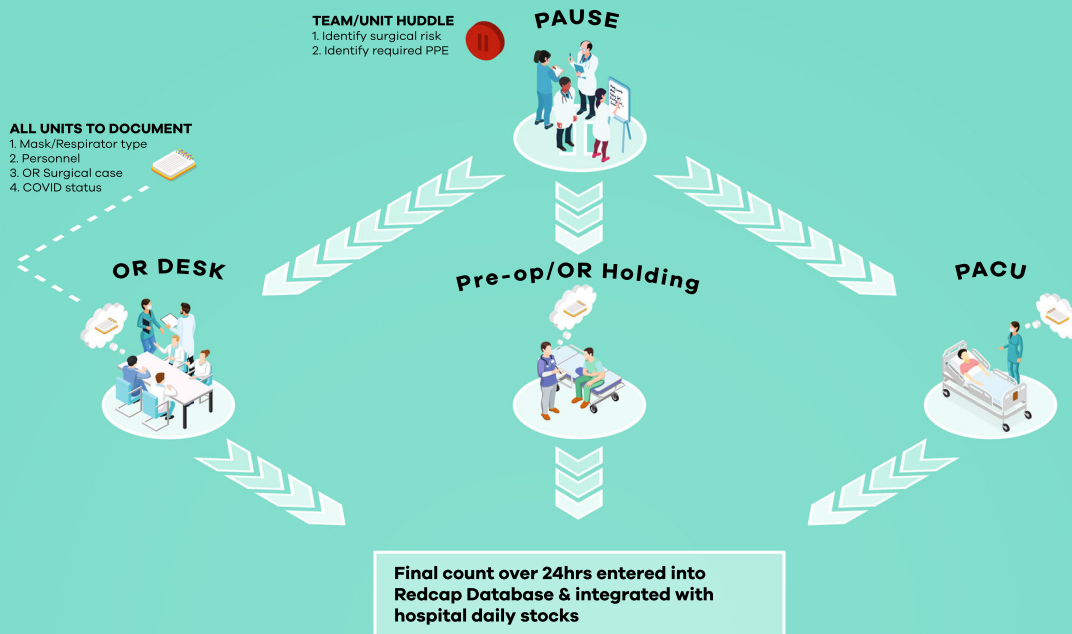
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# PeriOperative PPE Stewardship (POPPIES)

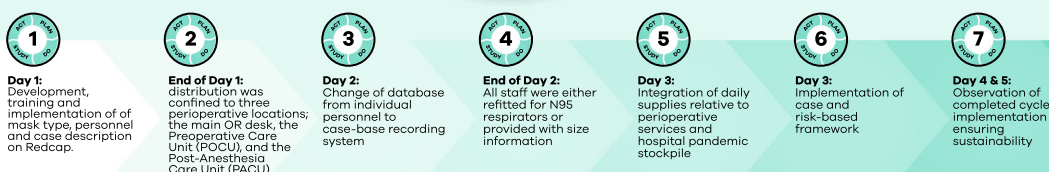
## part 1 Streamline distribution and limit locations



## part 2 Guidelines as per CAS, WHO and local IPAC recommendation

HIGH RISK ROOMS COVID + /COVID UNKNOWN	HIGH RISK ROOMS COVID -	LOW RISK ROOMS	ADD ON/ UNASSIGNED
N95	N95	PROCEDURAL MASK	PROCEDURAL MASK
FACESHIELD/ VISOR + GOGGLES	FACESHIELD + GOGGLES	+ / - FACESHIELD	FOLLOW PLAN ONCE ASSIGNED
DISCARD AFTER CASE	KEEP AFTER CASE UNLESS SOILED	KEEP FOR THE DAY	KEEP FOR THE DAY

## part 3 Trigger early warning shortage and schedule OR staff based on PPE availability



◀ **FIGURE** Perioperative PPE stewardship (POPPIES). Part 1 Streamline distribution and limit location. Part 2 Guidelines as per CAS, WHO, and local IPAC recommendation. Part 3 Trigger early warning shortage and schedule OR staff based on PPE availability. CAS = Canadian Anesthesiologists' Society; COVID = coronavirus disease; IPAC = infection prevention and control; OR = operating room; PPE = personal protective equipment; WHO = World Health Organization

5. "At risk" PPE items were identified. For example, hospital reports showed a two-day remaining supply of visors (full face shields) during week one. We redirected users to alternative PPE, allowing local supply management to advocate for and procure extra stock from hospital supplies, and conserve low supplies of essential equipment for high-risk airway surgeries the next day.
6. New equipment e.g., reusable visors, re-sterilized masks, etc. were prospectively tracked.
7. Overcrowding at OR desk, and delay in 8 a.m. start times was mitigated by training more OR desk staff and encouraging earlier staffing assignments and safety huddles. OR start times were staggered 15 min apart to facilitate N95 distribution without violating physical distancing expectations.
8. Colleagues were reassured by evidence-based advice in the face of ever-changing guidelines and mandates from provincial and ministerial sources.

We report the utility of iterative PDSA testing for rapidly establishing PPE stewardship in uncertain times. This model facilitates optimal PPE availability relative to procedure (not provider), allows for preparation of PPE kits for emergency response teams, will continue to inform case/staff scheduling, and promotes confidence in staff safety.

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