CERS Critical Appraisal Sheet

1. **Date of appraisal**: 23 March 2020

2. **Name of appraiser**: Associate Prof. Dr. Julia Patrick Engkasan

3. **Clinical Question**: What is the standardised personal protective equipment (PPE) method to combat COVID 19

4. **PICO**:
   - **P**: Healthcare worker and volunteers
   - **I**: Different types of personal protective equipment* (PPE)
   - **C**: -
   - **O**: Self-contamination and infection rates

   *Definition of PPE
   - body protection: gowns, coveralls or hazmat suits
   - eye and face protection: glasses, goggles, face shields or visors, or masks or hoods that cover the entire head;
   - hand protection: gloves;
   - foot protection: overshoes or boots.

5. **Article**:
   - **Title**: Personal protective equipment for preventing highly infectious diseases due to exposure to contaminated body fluids in healthcare staff. (Cochrane Database of Systematic Reviews 2019, Issue 7)
   - **Published date**: 19 April 2016

**Appraisal**

*Find:*

Search medium:
Electronic databases and up-to-dateness
- MEDLINE (15 July 2018);
- Scopus (18 June 2019)
- Cochrane Central Register of Controlled Trials (18 June 2019)
- CINAHL (31 July 2018)
- NIOSHTIC (OSH-UPDATE) (31 December 2018)
- NIOSHTIC-2 (OSH-UPDATE) (31 December 2018)
- HSELINE (OSH-UPDATE) (31 December 2018)
- CISDOC (OSH-UPDATE) (31 December 2018)
Checked reference lists of all primary studies
Contacted relevant authorities for unpublished literature

Key words: search strategies follow standard of Cochrane and included all the relevant terms

No language limitations; searched in English, Russian, Chinese

Appraise:
The inclusion or exclusion of studies were identified a priori which includes the followings:

- Study designs: All study designs including simulation studies (excluded studies without comparison)
- Participants included volunteers in simulation studies: included and field studies: HCW or ancillary staff exposed to body fluids
- Interventions: Include any PPE in any combination
- Outcomes: must include any of the specified outcomes

Quality assessment:
Quality of the included studies were assessed according to the protocol set by Cochrane using the following domains: Random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and others. According to the authors judgment, the studies were all at either unclear (N = 10) or at high risk of bias (N = 7).

Results:
There was generally one study for each type of comparisons of different types of PPE. Thus, there is no meta-analyses done.

This review found that:

- The use of a powered air-purifying respirator (PAPR) may protect better than a simple ensemble of PPE without such respirator (Relative Risk (RR) 0.27; 95% CI 0.17 to 0.43).
- Gowns may protect better against contamination than aprons (MD large patches −1.36 95% CI −1.78 to −0.94).
- There is only one study that compared the effectiveness of five different PPE ensembles (such as gown vs. coverall, boots with or without covers, hood vs. cap, length and number of gloves), but there were no event data available for compared groups.
- PPE made of more breathable material may not lead to more contamination spots on the trunk (Mean Difference (MD) 1.60 (95% Confidence Interval (CI) −0.15 to 3.35) than more water repellent material but may have greater user satisfaction (MD −0.46; 95% CI −0.84 to −0.08, scale of 1 to 5).
- Alterations to PPE design may lead to less contamination such as added tabs to grab masks (RR 0.33; 95% CI 0.14 to 0.80) or gloves (RR 0.22 95% CI 0.15 to 0.31), a sealed gown and glove combination (RR 0.27; 95% CI 0.09 to 0.78), or a better fitting gown around the neck, wrists and hands (RR 0.08; 95% CI 0.01 to 0.55) compared to standard PPE.
Strength of evidence for the above results are very low indication that further studies is likely to change the above estimates.

**Author’s Conclusion:**
The PICO is highly relevant to the clinical questions asked; although not COVID-specific. The authors performed a comprehensive search, without language and time limit. The inclusion and exclusion criteria, and quality assessment methods were appropriate for the questions asked. The methodology to perform this review was very robust. However, the studies included in this review were of moderate to high bias.

**Evidence Summary:** This systematic review shows that PPE with respirator (PAPR) compared to one without and gown compared to apron have better protection against contamination. However, the systematic review is limited by single small simulation studies with high risk of bias and is not COVID-specific.