*Characteristics of Included Studies*

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| *Study* | *Virus studied or* *Simulation* | *Study Design* | *Number of* *Participants* | *Primary Outcomes**-PAPR focused* | *Secondary Outcomes**-PAPR* *focused* | *Results* | *Level of Evidence* |
| Andonian at al 2019(1) | Simulation of training on PPE doffing including PAPR | Randomised Controlled Trial | 48(13 HCW in intervention group and 13 HCW control group)-others randomised to Doffing Assistants | 1.Effectiveness of training on contamination of a number of body sites | 2. Effectiveness of training on contamination using ultraviolet light and PLS swabbing | -11/13 HCW contaminated at least one body site;-13/13 HCW contaminated at least one body site;-median contamination score lower in the intervention group: 23.15 vs 64.45 p=0.004 (ultraviolet light);- median contamination score lower in the intervention group:72.4 vs144.8 p=0.001 (PLS visualization); |  2 |
| Chughtai et al2020(2) | Simulation by fit-testing and use of PAPR | Observational | 20 | 1.Examine attitudes and practices regarding PAPR | 2. Determine acceptability of a novel PAPR (CleanSpace2tm) | -14/20 participants found PAPR easy to don;-15/20 participants found PAPR easy to doff;-14/20 participants found PAPR comfortable to wear; |  4 |
| Chughtai et al 2018(3) | Simulation of doffing protocols including PAPR | Observational | 30 PPE sequences tested, 6 including PAPR(10 participants) | 1.Evaluate risk of self- contamination using ultraviolet light | 2.Evaluate user level of comfortIncluding breathability and ease of breathing | -4/24 participants contaminated using N95;-0/6 participants contaminated using PAPR;-24/24 reported discomfort with N/95 use;-2/6 reported discomfort with PAPR use; |  3 |
| El-Boghdadly et al 2020(4) | Field studyof SARS-CoV-2 | Observational -prospective international multicentre cohort study | -1718 healthcare workers reported 5148 trachealintubation episodes;-exact protective equipment composition not reported but included N95/P2/P3/PAPR | The primary endpoint was the incidence of laboratory-confirmed COVID-19 diagnosis ornew symptoms requiring self-isolation or hospitalization after a tracheal intubation episode. | N/A | -overall incidence of COVID outcomes was 10.7% over a median follow up of 32 days;-risk of the primary endpoint varied by country and gender, higher in females; |  3 |
| Powell et al2017(5) | Simulation assessment of participant comfort | Observational | 60 total assessments(12 participants)-12 N95;-12 tight fit PAPR;-24 loose PAPR;-12 hybrid PAPR;(note hybrid PAPR excluded from analysis) | 1. Evaluate face and body thermal sensations; | 2. Evaluate wearer comfort through assessment of eye dryness; | -temperature of facial skin lower in 36 PAPR compared to N95;-tight fitting face piece PAPR increased eye dryness;-loose fitting PAPR did not increase eye dryness;-perception of comfort equivalent in two groups;-perception of work of breathing was equivalent in the two groups; |  3 |
| Schumacheret al 2009(6) | Simulation study of impact of respiratoryprotectiveequipment during emergency life support | Randomised cross-oversimulation study | 42 total assessments(14 paramedics)-three types of respiratory equipment:1.PAPR(positive pressure)2. Standard APR ( negative pressure)3. Standard surgical protection(control group) | 1.Difference in treatment times in two resuscitation scenarios, with standard equipment use serving as control | 2. Wearer comfort as measured by user rating of-mobility-ease of communication/audibility-ease of breathing  | -The participating paramedics rated the ease of breathing with the PAPR system significantly better than with the APR. (p<0/05);-The wearer comfort in respect of mobility and the ability to communicate was similar in both respirator groups; |  2 |
| Schumacheret al 2013(7) | Simulation study of impact of respiratoryprotectiveequipment during emergency paediatric support | Randomised cross-oversimulation study | 48 total assessments(16 paramedics)-three types of respiratory equipment:1.PAPR(positive pressure)2. Standard APR ( negative pressure)3. Standard surgical protection(control group) | 1.Difference in treatment times in two resuscitation scenarios, with standard equipment use serving as control | 2.Wearer comfort as measured by user rating of -mobility-noise/speech intelligibility-heat | -Study subjects reported that communication (p=0.001) and mobility (p=0.000) were significantly improved in the APR group compared to PAPR;-Study subjects reported that heat-build-up was significantly less in the PAPR-hood group (p=000); |  2 |
| Schumacher2020(8) | Simulation study of impact of respiratoryprotectiveequipment on airwaymanagement | Randomised cross-oversimulation study | 300 total assessments(25 anaesthetists)-three types of respiratory equipment:1.PAPR(positive pressure)2. Standard APR ( negative pressure)3. Standard surgical protection(control group)-Four different intubation drills | 1.Difference in Intubation times in different airway scenarios | 2.Wearer comfort as measured by user rating of -mobility-noise-heat-vision-speech intelligibility | The powered respirator ensemble scored significantly better in user rating for -heat (p=0.002) -vision (p=0.008)The powered respirator ensemble scored significantly worse in user rating for-noise (p=0.021) -speech intelligibility (p=0.062) |   2 |
| Yao et al 2020(9) | Field studyof SARS-CoV-2 | Retrospective observational case series of two centres | 1.outer layer with full PAPR n=50;2.1.outer layer with goggles, FFP2/N95 with a face shield n=22;2.2 outer layer with goggles, FFP/N95 with a full hood without positive pressure n=130; | Analysis of two centre data by a panel of international experts whereboth groups wore an inner layer of protection in addition to designated protective equipment;A number of recommendations were made on the analysis of data and opinion on experts; | -zero transmission rates were noted in both groups;-larger series is needed to give greater confidence;-experts noted that outcome data, or the association between level of PPE and coronavirus transmission from the current epidemic are lacking;   |  3 |
| Zamora et al2006(10) | Simulation assessment of contamination | Prospective randomised controlled cross over study | 50 participants(PAPR versus E-RCP) | 1.Evaluate any contamination, size of contamination area; | 2.Donning non-compliance;3.Doffing non-compliance; | -13/50 any contamination PAPR group;-48/50 any contamination E-RCP group;-15/50 donning non-compliance PAPR;-2/50 donning non-compliance E-RCP;-6/50 doffing non-compliance PAPR-12/50 doffing non-compliance E-RCP; |  2 |

Studies:

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3. Chughtai AA, Chen X, Macintyre CR. Risk of self-contamination during doffing of personal protective equipment. American journal of infection control. 2018;(no pagination).

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6. Schumacher J, Gray SA, Weidelt L, Brinker A, Prior K, Stratling WM. Comparison of powered and conventional air-purifying respirators during simulated resuscitation of casualties contaminated with hazardous substances. Emergency medicine journal. 2009;26(7):501‐5.

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