# Appendix (online only)

| Appendix 1: Expert ratings during all Delphi rounds | | | | | | | | | | | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **Round 1** | | **Round 2** | | **Round 3** | | **Final\*** | | **Consensus** | |  |  |  |
| # | Scenario | **col.** | **inf.** | **col.** | **inf.** | **col.** | **inf.** | **col.** | **inf.** | **col.** | **inf.** | **Source** | **Pathway** | **Endpoint** |
| 1 | After caring for a first patient, a healthcare worker shakes another patient’s hand without hand hygiene. | 2.71 | 1.51 | 2.45 | 1.18\* | 2.53\* | -- | 2.53\* | 1.18\* | yes | yes | Other patient | Hands | Non-critical site |
| 2 | After caring for a first patient, a healthcare worker touches another patient’s open wound without hand hygiene. | 3.86 | 3.23 | 3.76\* | 3.12 | -- | 3.20\* | 3.76\* | 3.20\* | yes | yes | Other patient | Hands | Critical site |
| 3 | A healthcare worker touches her private mobile phone then, without hand hygiene, touches patient intact skin. | 2.46 | 1.49 | 2.30\* | 1.06\* | -- | -- | 2.30\* | 1.06\* | yes | yes | Mobile object | Hands | Non-critical site |
| 4 | A healthcare worker touches her private mobile phone then, without hand hygiene, touches a patient’s open wound. | 3.34 | 2.91 | 3.24\* | 2.73\* | -- | -- | 3.24\* | 2.73\* | yes | yes | Mobile object | Hands | Critical site |
| 5 | A healthcare worker cleans a toilet, touching toilet brush handle with bare hands then, without hand hygiene, touches patient intact skin. | 3.23 | 1.86 | 3.18\* | 1.36\* | -- | -- | 3.18\* | 1.36\* | yes | yes | Mobile object | Hands | Non-critical site |
| 6 | A healthcare worker cleans a toilet, touching toilet brush handle with bare hands then, without hand hygiene, touches a patient’s open wound. | 4.06 | 3.49 | 3.94 | 3.24\* | 3.80\* | -- | 3.80\* | 3.24\* | yes | yes | Mobile object | Hands | Critical site |
| 7 | A healthcare worker touches the paper patient records then, without hand hygiene, changes an infusion. | 2.34 | 2.09 | 2.48\* | 1.91\* | -- | -- | 2.48\* | 1.91\* | yes | yes | Environment | Hands | Critical site |
| 8 | A healthcare worker touches his face and hair then changes an infusion, without hand hygiene. | 2.77 | 2.57 | 2.76\* | 2.21\* | -- | -- | 2.76\* | 2.21\* | yes | yes | Healthcare worker | Hands | Critical site |
| 9 | After touching multiple surfaces in the healthcare environment, a healthcare worker enters a patient’s room then, without hand hygiene, prepares and administers intravenous medication. | 3.09 | 3.09 | 2.97 | 2.55 | 2.93 | 2.33\* | 2.93 | 2.33\* | no | yes | Environment | Hands | Critical site |
| 10 | After touching parts of her own body and her immediate environment (bedside table, phone, and bed linens), a patient touches her own open wound. | 3.17 | 2.91 | 3.18 | 2.70\* | 3.17\* | -- | 3.17\* | 2.70\* | yes | yes | Environment | Hands | Critical site |
| 11 | After having touched several surfaces in the healthcare environment, a healthcare worker enters a patient room then, without hand hygiene, pulls (non-sterile) gloves out of the box and dons the gloves then touches patient’s intact skin. | 2.20 | 1.40 | 1.97 | 1.21\* | 1.80\* | -- | 1.80\* | 1.21\* | yes | yes | Environment | Gloves | Non-critical site |
| 12 | After having touched several surfaces in the healthcare environment, a healthcare worker enters a patient room then, without hand hygiene, pulls gloves out of the box and dons the gloves then touches patient’s open wound | 2.71 | 2.34 | 2.45\* | 2.06\* | -- | -- | 2.45\* | 2.06\* | yes | yes | Environment | Gloves | Critical site |
| 13 | After having touched several surfaces in the healthcare environment, a healthcare worker enters a patient room then, without hand hygiene, carefully and correctly dons sterile surgical gloves without previous hand hygiene then proceeds to insert a central venous line. | 2.09 | 1.89 | 2.00 | 1.73\* | 1.77\* | -- | 1.77\* | 1.73\* | yes | yes | Environment | Gloves | Critical site |
| 14 | A healthcare worker wearing gloves disposes of a used vomiting bag then inserts a venous cannula while wearing the same pair of gloves. | 3.51 | 3.20 | 3.52\* | 3.06 | -- | 3.13\* | 3.52\* | 3.13\* | yes | yes | Mobile object | Gloves | Critical site |
| 15 | A healthcare worker performs hand hygiene, dons gloves, then examines a patient with open wounds moving from wounds to intact skin and back, wearing the same gloves for the entire examination. | 2.66 | 2.31 | 2.67\* | 2.09 | -- | 2.27\* | 2.67\* | 2.27\* | yes | yes | Patient intact skin | Gloves | Critical site |
| 16 | A healthcare worker disposes of gloves following intimate care, and does not perform hand hygiene prior to continuing patient care and touching patient’s intact skin. | 2.23 | 1.46 | 2.21\* | 1.12\* | -- |  | 2.21\* | 1.12\* | yes | yes | Patient critical site | Gloves | Non-critical site |
| 17 | A healthcare worker disposes of gloves following intimate care, and does not perform hand hygiene prior to continuing patient care and touching patient’s open wound. | 3.06 | 2.66 | 3.09\* | 2.39 | -- | 2.63\* | 3.09\* | 2.63\* | yes | yes | Patient critical site | Gloves | Critical site |
| 18 | A healthcare worker programs an infusion pump (touch screen) while wearing gloves that had already been worn for an extended period of time, touching multiple surfaces in the room, then manually verifies a central venous catheter insertion site while still wearing the same gloves. | 3.29 | 2.97 | 3.30\* | 2.58 | -- | 2.83\* | 3.30\* | 2.83\* | yes | yes | Medical device | Gloves | Critical site |
| 19 | A healthcare worker programs an infusion pump while wearing gloves that had already been worn for an extended period of time, touching multiple surfaces in the room, then manually verifies a peripheral catheter insertion site while still wearing the same gloves. | 3.20 | 2.83 | 3.18\* | 2.58\* | -- | -- | 3.18\* | 2.58\* | yes | yes | Medical device | Gloves | Critical site |
| 20 | A healthcare worker providing intimate care silences an alarm on the patient bedside monitor touchscreen, then continues with intimate care, all with the same pair of gloves. | 2.51 | 1.80 | 2.27\* | 1.33\* | -- | -- | 2.27\* | 1.33\* | yes | yes | Medical device | Gloves | Critical site |
| 21 | An x-ray plate with direct contact with patient skin is used on two consecutive patients without being disinfected between uses. | 2.83 | 1.40 | 2.67\* | 1.24\* | -- | -- | 2.67\* | 1.24\* | yes | yes | Other patient | Medical device | Non-critical site |
| 22 | An ECG device including the electrode with multi-use suction cups is used on two consecutive patients without being disinfected between uses. | 2.89 | 1.54 | 2.55\* | 1.24\* | -- | -- | 2.55\* | 1.24\* | yes | yes | Other patient | Medical device | Non-critical site |
| 23 | The electrode multi-use suction cups of an ECG device fall on the floor and then are used on a patient without being disinfected. | 2.54 | 1.40 | 2.33 | 1.27\* | 2.10\* | -- | 2.10\* | 1.27\* | yes | yes | Environment | Medical device | Non-critical site |
| 24 | An x-ray plate with direct contact with patient skin is used on a patient under contact isolation for colonization with Gram-negative multi-resistant Klebsiella pneumophila, then used on a subsequent patient, without being disinfected between uses. | 3.31 | 1.94 | 3.27\* | 1.79 | -- | 1.80\* | 3.27\* | 1.8\* | yes | yes | Other patient | Medical device | Non-critical site |
| 25 | A blood pressure cuff is used on two consecutive patients without being disinfected between uses. | 2.60 | 1.26 | 2.12 | 0.97\* | 2.10 | -- | 2.10 | 0.97\* | no | yes | Other patient | Medical device | Non-critical site |
| 26 | A healthcare worker disconnects a patient’s tracheal tube, places the tube on non-sterile patient bedding, then reconnects the tube again. | 2.94 | 2.51 | 2.94\* | 2.27 | -- | 2.30\* | 2.94\* | 2.30\* | yes | yes | Environment | Invasive device | Critical site |
| 27 | The tube connected to a patient’s urinary catheter lies on floor, then healthcare worker places it on the patient’s bed. | 2.80 | 2.06 | 2.64\* | 2.06 | -- | 2.07\* | 2.64\* | 2.07\* | yes | yes | Environment | Invasive device | Patient bed |
| 28 | A healthcare worker places a used suction catheter (used for suctioning of a mechanical ventilation) on the patient’s bed (same patient). | 2.54 | 1.86 | 2.30\* | 1.45\* | -- | -- | 2.30\* | 1.45\* | yes | yes | Patient critical site | Invasive device | Patient bed |
| 29 | A three-way valve IV line (connected to an IV line) is left open (uncapped) on a patient’s bed. | 3.03 | 3.00 | 2.36 | 2.48 | 2.83 | 2.73\* | 2.83 | 2.73\* | no | yes | Environment | Invasive device | Patient bed |
| 30 | A three-way valve is placed on a moltex absorbent sheet on a patient’s bed. An open lumen of the three-way valve touches the moltex. The three-way valve is then used for an IV-line. | 3.00 | 2.89 | 2.70\* | 2.39\* | -- | -- | 2.70\* | 2.39\* | yes | yes | Mobile object | Invasive device | Critical site |
| 31 | A stethoscope is used on two consecutive patients without being disinfected between uses. | 2.86 | 1.57 | 2.24 | 1.42\* | 2.07 | -- | 2.07 | 1.42\* | no | yes | Other patient | Medical device | Non-critical site |
| 32 | A tourniquet is used to draw blood of two consecutive patients without being disinfected between uses. | 2.60 | 1.46 | 2.27 | 1.21\* | 2.00 | -- | 2.00 | 1.21\* | no | yes | Other patient | Mobile object | Non-critical site |
| 33 | A purpose-built board to facilitate the transfer of patients from a stretcher to a bed (or vice versa) is used on two consecutive patients without disinfection between uses. | 2.71 | 1.57\* | 2.64\* | 1.33\* | -- | -- | 2.64\* | 1.33\* | yes | yes | Other patient | Mobile object | Non-critical site |
| 34 | A healthcare worker’s wristwatch comes into contact with the skin of multiple consecutive patients during patient examination. | 2.63 | 1.40 | 2.33\* | 1.27\* | -- | -- | 2.33\* | 1.27\* | yes | yes | Other patient | Healthcare worker | Non-critical site |
| 35 | A healthcare worker’s professional mobile phone, attached to her belt, comes into contact with patient skin during patient examination. | 2.09 | 1.17 | 2.03\* | 1.09\* | -- | -- | 2.03\* | 1.09\* | yes | yes | Other patient | Mobile object | Non-critical site |
| 36 | Medical-grade adhesive tape is attached to bedrails prior to being used to secure a peripheral line onto the patient’s skin. | 2.54 | 1.89 | 2.58\* | 1.67\* | -- | -- | 2.58\* | 1.67\* | yes | yes | Environment | Mobile object | Non-critical site |
| 37 | A healthcare worker places a bag of gastric secretions on an intubated and sedated patient’s face. | 2.74 | 2.00 | 2.67\* | 1.91 | -- | 1.83 | 2.67\* | 1.83 | yes | no | Unknown status | Mobile object | Non-critical site |
| 38 | A transfer cannula (plastic piercing spike with finger plate used to mix solutions and medications) is placed on a worktop for temporary storage, and then used again for preparing the next medication. | 2.69 | 2.83 | 2.82 | 2.91\* | 2.70\* | -- | 2.70\* | 2.91\* | yes | yes | Environment | Mobile object | Critical site |
| 39 | A patient’s duvet falls on the floor. A healthcare worker picks up the duvet and puts it back on the patient. | 2.31 | 1.40 | 1.97 | 1.06\* | 1.73\* | -- | 1.73\* | 1.06\* | yes | yes | Environment | Mobile object | Non-critical site |
| 40 | During intimate care, the washcloth being used to clean the patient falls to the floor. The healthcare worker picks it up and continues using it to provide intimate care. | 2.80 | 1.77 | 2.67\* | 1.45\* | -- | -- | 2.67\* | 1.45\* | yes | yes | Environment | Mobile object | Critical site |
| 41 | A healthcare worker draws blood from a vein in a patient’s foot, which is visibly soiled, without prior skin disinfection. | 2.43 | 2.91 | 2.39 | 2.82 | 2.13 | 2.63\* | 2.13 | 2.63\* | no | yes | Patient intact skin | Invasive device | Critical site |
| 42 | Disinfected skin is touched several times with non-sterile gloves (to locate anatomic structures), before inserting a central venous catheter. | 2.91 | 2.89 | 2.94\* | 2.76 | -- | 2.73\* | 2.94\* | 2.73\* | yes | yes | Patient intact skin | Invasive device | Critical site |
| 43 | Prior to inserting a peripheral line, a healthcare worker uses her bare hands (that had not been immediately disinfected) to palpate the patient’s vein after the insertion site had already been disinfected. | 3.06 | 2.80 | 3.03 | 2.61\* | 2.67\* | -- | 2.67\* | 2.61\* | yes | yes | Patient intact skin | Invasive device | Critical site |
| 44 | A healthcare worker touches the insertion site (already disinfected) of thoracic tubes with non-sterile gloves that had already been worn for an extended period of time touching multiple surfaces, and adjusts the position of the tubes. | 3.54 | 3.11 | 3.45\* | 3.06\* | -- | -- | 3.45\* | 3.06\* | yes | yes | Gloves | Invasive device | Critical site |
| 45 | A urinary catheter tip is touched with non-sterile disposable examination gloves prior to inserting a urinary catheter. | 3.06 | 2.94 | 3.03 | 2.82 | 2.97 | 2.53 | 2.97 | 2.53 | no | no | Gloves | Invasive device | Critical site |
| 46 | Just before inserting a peripheral venous catheter (PVC), the needle comes into contact with non-sterile disposable examination gloves. | 2.69 | 2.83 | 2.70\* | 2.88\* | -- | -- | 2.70\* | 2.88\* | yes | yes | Gloves | Invasive device | Critical site |
| 47 | While inserting a peripheral venous catheter, the same needle is retracted and re-inserted several times at slightly different skin sites in search of the vein. | 2.57 | 2.77 | 2.45\* | 2.94 | -- | 2.70\* | 2.45\* | 2.70\* | yes | yes | Patient intact skin | Invasive device | Critical site |
| 48 | An open wound is not completely covered by the wound dressing and in consequence, comes into contact with bed linens. | 3.03 | 2.63 | 3.18\* | 2.7\* | -- | -- | 3.18\* | 2.70\* | yes | yes | Environment | Mobile object | Critical site |
| 49 | A healthcare worker wearing blood-stained, non-sterile disposable examination gloves manipulates a three-way hub of a patient’s central vascular line. (Blood is from the same patient) | 3.49 | 3.31 | 3.00 | 2.94 | 2.80 | 2.63 | 2.80 | 2.63 | no | no | Gloves | Invasive device | Critical site |
| 50 | A healthcare worker prepares to replace a mechanical ventilation tube filter. The healthcare worker opens the new sterile filter with non-sterile disposable examination gloves, places the new filter on the patient’s bed, removes the old filter, then picks up the new filter from the bed and attaches it to the ventilation tube. | 2.97 | 2.46 | 2.97 | 2.45\* | 2.97\* | -- | 2.97\* | 2.45\* | yes | yes | Environment | Invasive device | Critical site |
| 51 | A healthcare worker wearing long-sleeved private clothing attends to several patients consecutively. The sleeves of his private clothing come into contact with several patients. | 2.69 | 1.57 | 2.55 | 1.45\* | 2.30 | -- | 2.30 | 1.45\* | no | yes | Other patient | Healthcare worker | Non-critical site |
| 52 | A healthcare worker wearing a long-sleeved white coat attends to several patients consecutively. The sleeves of his white coat come into contact with several patients. | 2.57 | 1.63 | 2.64\* | 1.36\* | -- | -- | 2.64\* | 1.36\* | yes | yes | Other patient | Healthcare worker | Non-critical site |

**Legend Appendix 1:** Expert ratings for all three Delphi survey rounds indicating the likelihood of negative outcomes, colonization (col.) and infection (inf.), using a Likert-type scale from 0 (none), 1 (very low), 2 (low), 3 (medium), 4 (high), to 5 (very high).