**Supplementary material**

**EFFECTIVENESS OF Chlorhexidine dressings to prevent catheter-related bloodstream infections: does one size fits all? A systematic literature review and meta-analysis**

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***Appendix 1.* Search strategy used in the meta-analysis**

**PubMed Search (March 1, 2019)**

**Group 1: Chlorhexidine**

**"Chlorhexidine"**[Mesh] OR Chlorhexidine [tw] OR **"chlorhexidine gluconate"** [Supplementary Concept] OR chlorhexidine gluconate [tw] OR chlorhexidine bigluconate [tw] OR chlorhexidine digluconate [tw] OR **"Occlusive Dressings"**[Mesh] OR Occlusive Dressings [tw] OR Occlusive Dressing [tw] OR Occlusive Bandage [tw] OR Occlusive Bandages [tw] OR Biopatch\* [tw] OR chlorhexidine dressing\* [tw] OR chlorhexidine impregnated dressing\* [tw] OR chlorhexidine gluconate-impregnated sponge\* [tw] OR chlorhexidine-impregnated sponge\* [tw] OR chlorhexidine sponge\* [tw] OR no dressing\* [tw] OR polyurethane dressing\* [tw] OR standard polyurethane dressing\* [tw] OR Tegaderm CHG dressing\* [tw] OR transparent polyurethane dressing\* [tw]

**Group 2: Infections**

**"Bacteremia"**[Mesh] OR Bacteremia [tw] OR Bacteremias [tw] OR **"Catheter-Related Infections"**[Mesh] OR Catheter-Related Infections [tw] OR Catheter Related Infections [tw] OR Catheter-Related Infection [tw] OR Catheter-Associated Infections [tw] OR Catheter Associated Infections [tw] OR Catheter-Associated Infection [tw] OR catheter-related bloodstream infection\* [tw] OR CLABSI\* [tw] OR central line-associated bloodstream infection\* [tw] OR CRBSI\* [tw] OR central venous catheter-related bloodstream infections\* [tw] OR vascular catheter-related infection\* [tw]

**Group 3: Catheters**

**"Catheters"**[Mesh] OR Catheters [tw] OR Catheter [tw] OR **"Catheters, Indwelling"**[Mesh] OR Indwelling Catheters [tw] OR Indwelling Catheter [tw] OR In-Dwelling Catheters [tw] OR In Dwelling Catheters [tw] OR In-Dwelling Catheter [tw] OR Implantable Catheters [tw] OR **"Catheterization"**[Mesh] OR Catheterization [tw] OR Catheterizations [tw] OR **"Catheterization, Central Venous"**[Mesh] OR Central Venous Catheterization [tw] OR Central Catheterization [tw] OR Central Catheterizations [tw] OR Central Venous Catheterizations [tw] OR **"Central Venous Catheters"**[Mesh] OR Central Venous Catheters [tw] OR Central Venous Catheter [tw] OR Broviac catheter [tw] OR Hemocath catheter\* [tw] OR Hickman catheter\* [tw] OR Hemodialysis catheter\* [tw] OR long term central venous catheter\* [tw] OR PICC [tw] OR PICCs [tw] OR PICC Line\* [tw] OR peripherally inserted central catheter\* [tw] OR peripherally inserted central venous catheter [tw] OR short-term central venous catheter\* [tw] OR tunneled central venous catheters\*

**EMBASE Search (March 1, 2019)**

**Group 1: Chlorhexidine**

**'chlorhexidine'/exp** OR **'chlorhexidine gluconate'/exp** OR 'ab antiseptico':ti,ab OR 'chlorhexidine bigluconate':ti,ab OR 'chlorhexidine digluconate':ti,ab OR 'chlorhexidine gluconate':ti,ab OR **'occlusive dressing'/exp** OR 'occlusive bandage':ti,ab OR 'occlusive bandages':ti,ab OR 'occlusive dressing':ti,ab OR 'occlusive dressings':ti,ab OR 'biopatch\*':ti,ab OR 'chlorhexidine dressing':ti,ab OR 'chlorhexidine dressings':ti,ab OR 'chlorhexidine impregnated dressing\*':ti,ab OR 'chlorhexidine gluconate-impregnated sponge':ti,ab OR 'chlorhexidine gluconate-impregnated sponges':ti,ab OR 'chlorhexidine-impregnated sponge':ti,ab OR 'chlorhexidine-impregnated sponges':ti,ab OR 'chlorhexidine sponge':ti,ab OR 'chlorhexidine sponges':ti,ab OR 'no dressing':ti,ab OR 'no dressings':ti,ab OR 'polyurethane dressing':ti,ab OR 'polyurethane dressings':ti,ab OR 'standard polyurethane dressing':ti,ab OR 'standard polyurethane dressings':ti,ab OR 'transparent polyurethane dressing':ti,ab OR 'transparent polyurethane dressings':ti,ab OR 'tegaderm chg dressing\*':ti,ab

**Group 2: Infections**

**'bacteremia'/exp** OR 'bacillaemia':ti,ab OR 'bacillemia':ti,ab OR 'bacteraemia':ti,ab OR 'bacteremia':ti,ab OR 'bacteriemia':ti,ab OR 'haemorrhagic bacteremia':ti,ab OR 'hemorrhagic bacteremia':ti,ab OR **'catheter infection'/exp** OR 'catheter associated blood stream infection':ti,ab OR 'catheter associated blood stream infections':ti,ab OR 'catheter associated bloodstream infection':ti,ab OR 'catheter associated bloodstream infections':ti,ab OR 'catheter associated infection':ti,ab OR 'catheter associated infections':ti,ab OR 'catheter infection':ti,ab OR 'catheter related blood stream infection':ti,ab OR 'catheter related blood stream infections':ti,ab OR 'catheter related bloodstream infection':ti,ab OR 'catheter related bloodstream infections':ti,ab OR 'catheter related infection':ti,ab OR 'catheter related infections':ti,ab OR 'catheter-related infections':ti,ab OR 'central line associated bloodstream infection':ti,ab OR 'catheter-associated infection':ti,ab OR 'catheter-associated infections':ti,ab OR 'catheter-related bloodstream infection':ti,ab OR 'catheter-related bloodstream infections':ti,ab OR 'clabsi':ti,ab OR 'clabsis':ti,ab OR 'central line-associated bloodstream infections':ti,ab OR 'crbsi':ti,ab OR 'crbsis':ti,ab OR 'central venous catheter-related bloodstream infection':ti,ab OR 'central venous catheter-related bloodstream infections':ti,ab OR 'vascular catheter-related infection':ti,ab OR 'vascular catheter-related infections':ti,ab

**Group 3: Catheters**

**'catheter'/exp** OR 'catheter':ti,ab OR 'catheters':ti,ab OR 'catheter device':ti,ab OR **'indwelling catheter'/exp** OR 'catheter indwelling':ti,ab OR 'catheters, indwelling':ti,ab OR 'indwelling cannula':ti,ab OR 'indwelling catheter':ti,ab OR 'catheterization'/exp OR 'catherization':ti,ab OR 'catheter technique':ti,ab OR 'catheterisation':ti,ab OR 'catheterization':ti,ab OR 'microcatheterisation':ti,ab OR 'microcatheterization':ti,ab OR **'central venous catheterization'/exp** OR 'central vein catheterisation':ti,ab OR 'central vein catheterization':ti,ab OR 'central venous catheterisation':ti,ab OR 'central venous catheterization':ti,ab OR 'central catheterization':ti,ab OR 'central catheterizations':ti,ab OR **'central venous catheter'/exp** OR 'axera':ti,ab OR 'broviac':ti,ab OR 'cvp line':ti,ab OR 'groshong':ti,ab OR 'icy (device)':ti,ab OR 'leonard':ti,ab OR 'leonard catheter':ti,ab OR 'pediasat':ti,ab OR 'powerline (central venous catheter)':ti,ab OR 'vortex (central venous catheter)':ti,ab OR 'vortex port':ti,ab OR 'central intravenous catheter':ti,ab OR 'central line':ti,ab OR 'central vein catheter':ti,ab OR 'central venous catheter':ti,ab OR 'central venous catheters':ti,ab OR 'central venous line':ti,ab OR 'cv cath':ti,ab OR 'hemocath catheter\*':ti,ab OR 'hickman catheter':ti,ab OR 'hickman catheters':ti,ab OR 'hemodialysis catheter':ti,ab OR 'hemodialysis catheters':ti,ab OR 'long term central venous catheter\*':ti,ab OR 'picc\*':ti,ab OR **'peripherally inserted central venous catheter'/exp** OR 'lifecath picc expert':ti,ab OR 'powerpicc solo catheter':ti,ab OR 'spectrum turboject':ti,ab OR 'peripherally inserted central catheter':ti,ab OR 'peripherally inserted central venous catheter':ti,ab OR 'pic line':ti,ab OR 'picc line':ti,ab OR 'picc lines':ti,ab OR 'peripherally inserted central catheters':ti,ab OR 'peripherally inserted central venous catheters':ti,ab OR 'tunneled central venous catheter'/exp OR 'tunneled central venous catheter':ti,ab OR 'tunnelled central venous catheter':ti,ab OR 'tunneled central venous catheters':ti,ab OR 'tunnelled central venous catheters':ti,ab OR 'short-term central venous catheter':ti,ab OR 'short-term central venous catheters':ti,ab

**CINAHL Search (March 5, 2019)**

**Group 1: Chlorhexidine**

MH "Chlorhexidine" OR "Chlorhexidine" OR "chlorhexidine gluconate" OR "chlorhexidine digluconate" OR MH "Occlusive Dressings" OR "Occlusive Dressings" OR "Occlusive Dressing" OR "Occlusive Bandage" OR "Occlusive Bandages" OR "Biopatch" OR "chlorhexidine dressing" OR "chlorhexidine dressings" OR "chlorhexidine impregnated dressing" OR "chlorhexidine impregnated dressings" OR "chlorhexidine gluconate-impregnated sponge" OR "chlorhexidine gluconate-impregnated sponges" OR "chlorhexidine-impregnated sponge" OR "chlorhexidine-impregnated sponges" OR "chlorhexidine sponge" OR "chlorhexidine sponges" OR "no dressing" OR "no dressings" OR "polyurethane dressing" OR "polyurethane dressings" OR "standard polyurethane dressing" OR "standard polyurethane dressings" OR "Tegaderm CHG dressing" OR "Tegaderm CHG dressings" OR "transparent polyurethane dressing" OR "transparent polyurethane dressings"

**Group 2: Infections**

MH "Bacteremia" OR "Bacteremia" OR "Bacteremias" OR MH "Catheter-Related Infections+" OR "Catheter-Related Infections" OR "Catheter-Related Infection" OR "Catheter-Associated Infection" OR "Catheter-Associated Infections" OR MH "Catheter-Related Bloodstream Infections" OR "Catheter-Related Bloodstream Infection" OR "Catheter-Related Bloodstream Infections" OR "CLABSI" OR "CLABSIs" OR "central line-associated bloodstream infection" OR "central line-associated bloodstream infections" OR "CRBSI" OR "CRBSIs" OR "central venous catheter-related bloodstream infection" OR "central venous catheter-related bloodstream infections" OR "vascular catheter-related infection" OR "vascular catheter-related infections"

**Group 3: Catheters**

MH "Catheters+" OR "Catheters" OR Catheter" OR "Indwelling Catheters" OR "Indwelling Catheter" OR "In-Dwelling Catheter" OR "In-Dwelling Catheters" OR "Implantable Catheter" OR "Implantable Catheters" OR MH "Catheterization+" OR “Catheterization” OR "Catheterizations" OR MH "Catheterization, Central Venous+" OR "Central Venous Catheterization" OR "Central Venous Catheterizations" OR "Central Catheterization" OR "Central Catheterizations" OR MH "Central Venous Catheters+" OR "Central Venous Catheters" OR "Central Venous Catheter" OR "Broviac catheter" OR "Broviac catheters" OR "Hickman catheter" OR "Hickman catheters" OR "Hemodialysis catheter" OR "Hemodialysis catheters" OR "long term central venous catheter" OR "long term central venous catheters" OR "PICC" OR "PICCs" OR "PICC Line" OR MH "Peripherally Inserted Central Catheters" OR "Peripherally Inserted Central Catheters" OR "Peripherally Inserted Central Catheter" OR "peripherally inserted central venous catheter" OR "peripherally inserted central venous catheters" OR "short-term central venous catheter" OR "short-term central venous catheters" OR "tunneled central venous catheter" OR "tunneled central venous catheters"

***Appendix 2.* Reasons for excluding full-text articles**

|  |  |
| --- | --- |
| **Study** | **Reason for exclusion** |
| Ali, 20151 | Study design was not clear (probable cohort study) |
| Apata, 20172 **\*** | Incidence of CRBSI has not reported. Bloodstream infections are grouped together with tunnel-site infections |
| Banton, 20023 | Incidence of CRBSI as counts (%) has not been reported and cannot be calculated |
| Camins, 20104 **\*** | Incidence of CRBSI has not been reported. Rates are expressed per dialysis session |
| Camins, 20135 | Incidence of CRBSI as counts (%) has not been reported and cannot be calculated |
| Eggimann, 20106  Eggimann, 20117 | Incidence of CRBSI has not been reported. Results are reported grouping together all types of bloodstream infections or primary bacteremias |
| Gould, 20118 | The control group uses an antimicrobial-impregnated dressing. Two types of CHG dressings are compared |
| Gould, 20109 | The CHG dressing was implemented along with catheter care "bundle" practices. The control group used silver alginate patch for 3 months |
| Hanazaki, 199910 | Incidence of CRBSI has not been reported. Skin colonization was the only variable assessed |
| Ivanova, 201611 | Incidence of CRBSI has not been reported |
| Karlnoski, 201912 | The control group uses an antimicrobial-impregnated dressing. A CHG impregnated sponge is compared to a silver-plated dressing |
| Karpanen, 201613 | Incidence of CRBSI has not been reported. Skin colonization and catheter tip colonization were the outcomes assessed |
| Kawamura, 201414 | Zero outcomes in each study arm |
| Krau, 2009 15 | Not a research article. This is a commentary |
| Loftus, 201416 | Incidence of CRBSI has not been reported |
| Lewis, 201817 | Not enough information to calculate the incidence of CRBSI |
| Maki, 200018 | Overlapping data with another abstract |
| Miller, 201119 | Not enough information to calculate incidence of CRBSI. Only aggregated rates for CRBSI among different groups are shown |
| Onder, 200920 **\*** | CRBSI is defined as positive blood cultures obtained from the catheter |
| Pedrolo, 201421 | Overlapping data with another article |
| Pfaff, 201222 | The control group uses an antimicrobial-impregnated dressing. Two types of CHG dressings (Biopatch® vs Tegaderm®) are compared |
| Richtmann, 201123 | Incidence of CRBSI as counts (%) has not been reported and cannot be calculated |
| Righetti, 201624 **\*** | Cross-over RCT in which analyses could not be adjusted for within-patient correlation |
| Scheithauer, 201425 | Incidence of CRBSI as counts (%) has not been reported and cannot be calculated |
| Schroeder, 201226 | Incidence of CRBSI has not been reported. Catheter exit-site colonization was the reported outcome |
| Sharma, 201327 | Not enough information to calculate incidence of CRBSI. The number of participants in the intervention and control group are unknown |
| Telli, 201528 | The CHG dressing was implemented along with changes in infection control measures (i.e., swab sticks with CHG, staff education). The effectiveness of CHG dressing alone cannot be determined |
| Webster, 201629 | The control group is an antimicrobial-impregnated dressing. The CHG dressing (Biopatch®) is compared to a Foam disc |
| Webster, 201730 | The control group is an antimicrobial-impregnated dressing. The CHG dressing (Biopatch®) is compared to a Foam disc |
| Wong, 201231 | Descriptive study. No control group without CHG dressing |
| Unpublished RCT 32 | There are no results available. Authors were contacted with no response |
| Yu, 201533 | Overlapping data with another article |

Abbreviations: CHG, chlorhexidine dressing; CRBSI, catheter-related bloodstream infection; RCT, randomized controlled trial

**\***Studies performed in hemodialysis patients

***Appendix 3.* Sample size and incidence of CRBSI and exit-site/tunnel infections in the included studies**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **First author, year, location** | **No. of catheters studied**  **(no. of patients if applicable)a** | | **Mean catheter indwelling time (days)b** | | **Catheter-related bloodstream infection** | | | | **Exit-site/tunnel infections** | | | | | |
| **n (%)** | | **Rate**  **(1,000 catheter-days)** | | **n (%)** | | | **Rate**  **(1,000 catheter-days)** | | |
| **CHG group** | **Control group** | **CHG group** | **Control group** | **CHG group** | **Control group** | **CHG group** | **Control group** | **CHG group** | | **Control group** | **CHG group** | **Control group** | |
| Arpa, 2013 | 63 | 60 | 7.7 | 7.8 | 0 (-) | 1 (1.7) | NR | | 0 (-) | | 1 (1.7) | NR | | |
| Arvaniti, 2012 | 150 | 156 | 7 | 7 | 3 (2) | 2 (1.3) | 2.8 | 1.4 | 1 (0.7) | | 2 (1.3) | NR | | |
| Biehl, 2016c | 307 | 306 | 19 (SD 12.1) | 18.5 (SD 12.1) | Definite CRBSI:  13 (4.2) | Definite CRBSI:  24 (7.8) | Definite CRBSI: 2.2 | Definite CRBSI 4.5 | NR | | | NR | | |
| Chambers, 2005 | 58 (52) | 54 (43) | 140.8 (SD 100.5) | 146 (SD 109.8) | 0/58 (-) | 4/54 (7.4) | NR | | 5/58 (8.6) | | 23/54 (42.6) | NR | | |
| Chan, 2017 | 86 | 35 | 9.4 | 8.6 | 1 (1.2) | 0 (-) | NR | | 2 (2.3) | | 2 (6.0) | NR | | |
| Duzkaya, 2016 | 50 | 50 | 13.8 (SD 7.0) | 14.2 (SD 7.1) | 1 (2) | 5 (10) | NR | | 1 (2.0) | | 2 (4.0) | NR | | |
| Ergul, 2018 | 63 | 68 | 14.7 | 14.3 | 13 (20.6) | 18 (26.5) | NR | | NR | | | NR | | |
| Garland, 2001 | 335 | 370 | 17.7 | 17.4 | 12/314 (3.8)c | 11/341 (3.2)c | NR | | NR | | | NR | | |
| Gerceker, 2017d | 14 | 13 | 72.5 (SD 55.8) | 85.7 (SD 50.8) | Definite CRBSI 2 (14.3) | Definite CRBSI 0 (-) | Definite CRBSI 2.0 | Definite CRBSI - | 0 (-) | | 2 (15.4) | - | | 1.7 |
| Levy, 2005 | 74 | 71 | NR | NR | 4 (5.4) | 3 (4.2) | NR | | NR | | | NR | | |
| Maki, 2000 | 665 (301)e | 736 (366)e | NR | NR | 8/665 (1.2) | 24/736 (3.3) | NR | | NR | | | NR | | |
| Margatho, 2018 | 47 | 54 | 7.7 (SD 5.1) | 7.7 (SD 5.1) | 1/35 (2.9)f | 2/42 (4.8)f | NR | | 7 (14.9) | | 6 (11.1%) |  | | |
| O’Horo, 2013 | 1237 | 1348 | NR | NR | 51 (4.1) | 69 (5.1) | NR | | 13 (1) | | 28 (2) |  | | |
| Pedrolo, 2014 | 43 | 42 | 4.9 (SD 2.5) | 5 (SD 2.7) | 6 (14.0) | 5 (11.9) | NR | | NR | | | NR | | |
| Pivkina, 2018 | 30 | 30 | 9.5 | 7.3 | 2 (6.7) | 5 (16.7) | 6.9 | 20.6 | 0 (-) | | 2 (6.7) |  | | |
| Roberts, 1998 | 20 (NR)g | 20 (NR)g | 7 (range 4­–2) | 6 (range 2–14) | 1/17 (5.9)  with available data | 0/16 (-)  with available data | NR | | NR | | | NR | | |
| Ruschulte, 2009 | 300 | 301 | 16.6 | 15.8 | 19 (6.3) | 34 (11.3) | NR | | NR | | | NR | | |
| Timsit, 2009 | 1953 (817) | 1825 (819) | 6.7 | 6.7 | 6/1953 (0.3) | 17/1825 (0.9) | 0.4 | 1.3 | 9 (0.5) | 6 (0.3) | | NR | | |
| Timsit, 2012 | 2108 (938) | 2055 (941) | 7.7 | 7 | 9/2108 (0.4) | 22/2055 (1.1) | 0.5 | 1.3 | NR | | | NR | | |
| Yu, 2019 | 259 (NR)h | 215 (NR)h | NR | NR | 8 (3.1) | 6 (2.8) | 5.7 | 4.9 | NR | | | NR | | |

Abbreviations: CRBSI, catheter-related bloodstream infection NR, not reported; SD, standard deviation;

aIn some studies, patients could have received more than one catheter during the study period; they could have been enrolled multiple times in the study. For studies in which this information was not clearly mentioned, we assumed that the number of catheters and patients were the same; patients were only enrolled once during the study period.

bFor studies that reported the catheter indwelling time as a median [inter-quartile range (IRQ) or range], we estimated the mean as devised by Wan et al34

cNot all the catheters had the tip cultured to define an episode as CRBSI

dMultiple definitions of CRBSI are provided in the article. Here, we only report incidence and rates of definite catheter-related bloodstream infections

eNumber of patients per study arm obtained from another article published by the same senior author

fThere were 12 patients in each group from whom blood samples were not taken, and thus the sample size for CRBSI assessment was reduced

gA total of 40 catheters from 32 patients were included

hA total of 474 catheters from 304 patients were analyzed

***Appendix 4.* Definition of the outcomes as described in the included articles**

1. *Catheter-related bacteremia (CRBSI)*

Some articles could use more than one definition. If there was not mention whether the positive blood culture was drawn from a peripheral vein, we assumed that this was the case.

|  |  |
| --- | --- |
| **Definition** | **Articles** |
| **Definite/confirmed CVC-related bacteremia**  Growth of the same pathogen from blood culture of peripheral vein and catheter and one of the following:**35 36**   * Catheter exit site exudate with the same pathogen isolated from the bloodstream * Semiquantitative catheter tip culture yielded greater than 15 colony-forming units (CFUs) of the same pathogen or quantitative (>103 colony forming units) device culture * Simultaneously quantitative cultures of blood samples showed a ratio of 3:1 of CFU between blood samples obtained through a catheter and peripheral vein, or the differential time to positivity was greater than or equal to 2 hours | **37-49 (\*)** |
| **“Probable” CVC-related bacteremia**   * Bloodstream infection in a patient with an intravascular catheter * Signs of infection with no other recognized focus of infection apart from the catheter and * ± Positive catheter-tip culture (same organism recovered from tip and blood, without mention to semiquantitative roll-plate culture) | **50-54** |
| **CVC-associated bloodstream infection as defined by the Centers for Disease Control and Prevention (CDC)55** | **54** |
| **No definition provided or unclear** | **56 57** |

(\*) Of these articles, Timsit et al 201245 performed a posthoc analysis in which episodes where reclassified according to the CDC criteria. This information has not been included in this meta-analysis.

1. *Exit-site infection/tunnel infection*

|  |  |
| --- | --- |
| **Exit-site infection** (with or without concomitant bloodstream infection) | **Articles** |
| Purulent discharge at exit site or at catheter removal | **38 40 44 57** |
| Redness, pain and tenderness within 2 cm of the catheter exit site | **41 48 50 56** |
| Growth of ≥15 CFUs in the culture of the catheter end and find­ings of inflammation at the catheter insertion site in the absence of blood-borne infection | **46** |
| Infection at the catheter entry site (without other details) | **37** |

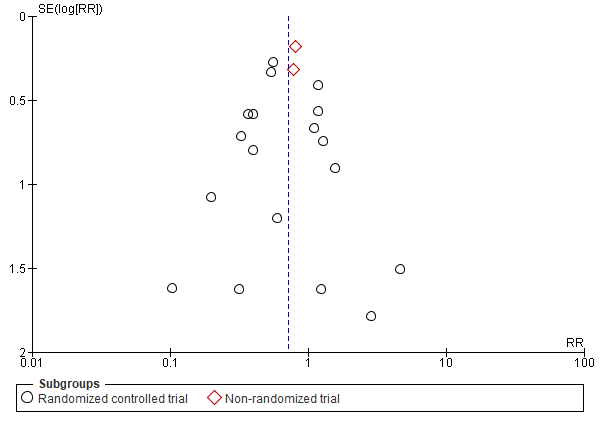
|  |  |
| --- | --- |
| **Tunnel infection** (with or without concomitant bloodstream infection) | **Articles** |
| Tenderness, erythema and induration along over the subcutaneous tunnel > 2 cm from the catheter exit site | **41 50** |

1. *Adverse events*

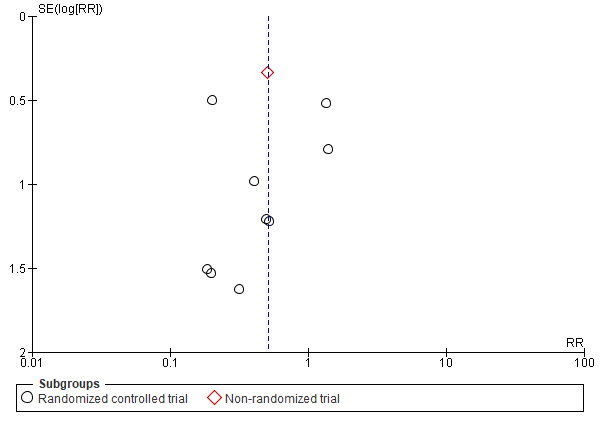
|  |  |
| --- | --- |
| **Definition** | **Articles** |
| Severe contact dermatitis (leading to permanent discontinuation of the study dressing) | **44 45** |
| Contact dermatitis (regardless of severity) | **47** |
| Skin allergic reaction | **37** |
| Skin irritation | **48 57** |
| Local erythema | **53** |
| Any of the following: Blisters, itchiness, skin tear, maceration, rash, erythema, bruise at device removal, others | **39 40 52** |

***Appendix 5.* Funnel plot of included studies**

*A. Twenty studies assessing CRBSI*

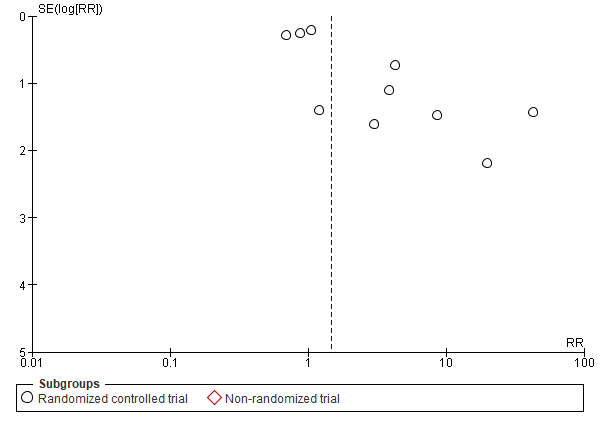


*B. Ten studies reporting exit-site and/or tunnel infections*



There is publication bias. This plot is asymmetric toward a large association between CHG dressing and reduced infections.

*C. Ten studies reporting adverse events*



There is publication bias. This plot is asymmetric toward a large association between CHG dressing and adverse events.

***Appendix 6.* Subgroup analyses evaluating the effectiveness of CHG dressing to prevent CRBSIs**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subgroup analyses** | **No. of studies** | **No. of catheters**  **(CHG/control)** | **Pooled risk ratio (95% CI)** | **I2 test** |
| *All studies* | 20 | 7,826/7,764 | 0.71 (0.58–0.87) | 0% |
| **Study design** |  |  |  |  |
| RCTs37-50 52-54 57 | 18 | 6,526/6,348 | 0.65 (0.49–0.85) | 0% |
| Non-randomized trials51 56 | 2 | 1,300/1,416 | 0.80 (0.59–1.09) | 0% |
| **Definition of CRBSI** |  |  |  |  |
| Definite/confirmed CRBSI37-49 | 13 | 6,062/5,936 | 0.60 (0.44–0.82) | 0% |
| “Probable” CRBSI or CDC criteria is met50-54 | 5 | 497/450 | 0.88 (0.55–1.41) | 0% |
| **Maximal sterile barrier precautions during catheter insertion** |  |  |  |  |
| Precautions stated37 38 41-48 52-54 57 | 14 | 5,410/5,217 | 0.71 (0.52–0.99) | 0% |
| No precautions are mentioned39 40 49-51 56 | 6 | 2,466/2,597 | 0.65 (0.51–0.82) | 0% |
| **Skin antisepsis preparation before catheter insertion** |  |  |  |  |
| Povidone iodine (± alcohol)37 38 44 46 50 | 5 | 2,274/2,145 | 0.41 (0.17–1.00) | 0% |
| CHG (± alcohol)40 42 48 51 53 54 57 | 7 | 564/477 | 0.83 (0.51–1.34) | 0% |
| **Reason for drawing blood cultures** |  |  |  |  |
| Only if signs or suspicion of infection37-40 42 43 47 48 50-53 | 12 | 1,641/1,600 | 0.73 (0.55–0.98) | 0% |
| **Assessment of CRBSI outcomes in RCTs** |  |  |  |  |
| Researcher was blinded38 40 44 45 48 49 | 6 | 4,997/4,849 | 0.48 (0.26–0.88) | 0% |
| Researcher was not blinded or unknown37 39 41-43 46 47 50 52-54 57 | 12 | 1,529/1,499 | 0.70 (0.51–0.95) | 0% |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subgroup analyses** | **No. of studies** | **No. of catheters**  **(CHG/control)** | **Pooled risk ratio (95% CI)** | **I2 test** |
| *All studies* | 20 | 7,826/7,764 | 0.71 (0.58–0.87) | 0% |
| **Type of dressing** |  |  |  |  |
| CHG-impregnated disc38 40 42-44 47 49 50 53 56 | 10 | 5,009/5,113 | 0.74 (0.57­–0.95) | 0% |
| CHG transparent dressing37 39 41 45 48 51 54 57 | 8 | 2,714/2,559 | 0.64 (0.44­­­­­–0.94) | 0% |
| **Study population and settings** |  |  |  |  |
| Adults38-40 42-45 48-50 52 54 56 57 | 14 | 7,178/7,108 | 0.67 (0.53–0.84) | 0% |
| ICU38 42 44 45 48 52 54 57 | 8 | 4,525/4,328 | 0.70 (0.41–1.18) | 0% |
| Onco-hematological patients39 43 50 | 3 | 665/661 | 0.54 (0.36–0.81) | 0% |
| Neonates and pediatric populations37 41 46 47 51 53 | 6 | 578/603 | 0.90 (0.57–1.40) | 0% |
| **Type of catheter** |  |  |  |  |
| Short-term CVCs37-39 43 46 48 51-54 57 | 11 | 1,374/1,341 | 0.67 (0.50–0.90) | 0% |
| Length of catheterization > 7  days37 39 43 46 48 51 57 | 7 | 848/857 | 0.58 (0.42–0.81) | 0% |
| Length of catheterization ≤ 7 days38 42 52 | 3 | 210/214 | 1.34 (0.54–3.32) | 6% |
| Long-term CVCs41 50 56 | 3 | 1,309/1,415 | 0.80 (0.22–2.95) | 33% |
| **Insertion site** |  |  |  |  |
| Studies including only short-term CVCs with jugular/subclavian insertion37 51-53 57 | 5 | 273/271 | 0.82 (0.51–1.32) | 0% |
| Studies including mainly short-term CVCs with femoral insertion (≥44% of the study cohort)33 38 46 | 3 | 459/421 | 0.84 (0.29–2.42) | 17% |
| **Frequency of dressing change** |  |  |  |  |
| Similar frequency of dressing change in study groups37-45 48 53 57 | 12 | 5,137/4,910 | 0.58 (0.42–0.82) | 0% |
| Different frequency of dressing change between study groups (7 days in the CHG group vs ≤3 days)46 49 51 52 54 | 5 | 1,080/1,115 | 0.73 (0.46–1.14) | 0% |

Abbreviations: CDC, Centers for Disease Control and Prevention; CHG, chlorhexidine dressing; CI, confidence interval; CRBSI, catheter-related bloodstream infection; CVC, central venous catheter; ICU, intensive care unit; RCT, randomized-controlled trial

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