

Appendix Table. Features of the Included Studies*

| Study, Year (Reference) | Diagnostic Test Studied | Criteria for Positivity | Reference Standard Used | Basis of Reference Standard | Study Design | Patients/Catheters or Infectious Episodes, n/n | Sample | Rationale for Performance of Diagnostic Test |
|--------------------------------|-------------------------|-------------------------|---|-----------------------------|---------------|--|---|---|
| Maki et al., 1977 (25) | Qualitative CSC | Any growth | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | 250/250 | General inpatients | All catheters at removal |
| Maki et al., 1977 (64) | Qualitative CSC | Any growth | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | 6/50 | Patients with burns | All catheters at removal |
| Cleri et al., 1980 (26) | Qualitative CSC | Any growth | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | NR/149 | General inpatients | Suspected bloodstream infection |
| Jones et al., 1986 (56) | Qualitative CSC | Any growth | Primary bloodstream infection† | Blood culture | Prospective | NR/379 | Patients with cancer | All catheters at removal |
| Nahass et al., 1990 (57) | Qualitative CSC | Any growth | Primary bloodstream infection† | Blood culture | Prospective | 80/80 | Surgical patients | All patients |
| Whitman and Boatman, 1995 (58) | Qualitative CSC | Any growth | Qualitative PBC and culture of catheter segment or reservoir material | Catheter segment | Retrospective | 29/29 | Patients with cancer, sickle-cell disease, and HIV infection | Suspected bloodstream infection |
| Maki et al., 1977 (25) | Semi-quantitative CSC | ≥15 CFU | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | 250/250 | General inpatients | All catheters at removal |
| Maki et al., 1977 (64) | Semi-quantitative CSC | ≥15 CFU | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | 6/50 | Patients with burns | All catheters at removal |
| Moyer et al., 1983 (70) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 67/67 | Patients receiving total parenteral nutrition and patients with burns | All catheters at removal |
| Cooper and Hopkins, 1985 (59) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 224/330 | Mostly patients in the ICU | All catheters at removal |
| Collignon et al., 1986 (66) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 440/780 | Patients in the ICU | All catheters at removal |
| Jones et al., 1986 (56) | Semi-quantitative CSC | ≥15 CFU | Primary bloodstream infection† | Blood culture | Prospective | NR/379 | Patients with cancer | All catheters at removal |
| Collignon et al., 1987 (69) | Semi-quantitative CSC | ≥15 CFU | Primary bloodstream infection† | Blood culture | Prospective | NR/322 | NR | All catheters at removal |
| Rello et al., 1989 (72) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC or quantitative CSC | Catheter segment | Prospective | 41/50 | Patients with end-stage renal disease | All catheters at removal |
| Cercenado et al., 1990 (61) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | NR/139 | General inpatients | All catheters at removal |
| Rello et al., 1991 (62) | Semi-quantitative CSC | ≥15 CFU | Primary bloodstream infection† | Blood culture | Prospective | 49/91 | General inpatients | Suspected bloodstream infection |
| Aufwerber et al., 1991 (63) | Semi-quantitative CSC | ≥15 CFU | Qualitative CSC and qualitative PBC | Catheter segment | Retrospective | 453/542 | Patients in the ICU | All catheters at removal |
| Raad et al., 1992 (65) | Semi-quantitative CSC | ≥15 CFU | Catheter segment culture and qualitative PBC; clinical signs and symptoms of infection | Catheter segment | Prospective | 153/313 | General inpatients | All catheters at removal |
| Widmer et al., 1992 (67) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | NR/157 | Patients in the ICU | All catheters at removal |
| Gutierrez et al., 1992 (60) | Semi-quantitative CSC | ≥15 CFU | Semi-quantitative CSC or quantitative CSC and qualitative PBC | Catheter segment | Prospective | NR/98 | General inpatients | Suspected bloodstream infection |
| Maki et al., 1996 (68) | Semi-quantitative CSC | ≥15 CFU | Culture isolates of hub, infusate, or catheter segment and bloodstream infection by DNA subtyping | Blood culture | Prospective | NR/400 | General inpatients | All catheters at removal |
| Kite et al., 1997 (32) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and quantitative CSC or semi-quantitative CSC | Catheter segment | Prospective | 216/230 | Surgical patients in the ICU | All catheters and suspected bloodstream infection |
| Kite et al., 1999 (37) | Semi-quantitative CSC | ≥15 CFU | Quantitative PBC and semi-quantitative CSC or quantitative CSC | Catheter segment | Prospective | NR/112 | Surgical patients | Suspected bloodstream infection |
| Snydman et al., 1982 (29) | Semi-quantitative CSC | ≥15 CFU | Qualitative PBC and Qualitative CSC | Catheter segment | Prospective | 100/69 | Patients receiving total parenteral nutrition | All patients |

Appendix Table—Continued

| Study, Year (Reference) | Diagnostic Test Studied | Criteria for Positivity | Reference Standard Used | Basis of Reference Standard | Study Design | Patients/Catheters or Infectious Episodes, n/n | Sample | Rationale for Performance of Diagnostic Test |
|--------------------------------|--|---|--|-----------------------------|-------------------------------|--|--|---|
| Widmer et al., 2003 (71) | Semi-quantitative CSC | ≥15 CFU | Semi-quantitative CSC or quantitative CSC and qualitative PBC | Catheter segment | Prospective | NR/1000 | NR | All catheters at removal |
| Rello et al., 1989 (72) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and semi-quantitative CSC or quantitative CSC | Catheter segment | Prospective | 41/50 | Patients with end-stage renal disease | All catheters at removal |
| Cleri et al., 1980 (26) | Quantitative CSC | ≥1000 CFU | Qualitative CSC and qualitative PBC | Catheter segment | Prospective | NR/149 | General inpatients | Suspected bloodstream infection |
| Brun-Buisson et al., 1987 (27) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and qualitative CSC; no other focus of infection | Catheter segment | Prospective | 231/331 | Patients in the ICU | All catheters at removal |
| Rello et al., 1991 (62) | Quantitative CSC | ≥1000 CFU | Primary bloodstream infection | Blood culture | Prospective | 49/91 | General inpatients | Suspected bloodstream infection |
| Kite et al., 1999 (37) | Quantitative CSC | ≥1000 CFU | Quantitative PBC and semi-quantitative CSC or quantitative CSC | Catheter segment | Prospective | NR/112 | Surgical patients | Suspected bloodstream infection |
| Gutierrez et al., 1992 (60) | Quantitative CSC | ≥1000 CFU | Semi-quantitative CSC or quantitative PBC and qualitative PBC | Catheter segment | Prospective | NR/98 | General inpatients | Suspected bloodstream infection |
| Kite et al., 1997 (52) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and quantitative PBC | Catheter segment | Prospective | NR/228 | Surgical patients in the ICU | All catheters and suspected bloodstream infection |
| Sherertz et al., 1990 (28) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Retrospective | 104/216 | Mostly patients in the ICU | Suspected bloodstream infection |
| Raad et al., 1992 (65) | Quantitative CSC | ≥1000 CFU | Catheter segment culture, qualitative PBC, and clinical symptoms and signs of infection | Catheter segment | Prospective | 153/313 | General inpatients | All catheters at removal |
| Maki et al., 1996 (68) | Quantitative CSC | ≥1000 CFU | Culture isolates of hub, infusate, or catheter segment and bloodstream infection concordant by DNA subtyping | Blood culture | Prospective | NR/400 | General inpatients | All catheters at removal |
| Kelly et al., 1996 (73) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and qualitative CSC | Catheter segment | Retrospective and prospective | NR/405 | General inpatients | All catheters at removal |
| Douard et al., 1999 (32) | Quantitative catheter septum and tip culture | >4-fold increase in growth from catheter blood compared with peripheral blood | No other focus of infection, and 1) purulence at the insertion site with positive exudates and PBCs or 2) signs and symptoms of sepsis with positive quantitative CSC and positive PBC | Catheter segment | Prospective | 170/170 | Immuno-compromised patients | All catheters at removal |
| Bjornson et al., 1982 (75) | Quantitative CSC | ≥1000 CFU | Qualitative PBC and CSC | Catheter segment | Prospective | 53/74 | Patients receiving total parenteral nutrition | All catheters at removal |
| Widmer et al., 2003 (71) | Quantitative CSC | ≥1000 CFU | Semi-quantitative CSC or quantitative CSC and qualitative PBC | Catheter segment | Prospective | NR/1000 | NR | All catheters at removal |
| Snydman et al., 1982 (29) | IVD-drawn qualitative blood culture | Any growth | Qualitative PBC and Qualitative CSC | Catheter segment | Prospective | 100/69 | Patients receiving total parenteral nutrition | All patients |
| Bozzetti et al., 1984 (76) | IVD-drawn qualitative blood culture | Any growth | Semi-quantitative CSC and qualitative PBC | Catheter segment | Prospective | 64/256 | Patients with cancer | All patients |
| Paya et al., 1989 (77) | IVD-drawn qualitative blood culture | Any growth | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 44/52 | Surgical patients in the ICU | Suspected bloodstream infection |
| Whitman and Boatman, 1995 (48) | IVD-drawn qualitative blood culture | Any growth | Semi-quantitative CSC and qualitative PBC | Catheter segment | Retrospective | 29/29 | Patients with cancer, sickle-cell disease, and HIV infection | Suspected bloodstream infection |
| Raucher et al., 1984 (78) | IVD-drawn qualitative blood culture | >5:1 | Peripheral qualitative blood culture and catheter blood culture | Blood culture | Prospective | 28/30 | Children | Suspected bloodstream infection |

Appendix Table—Continued

| Study, Year (Reference) | Diagnostic Test Studied | Criteria for Positivity | Reference Standard Used | Basis of Reference Standard | Study Design | Patients/Catheters or Infectious Episodes, n/n | Sample | Rationale for Performance of Diagnostic Test |
|---------------------------------|---|--|--|-----------------------------|---------------|--|---|--|
| Capdevila et al., 1992 (31) | IVD-drawn qualitative blood culture | Any growth | Qualitative PBC and semi-quantitative CSC; no other source; recovery after catheter removal | Catheter segment | Prospective | 64/107 | NR | Suspected bloodstream infection |
| Moyer et al., 1983 (70) | IVD-drawn qualitative blood culture | Any growth | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 67/67 | Patients receiving total parenteral nutrition and patients with burns | All catheters at removal |
| Paya et al., 1989 (77) | IVD-drawn quantitative blood culture | Any growth | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 44/52 | Surgical patients in the ICU | Suspected bloodstream infection |
| Snydman et al., 1982 (29) | IVD-drawn quantitative blood culture | >15 CFU | Qualitative PBC and qualitative CSC | Catheter segment | Prospective | 100/69 | Patients receiving total parenteral nutrition | All patients |
| Raucher et al., 1984 (78) | IVD-drawn quantitative blood culture | >5:1 | Qualitative PBC and catheter blood culture | Blood culture | Prospective | 28/30 | Children | Suspected bloodstream infection |
| Capdevila et al., 1992 (31) | IVD-drawn quantitative blood culture | >100 CFU | Qualitative PBC and semi-quantitative CSC; no other source; recovery after catheter removal | Catheter segment | Prospective | 64/107 | NR | Suspected bloodstream infection |
| Moyer et al., 1983 (70) | IVD-drawn quantitative blood culture | ≥25 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 67/67 | Patients receiving total parenteral nutrition and patients with burns | All catheters at removal |
| Franklin et al., 2004 (91) | IVD-drawn quantitative blood culture | ≥100 CFU | Paired quantitative blood culture | Blood culture | Retrospective | 241/241 | Children with cancer | Suspected bloodstream infection |
| Catton et al., 2002 (94) | IVD-drawn quantitative blood culture | >100 CFU | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 205/205 | Surgical patients | Suspected bloodstream infection |
| Flynn et al., 1988 (34) | Paired lysis–centrifugation± quantitative blood culture | >5-fold increase in growth from catheter compared with periphery | Qualitative PBC and qualitative catheter blood culture | Blood culture | Prospective | 13/13 | Children | Suspected bloodstream infection |
| Sanchez-Conde et al., 2003 (79) | Paired lysis–centrifugation± quantitative blood culture | >5-fold increase in growth from catheter compared with periphery | Qualitative PBC and CSC | Catheter segment | Prospective | 145/145 | Adults | Suspected bloodstream infection |
| Douard et al., 1991 (74) | Paired quantitative blood culture | >5-fold | Positive paired quantitative blood cultures | Blood culture | Prospective | NR/53 | Children with hematologic or oncologic illness | Suspected bloodstream infection |
| Douard et al., 1994 (33) | Paired quantitative blood culture | >3:1 | Positive PBC and CSCs | Catheter segment | Prospective | 58/58 | Medical and surgical patients in the ICU | Suspected bloodstream infection |
| Mosca et al., 1987 (80) | Paired lysis–centrifugation± quantitative blood culture | >5-fold | Clinical follow-up | Other | Prospective | 25/26 | General inpatients | Suspected bloodstream infection |
| Paya et al., 1989 (77) | Paired lysis–centrifugation± quantitative blood culture | >30 CFU compared with peripheral sample | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | 44/52 | Surgical patients in the ICU | Suspected bloodstream infection |
| Fortun et al., 2000 (81) | Paired lysis–centrifugation± quantitative blood culture | >5:1 | Qualitative PBC and semi-quantitative CSC | Catheter segment | Prospective | NR/118 | General inpatients | All catheters at removal |
| Capdevila et al., 1992 (31) | Paired quantitative blood culture | >4:1 | Qualitative PBC and semi-quantitative CSC; no other source of infection; recovery after catheter removal | Catheter segment | Prospective | 64/107 | Patients in the ICU | Suspected bloodstream infection |
| Raucher et al., 1984 (78) | Paired quantitative blood culture | >5:1 | Qualitative PBC and catheter blood culture | Blood culture | Prospective | 28/30 | Children | Suspected bloodstream infection |

Appendix Table—Continued

| Study, Year (Reference) | Diagnostic Test Studied | Criteria for Positivity | Reference Standard Used | Basis of Reference Standard | Study Design | Patients/Catheters or Infectious Episodes, n/n | Sample | Rationale for Performance of Diagnostic Test |
|---------------------------------|---|---|--|-----------------------------|---------------|--|--|---|
| Douard et al., 1999 (32) | Paired lysis–centrifugation† quantitative blood culture | >4-fold increase in growth from catheter-drawn blood compared with peripherally drawn blood | No other focus of infection, and 1) purulence at the insertion site with positive exudates and PBCs or 2) signs and symptoms of sepsis with positive quantitative CSC and positive PBC | Catheter segment | Prospective | 170/170 | Immuno-compromised patients | All catheters at removal |
| Blot et al., 1999 (35) | Differential time to positivity | >2 h | Qualitative PBC and quantitative CSC | Catheter segment | Prospective | 87/93§ | General inpatients | Suspected bloodstream infection |
| Malgrange et al., 2001 (83) | Differential time to positivity | >2 h | Qualitative PBC and quantitative CSC | Catheter segment | Prospective | NR/98§ | Patients with cancer | Suspected bloodstream infection |
| Rjinders et al., 2001 (84) | Differential time to positivity | >2 h | Qualitative PBC and quantitative CSC | Catheter segment | Prospective | 10/10 | Medical and surgical patients in the ICU | Suspected bloodstream infection |
| Blot et al., 1998 (82) | Differential time to positivity | >2 h | Qualitative PBC and quantitative CSC | Catheter segment | Retrospective | NR/42§ | General inpatients | Suspected bloodstream infection |
| Gaur et al., 2002 (89) | Differential time to positivity | >2 h | Paired quantitative blood culture | Blood culture | Prospective | NR/28§ | Children with cancer | Suspected bloodstream infection |
| Mermel et al., 1998 (85) | Differential time to positivity | >2 h | Clinical definition | Other | Retrospective | 36/31 | General inpatients | Suspected bloodstream infection |
| Raad et al., (90) | Differential time to positivity | >2 h | No other focus of infection; signs and symptoms; and semi-quantitative catheter tip culture with PBC or paired quantitative blood culture, or both | Blood culture | Prospective | 201/191 | Adults with cancer | Suspected bloodstream infection |
| Seifert et al., 2003 (36) | Differential time to positivity | >2 h | Paired quantitative blood culture, DNA subtyping, and quantitative CSC | Blood culture | Prospective | 51/51 | Patients with neutropenia | Suspected bloodstream infection |
| Sanchez-Conde et al., 2003 (79) | Differential time to positivity | >2 h | Qualitative PBC and quantitative CSC | Blood culture | Prospective | 145/145 | Adults | Suspected bloodstream infection |
| Rushforth et al., 1993 (86) | Acridine orange leukocyte cytopsin | Any growth | Paired quantitative blood culture | Blood culture | Prospective | 51/95§ | Infants | Suspected bloodstream infection |
| von Baum et al., 1998 (87) | Acridine orange leukocyte cytopsin | Any growth | Semi-quantitative CSC and qualitative PBC | Catheter segment | Prospective | 14/14 | Adults in the ICU | Random sampling of both suspected bloodstream infection and not bloodstream infection; data obtained from subgroup analysis |
| Kite et al., 1999 (40) | Acridine orange leukocyte cytopsin | Any growth | Quantitative PBC and semi-quantitative CSC or quantitative CSC | Catheter segment | Prospective | NR/112 | Surgical patients | Suspected bloodstream infection |
| Tighe et al., 1996 (36) | Acridine orange leukocyte cytopsin | Any growth | Semi-quantitative CSC and qualitative PBC | Catheter segment | Prospective | 50/50 | General inpatients | Suspected bloodstream infection |
| Bong et al., 2003 (87) | Acridine orange leukocyte cytopsin | Any growth | Semi-quantitative CSC and qualitative PBC | Catheter segment | Prospective | 50/50 | Surgical patients | Suspected bloodstream infection |

* CFU = colony-forming units; CSC = catheter segment culture; ICU = intensive care unit; IVD = intravascular device; NR = not reported; PBC = peripheral blood culture.

† Presence of bacteremia while the catheter is in place and no other probable source of bacteremia.

‡ Isolator system (Wampole Laboratories, Cranbury, New Jersey).

§ Infectious episodes.