

Publications – Charles Edmiston, PhD

Peer-Reviewed Journal Publications/Original Manuscripts:

1976

1. Gordon, R.C., Stevens, L.I., Edmiston, C.E. and Mohan, K. Comparative in vitro studies of cinoxacin, nalidixic acid and oxolinic acid. *Antimicrob Agents Chemother* 10:918-921.
2. Mohan, K., Gordon, R.C., Beamin, T.C., Belding, R.C., Leucke, D., Edmiston, C.E. and Gerhard, R. Synergism of penicillin and gentamicin against *Listeria monocytogenes* in ex vivo hemodialysis culture. *J Infect Dis* 135:51-54.

1977

3. Dunkerley, B., Cromer, M., Edmiston, C.E. et al. Evaluation of betadine as a disinfectant in routine endoscopy practice. *GI Endosc* 2:156-160.

1979

4. Edmiston, C.E. and Gordon, R.C. Evaluation of penicillin and gentamicin as a synergistic combination in experimental murine listeriosis. *Antimicrob Agents Chemother* 16:862-863.
5. Edmiston, C.E., Hulsey, T.K., Scott, H.W., Hoyumpa, A.M. and Wilson, F.A. Microbial colonization with hepatic abnormalities in jejunoileal bypass with resection, ileal mucous fistula and ileocolostomy. *J Infect Dis* 140:358-369.

1982

6. Edmiston, C.E., Avant, G., and Wilson, F.A. Anaerobic bacterial populations on the normal and diseased human biopsies obtained at colonoscopy. *Appl Environ Microbiol* 153:1173-1181.

1984

7. Edmiston, C.E., Goheen, M.P. and Malaney, G.W. Environmental assessment: Utilization of Coomassie blue G soluble protein assay as an index of environmental toxicity. *Haz Waste* 1:205-215.

1985

8. Edmiston, C.E., Goheen, M.P., Malaney, G.W. and Mills, W. Evaluation of carbamate toxicity to a protozoan population as measured by the acute plate assay and Warburg respirometer. *Environ Res* 36:338-350.
9. Matthews, E.L., Adams, M.B., Edmiston, C.E., Engstrand, D.J., Condon, R.E. and Buchmann, E.J. Toxicity of povidone-iodine peritoneal lavage in fecal peritonitis. *Surg Forum* 36:157-159.

1986

10. Condon, R.E, Friedhoff, L.T., Edmiston, C.E. and Levinson, B. Aztreonam concentration in abdominal tissue and bile. *Antimicrob Agents Chemother* 29:1101-1103.

1987

11. Jones, F.E., Malangoni, M.A., Edmiston, C.E., Spiegel, C., Walker, A.P. and Condon, R.E. Antibiotic management of intra-abdominal sepsis. *Inf Surg* 6:15-25.

1988

12. Walker, A.P., Edmiston, C.E., Krepel, C.J. and Condon, R.E. A prospective study of the microflora of non-puerperal breast abscess. *Arch Surg* 123:908-911.

13. Edmiston, C.E., Krepel, C.J. Clausz, J.C. and Condon, R.E. Comparative in vitro beta-lactam activity against aerobic and anaerobic surgical isolates. *Diagn Microbiol Infect Dis* 9:105-113.

14. Krepel, C.J., Schopf, L.R., Gordon, R.C. and Edmiston, C.E. Comparative in vitro activity of cefixime with eight other antimicrobials against Enterobacteriaceae, Streptococcus and Haemophilus influenzae. *Curr Ther Res* 43:296-302.

15. Edmiston, C.E., Krepel, C.J., Scarry, R.L. and Goheen, M.P. In vitro activity of YM - 13115 a new cephalosporin compared with other beta-lactams against Pseudomonas aeruginosa. *Cum Ther Res* 43:657-662.

16. Siverhus, D.J., Edmiston, C.E., Clausz, J.C. and Goheen, M.P. Post-antibiotic effect Bacteroides fragilis group. *Ann Clin Lab Sci* 18:326-336.

1989

17. Groner, J.I., Edmiston, C.E., Telford, G.L., Krepel, C.J. and Condon, R.E. The efficacy of oral antimicrobials in reducing aerobic and anaerobic colonic mucosal flora. *Arch Surg* 124:281-284.

18. Edmiston, C.E., Krepel, C.J. and Walker, A.P. Recovery of Mobiluncus curtisii ssp. holmesii from non-puerperal breast abscess. *Eur J Clin Microbiol Infect Dis* 8:315- 316.

19. Schmitt, D.D., Levy, M.E., Bandyk, D.F., Krepel, C.J., Edmiston, C.E., Seabrook, G.R. and Towne, J.B. The effect of subinhibitory concentrations of antibiotics on adherence of slime producing Staphylococcus epidermidis to prosthetic surfaces. *J Chemother* 4:269-272.

20. Almassi, G.H., Edmiston, C.E. and Olinger, G.N. Tissue and mediastinal fluid levels of long-acting cephalosporin in cardiac surgical patients. *Current Ther Res* 45: 1-6.

21. Edmiston, C.E. and Goheen, M.P. Impact of subinhibitory quinolone activity on adherence of Enterobacteriaceae to small bowel cell population. In Proceedings of the 2nd International Symposium on New Quinolones. *Rev Infect Dis* 11:948-949.

22. Schmitt, D.D., Bandyk, D.F., Edmiston, C.E., Levy, M.E., Seabrook, G.R. and Towne, J.B. The in vitro effect of subinhibitory quinolones and vancomycin on adherence of slime producing Staphylococcus

epidermidis to vascular prostheses. In Proceedings of the 2nd International Symposium on New Quinolones. Rev Infect Dis 11:947-948.

23. Edmiston, C.E., Schmitt, D.D., Seabrook, G.R. Coagulase negative staphylococcal infections in vascular surgery: Epidemiology and pathogenesis. Infect Control Hosp Epidemiol 10:111-117.

1990

24. Edmiston, C.E., Goheen, M.P., Kornhall, S., Jones, F.E. and Condon, R.E. Fecal peritonitis: microbial adherence to serosa mesothelium and resistance to peritoneal lavage. World J Surg 14:176-183.

25. Siverhus, D.J., Schmitt, D.D., Edmiston, C.E., Goheen, M.P., Bandykk, D.F., Seabrook, G.R. and Towne, J.B. Adherence of mucin and non-mucin producing staphylococci to preclotted and albumin coated velour knitted vascular grafts. Surgery 107: 613-619.

26. Levy, M.E., Schmitt, D.D., Edmiston, C.E., Bandykk, D.F., Krepel, C.J., Seabrook, G.R., and Towne, J.B. Sequential analysis of staphylococcal colonization by body surface cultured on patients undergoing vascular surgery. J Clin Microbiol 28:664-669.

27. Seabrook, G.R., Schmitt, D.D., Bandykk, D.F., Edmiston, C.E., Krepel, C.J. and Towne, J.B. Anastomotic femoral pseudoaneurysm: a prospective investigation of occult infection as an etiologic factor. J Vasc Res 11:624-628.

28. Schmitt, D.D., Edmiston, C.E., Krepel, C.J., Gohr, C.M., Seabrook, G.R., Bandykk, D.F., and Towne, J.B. Impact of post-antibiotic effect (PAE) on bacterial adherence to vascular prosthesis. J Surg Res 48:373-378.

29. Edmiston, C.E., Walker, A.P., Krepel, C.J., and Gohr, C.M. Nonpuerperal breast infection: aerobic and anaerobic microbial from recovery from acute and chronic disease. J Infect Dis 162:695-699.

1991

30. Edmiston, C.E. and Condon, R.E. Bacterial translocation. Surg Gynecol Obstet 173:73-83.

31. Edmiston, C.E., Walker, A.P., Krepel, C.J., Gohr, C.M., Seabrook, G.R., and Frantzides, C.T. Recovery of Streptococcus milleri group from intra-abdominal and soft tissue infected sites. Ann Chin Lab Sci 21:56-61.

32. Kornhall, S., Condon, R.E., Edmiston, C.E., Garancis, J.C. and Jones, F.E. Renal dysfunction in experimental intra-abdominal sepsis: evaluation of a model. Surg Res Comm 11:123-135.

33. Krepel, C.J., Gohr, C.M., Edmiston, C.E., and Farmer, S.G. Anaerobic pathogenesis: collagenase production by Peptostreptococcus magnus and its relationship to site of infection. J Infect Dis 163:1148-1150.

34. Frantzides, C.T., Llanos, E.A., Wittmann, D.H., Greenwood, B., and Edmiston, C.E. Prostaglandins and modulation of small bowel myoelectric activity. Am J Physiol 262:G488-G497.

35. Fassel, T.A., Van Over, J.E., Hanser, C.C., Edmiston, C.E., and Sanger, J.R. Adhesion of staphylococci to breast prosthesis biomaterials: an electron microscopic evaluation. *Cells and Materials* 1:199-208.

36. Browne, B.J., Johnson, C.P., Edmiston, C.E., Hlava, M.A., Moore, G.H., Roza, A.M., Telford, G.L., and Adams, M.B. Small bowel transplantation promotes bacterial overgrowth and translocation. *J Surg Res* 51:512-517.

1992

37. Rom, A.M., Edmiston, C.E., Frantzides, C.T., Moore, G.H., Nowak, T.V., Johnson, C.P. and Adams, M.B. Untreated diabetes mellitus promotes intestinal microbial overgrowth. *Am J Surg* 163:417-421.

38. Seabrook, G.R., Edmiston, C.E., Schmitt, D.D., Krepel, C.J., Bandykk, D.F. and Towne, J.T. Comparison of serum and tissue antibiotic levels in diabetes-related foot infections. *Surgery* 110:671-677.

39. Frantzides, C.T., Edmiston, C.E., Nowak, T.V., Roza, A.M., and Walker, A.P. The diabetic gut: a risk factor in postoperative infections. *Surg Res Comm* 12:33-42.

40. Browne, B.J., Johnson, C.P., Edmiston, C.E., Hlava, M.A., Roza, A.M., Telford, G.L., and Adams, M.B. Alterations in intestinal flora following small bowel transplantation. *Transplant Proc* 24:1102.

41. Walker, A.P., Nichols, R.L., Wilson, R.F., Bivens, B.A., Trunkey, D.D., Edmiston, C.E., Smith, J.W., and Condon, R.E. Efficacy of beta-lactamase inhibitor combination for serious infection. *Ann Surg* 217:115-121.

42. Fassel, T.A., Van Over, J.E., Hauser, C., Buckholz, L.E., Edmiston, C.E., Sanger, J.R., and Remsem, C.C. Evaluation of bacterial glycocalyx preservation and staining by ruthenium red, ruthenium red-lysine, and alcian blue for several methanotroph and staphylococcal species. *Cells & Materials* 2:37-48.

1993

43. Edmiston, C.E., Josephson, A., Pottinger, J., Ciacco-Tsivitis, M., and Palenik, C. The numbers game: sample size determination. *Am J Infect Control* 21:151-154.

44. Frantzides, C.T., Mathias, C.A., Ludwig, K.A., Edmiston, C.E. and Condon, R.E. Small bowel myoelectric activity in peritonitis. *Am J Surg* 165:681-685.

45. Krepel, C.J., Gohr, C.M., Edmiston, C.E. and Condon, R.E. Micro-broth versus agar dilution for susceptibility testing of temafloxacin and five other antibiotics against 212 anaerobic bacteria. *J Antimicrob Chemother* 32:88-92.

46. Krepel, C.J., Gohr, C.M., Walker, A.P., Farmer, S.G. and Edmiston, C.E. Enzymatically active *Peptostreptococcus magnus*: association with site of infection. *J Clin Microbiol* 30:2330-2334.

47. Wittmann, D.H., Aprahamian, C., Bergstein, J.M., Edmiston, C.E., Frantzides, C.T., Quebbeman, E.J., and Condon, R.E. A burr-like device to facilitate temporary abdominal closure in planned multiple laparotomies. *Eur J Surg* 159:75-79.

48. Fassel, T.A., Sanger, J.R., and Edmiston, C.E. Lysine effect on ruthenium red and alcian blue preservation and staining of the staphylococci glycoalyx. *Cells and Materials* 3:327-336.

1994

49. Walker, A.P., Krepel, C.J., Gohr, C.M., and Edmiston, C.E. Microflora of abdominal sepsis by locus of infection. *J Clin Microbiol* 32: 557-558.

50. Edmiston, C.E., and Sanger, J.R. Fibroblast behavior is unaltered by products of staphylococci cultured from silicone. *Ann Plast Surg* 32:650-651.

51. Ferraz, A., Edmiston, C.E., and Walker, A.P. Biomaterial-associated infections in surgery: Part 1 - Applications, etiology and Pathogenesis. *Brazil Arch Digest Surg* 9:42-50.

52. Towne, J.B., Seabrook, G.R., Bandyk, D., Freischlag, J.A., and Edmiston, C.E. In situ replacement of arterial prosthesis infected by bacterial biofilm: long term followup. *J Vase Surg* 19:226-235.

53. Edmiston, C.E. Vascular graft infections: Perspectives on acute and late-onset infection. *Infect Dis Clin Pract* 3:147-150.

54. Ferraz, A., Edmiston, C.E., and Walker, A.P. Biomaterial-associated infections in surgery: Part 2 - Clinical Perspective. *Brazil Arch Digest Surg* 9:86-95

1995

55. Goldman, D.A., Gilchrist, M.J., Mayhall, C.G., McCormick, R.D., Edmiston, C.E., Pugliese, R., Weinstein, R.A., Maki, D.G., Russell, B.J., Tablan, O.C., Tenover, F.C., Martone, W.J., Gaynes, R.F., Jarvis, W.R., and Favero, M.F. Recommendations for preventing the spread of vancomycin resistance. *Infect Control Hosp Epidemiol* 1995;16:105-113.

56. Krepel, C.J., Gohr, C.M., Edmiston, C.E., and Condon, R.E. Surgical sepsis: constancy of antibiotic susceptibility of causative organisms. *Surgery* 117:505-509.

57. Condon, R.E., Krepel, C.J., and Edmiston, C.E. Antibiotic resistance among intra-abdominal pathogens. *Infect Dis Clin Pract* 4:5150-5155.

58. Krzywda, E., Andris, D., Quebbeman, E., and Edmiston, C.E. Hickman catheter sepsis: efficacy of antibiotic lock therapy. *Infect Control Hosp Epidemiol* 16:596-598.

1996

59. Edmiston, C.E., Suarez, E.C., Walker, A.P., Demeure, M.J., Frantzides, C.T., Schulte, W.J., and Wilson, S.D. Penetration of fleroxacin and ciprofloxacin into biliary tract. *Antimicrob Agents Chemother* 40:787-788.

60. Edmiston, C.E. Vancomycin resistance: When Failure becomes an opportunity for leadership. *Ann Pharmacother* 1996;30:680-682.

61. Edmiston, C.E. and Walker, A.P. Microbiology of intra-abdominal infections. *Infect Dis Clin Pract* 5:515-519.

62. DiPiro J.T., Edmiston C.E., Bohnen JMA. Pharmacodynamics of antimicrobial therapy in surgery. *Am J Surg* 1996;171:615-622.

1997

63. Fassel, T.A., Mozdziak, P.E., Sanger, J.R., and Edmiston, C.E. Paraformaldehyde effect on ruthenium red and lysins preservation and staining of staphylococcal glycocalyx. *Microsc Res Tech* 36:1-6.

1998

64. Messick C.G., McNicholl I.R., Danziger L.H., Rodvold K.A., Condon R.E., Walker A.P., and Edmiston C.E. Pharmacoeconomic analysis of ampicillin/sulbactam versus cefoxitin in the treatment of intra-abdominal infections. *Pharmacotherapy* 18:175- 183.

1999

65. Andris, DA, Krzywda, EA, Edmiston, CE, Krepel, CJ, and Gohr, CM. Elimination of intraluminal colonization by antibiotic lock (AL) in silastic catheters. *Nutrition* 14: 427-432.

66. Edmiston, CE, Matthews, E, Gordon, RC, and Jochimsen WG. Susceptibility of adult and pediatric isolates of *Streptococcus pneumoniae* from Midwestern community hospitals. In Zinner SH, Young LS, Acar JF, Ortiz-Neu C. (eds). *New Considerations for Macrolides, Azalides, Streptogramins, and Ketolides*. NY: Marcel Dekker, Inc., pp. 228-232.

67. Edmiston, CE, Sinski, Seabrook, GR, S, Simons, D, and Goheen, M.. Airborne particulates in the OR environment. *AORN J* 69:1169-1183.

68. Fassel TA and Edmiston CE. Ruthenium Red and the Bacterial Glycocalyx. *Biotechnology and Histochemistry* 74:4:194-212.

69. Almassi GH, Edmiston CE, and Olinger GN. Fibrous ball: A new manifestation of chronic defibrillator and pacemaker infection. *Ann Thorac Surg* 67:1782-1783.

70. Krzywda EA, Andris DA, and Edmiston CE. Catheter Infections: Diagnosis, Etiology, Treatment and Prevention. *Nutr Clin Pract* 14:178-190.

2000

71. Xi-Moy S, Thorvilson NK, Edmiston CE, Woehleck HJ. Anaphylaxis to penicillin on reperfusion during liver transplantation. *Anesthesiology* 93:280-281.

72. Fassel T.A., Mozdziak, P.E., Sanger, J.R., and Edmiston, C.E. Superior Preservation of staphylococcal glycocalyx with aldehyde-ruthenium red and selected lysins salts using extended fixation time. *Microscopy Res Technol* 39:34-41.

73. Summers A, Larson D, Edmiston CE, Gosain, A K, Denny, AD, Radke, L. Efficacy of preoperative decontamination of the oral cavity. *Plast Reconstr Surg* 106:895-900.

2001

74. Edmiston CE, Seabrook GR, Hennen, C. The importance of beta-lactamase resistance in surgical infections. *Surg Infect* 2:1-10.
75. Krzywda EA, Edmiston CE. Central venous catheter infections: clinical aspects of microbial etiology and pathogenesis. *J Infus Nurs* 25:29-35.
76. Edmiston CE. Evaluation of an antiseptic triple-lumen catheter in an intensive care unit/ Nutrition in Clinical Practice 16:264-265.

2002

77. Edmiston CE, Krepel C, Seabrook GR, Jochimsen W. Anaerobic infections in the surgical patient: microbial etiology and therapy. *Clin Infect Dis* 35:S1-S7.
78. Yorganci K, Krepel C, Weigelt JA, Edmiston, CE. In-vitro evaluation of the antibacterial activity of three different central venous catheters against gram-positive bacteria. *Eur J Clin Microbiol* 5:379-384.
79. Yroganci K, Krepel C, Weigelt JA, Edmiston CE. Activity of antibacterial impregnated central venous catheters against *Klebsiella pneumoniae*. *Crit Care Med* 28:438-442.

2003

80. Brasil KJ, Allen B, Edmiston C, Weigelt JA. Correlation of intracellular organisms with quantitative endotracheal aspirate. *J Trauma* 54:141-146.
81. Edmiston CE, Graham, MB, Wilson PJ, Grahn B. The monkeypox virus outbreak: Reflections from the front lines. *Am J Infect Control* 31:382-384.
82. Poetker DM, Edmiston CE, Smith MM, Meyer GA, Wackym PA. Meningitis Due to *Enterobacter aerogenes* Subsequent to Resection of Acoustic Neuroma and Percutaneous Endoscopic Gastrostomy (PEG) Tube Placement: A Rare Nosocomial Event. *Infect Control Hosp Epidemiol* 24:780-782.

2004

83. Edmiston, CE, Krepel CJ, Seabrook GR, Somberg LR, Nakeeb A, Cambria RA, Towne JB. Comparative In-Vitro Activity of Moxifloxacin against Nine-Hundred Aerobic/Anaerobic Surgical Isolates from Intra-abdominal and Diabetic Foot Infections. *Antimicrob Agents Chemother* 48:1012-1016.
84. Cristobal R, Runge-Samuelson CL, Firszt JB, Edmiston CE, Owen H, Wackym PA. Fungal biofilm formation on cochlear implants hardware after prophylactic antibiotic-induced fungal overgrowth within the middle ear. *Pediatr Infect Dis J* 23: 774-778.
85. Edmiston CE, Krepel C, Kelly H, Larson J, Andris D, Hennen C, Nakeeb A, Wallace JR. Perioperative antimicrobial prophylaxis in the gastric bypass patient: Do we achieve therapeutic levels? *Surgery* 136:738-747.

2005

86. Hart JP, Eginton MT, Brown KR, Seabrook GR, Lewis BD, Edmiston CE, Towne JB, Cambria RA. Operative strategies in aortic graft infections: Is complete graft excision always necessary? *Ann Vasc Surg.* 19:154-160.
87. Poetker DM, Lindstrom DR, Krepel CJ, Edmiston CE, Link R, Kerschner JE. Microbiology of middle ear effusion from 292 patients undergoing tympanostomy tube placement for middle ear disease. *Int J Pediatr Otolaryngology.* 69:799-804.
88. Edmiston CE, Krepel CJ, Kehl KS, Seabrook GR, Sombery LB, Almassi GH, Smith TL, Loehrl TA, Brown KR, Lewis BD, Towne JB. Comparative in-vitro activity of new quinolone garenoxacin against aerobic and anaerobic microbial isolates from general, vascular, cardiothoracic and otolaryngologic surgical patients. *J Antimicrob Chemotherapy* 56:872-878.
89. Edmiston CE, Seabrook GR, Cambria RA, Brown KR, Lewis BD, Sommers JR, Krepel CJ, Wilson PJ, Sinski S, Towne JB. Molecular epidemiology of microbial contamination in the operating room environment: Is there a risk for infections? *Surgery* 138:572-588.
90. Johnson CP, Edmiston CE, Guo J, Zhu YR, Adams MB, Roza AM, Kurup V. A murine model of invasive aspergillosis: Variable benefit of interferon-gamma (IFN- γ) administration under in-vivo and in-vitro conditions. *Surgical Infections* 6:397-407.

2006

91. Edmiston EC, Goheen MP, Seabrook GR, Johnson CP, Lewis BD, Brown KR, Towne JB. Impact of selective antimicrobial agents on staphylococcal adherence to biomedical devices. *Am J Surg* 192:344-354.
92. Edmiston CE, Goheen MP, Krepel C, Seabrook, GR, Johnson CP, Lewis BD, Brown KR, Towne JB. Bacterial Adherence to Surgical Sutures: Is There a Role for Antibacterial-Coated Sutures in Reducing the Risk of Surgical Site Infections? *J Am Coll Surgeons* 203:481-489.

2007

93. Edmiston CE, Krepel CJ, Seabrook GR, Towne JB, Smith TL, Loehrl TA, Wackym PA, Johnson CP, Otterson, MM. Tissue and fluid penetration of garenoxacin in surgical patients. *Surgical Infections* 8:179-187.
94. Edmiston CE, Seabrook GR, Johnson CJ, Paulson DS, Beausoleil C. Comparison of a New and Innovative 2% Chlorhexidine Impregnated Cloth with 4% Chlorhexidine as Topical Antiseptic for Preparation of the Skin Prior to Surgery. *Am J Infect Control* 35:89-96.
95. Guralnick ML, Benouni S, O'Conner RC, Edmiston CE. Characteristic of infection in patients undergoing staged implantation for sacral nerve stimulation. *J Urology* 2007;69:1073-1076.
96. Griffith BR, Krepel C, Fu X, Blanchard S, Ahmed A, Edmiston CE, Thorson JS. A model for antibiotic optimization via neoglycosylation: synthesis of neolipoglycopeptides active against VRE. *J Am Chem Society* 129:8150-8155.

2008

97. Edmiston CE. Reducing the risk of surgical site infections: A consistent approach to improving surgical outcomes. In Press: Surgery
98. Edmiston CE, Krepel CJ, Seabrook, GR, Lewis, BD, Brown KR, Towne, JB. The preoperative shower revisited: Can high topical antiseptic levels be achieved on the skin surface prior to surgical admission? *Journal American College of Surgeons*;207:233-239.
99. Edmiston CE, Krepel C, Seabrook, GR, Wilson P, Grahn B. Impact of UV-C on reducing microbial biofilm within air-handling units: Infection control implication. Submitted: *Infection Control Hospital Epidemiology*.
100. Edmiston C, Krepel C, Wilson P, Grahn B, Sadenwasser P, Graham MB. Acquisition-dissemination of nosocomial isolates on reusable sphygmomanometers. Submitted: *American Journal of Infection Control*.
101. Edmiston, CE, Krepel, CJ, Krzywda, EA, Andris, DA. Recovery of multi-drug resistant pathogens from data entry keyboard: Does the electronic revolution encourage the problem? Submitted: *Infection Control Hospital Epidemiology*
102. Graham MB, Grahn B, Wilson P, Saderwasser P, Welter D, Ledebor N, and Edmiston CE. *Clostridium difficile*: Reducing rates through fundamental infection control practices. Submitted: *American Journal of Infection Control*.