

Practice Guidelines for the Prevention, Detection and Management of Respiratory Depression Associated with Neuraxial Opioid Administration: An Updated Report

American Society of Anesthesiologists

Bibliography in Alphabetical Order

1. Abboud TK, Afrasiabi A, Davidson J, Zhu J, Reyes A, Khoo N, Steffens Z: Prophylactic oral naltrexone with epidural morphine: effect on adverse reactions and ventilating responses to carbon dioxide. *Anesthesiology* 1990; 72:233-237
2. Abboud TK, Dror A, Mosaad P, Zhu J, Mantilla M, Swart F, Gangolly J, Silao P, Makar A, Moore J, Davis H, Lee J: Mini-dose intrathecal morphine for the relief of post-cesarean section pain. *Anesth Analg* 1988; 66:137-143
3. Abboud TK, Lee K, Zhu J, Reyes A, Afrasiabi A, Mantilla M, Steffens Z, Chai M: Prophylactic oral naltrexone with intrathecal morphine for cesarean section: effects on adverse reactions and analgesia. *Anesth Analg* 1990; 71:367-370
4. Abouleish E: Apnoea associated with the intrathecal administration of morphine in obstetrics. *Br J Anaesth* 1988; 60:592-594
5. Abouleish F, Rawal N, Rashad MN: The addition of 0.2 mg subarachnoid morphine to hyperbaric bupivacaine for cesarean delivery: a prospective study of 856 cases. *Reg Anesth* 1991; 16:137-140
6. Ahuja BR, Strunin L: Respiratory effects of epidural fentanyl: changes in end-tidal and respiratory rate following single-doses and continuous infusion *Anaesth* 1985; 40:949-955
7. Allen PD, Walman T, Concepcion M, Sheskey M, Patterson MK, Cullen D, Covino BG: Epidural morphine provides postoperative pain relief in peripheral vascular and orthopedic surgical patients: a dose-response study. *Anesth Analg* 1986; 65:165-170
8. Asantila R, Rosenberg PH, Scheinin B: Comparison of different methods of postoperative pain analgesia after thoracotomy. *Acta Anaesth Scand* 1986; 30:421-425
9. Backlund M, Lindgren L, Kajimoto Y, Rosenberg PH: Comparison of epidural morphine and oxycodone for pain after abdominal surgery. *J Clin Anesth* 1997; 9:30-35
10. Badner NH, Sandler AN, Koren G, Lawson SL, Klean J, Einarson TR: Lumbar epidural fentanyl infusions for post-thoracotomy patients: analgesia, respiratory, and pharmacokinetic effects. *J Cardiothorac Anesth* 1990; 4:543-551
11. Baker MN, Sarna MC: Respiratory arrest after a second dose of intrathecal sufentanil. *Anesthesiology* 1995; 83:231-232
12. Baraka A, Noueihid R, Hajj S: Intrathecal injection of morphine for obstetric analgesia. *Anesthesiology* 1981; 54:136-140
13. Baxter AD, Laganieri S, Samson B, Stewart J, Hull K, Goernert L: A comparison of lumbar epidural and intravenous fentanyl infusions for post-thoracotomy analgesia. *Can J Anaesth* 1994; 41:184-191
14. Belzarena SD: Clinical effects of intrathecally administered fentanyl in patients undergoing cesarean section. *Anesth Analg* 1992; 74:653-657
15. Benzon HT, Wong HY, Belavic AM, Goodman I, Mitchell D, Lefheit T, Locicero J: A randomized double-blind comparison of epidural fentanyl infusion versus patient-controlled analgesia with morphine for postthoracotomy pain. *Anesth Analg* 1993; 76:316-322

16. Bernard JM, Hommeril JL, Legendre MP, Passuti N, Pinaud M: Spinal or systemic analgesia after extensive spinal surgery: comparison between intrathecal morphine and intravenous fentanyl plus clonidine. *J Clin Anesth* 1993; 5:231-236
17. Berti M, Fanelli G, Casati A, Lugani D, Aldegheri G, Torri G: Comparison between epidural infusion of fentanyl/bupivacaine and morphine/bupivacaine after orthopaedic surgery. *Can J Anaesth* 1998; 45:545-550
18. Bierman MI, Stein KL, Snyder JV: Pulse oximetry in the postoperative care of cardiac surgical patients: a randomized controlled trial. *Chest* 1992; 102:1367-1370
19. Blackburn C: Respiratory arrest after epidural sufentanil. *Anaesth* 1987; 42:665-666
20. Boezaart AP, Eksteen JA, Spuy GV, Rossouw P, Knipe M: Intrathecal morphine. Double-blind evaluation of optimal dosage for analgesia after major lumbar spinal surgery. *Spine* 1999; 24:1131-1137
21. Bowrey S, Hamer J, Bowler I, Symonds C, Hall JE: A comparison of 0.2 and 0.5 mg intrathecal morphine for postoperative analgesia after total knee replacement. *Anaesthesia* 2005; 60:449-452
22. Boylan JF, Katz J, Kavanagh BP, Klinck JR, Cheng DC, DeMajo WC, Walker PM, Johnston KW, Sandler AN: Epidural bupivacaine-morphine analgesia versus patient-controlled analgesia following abdominal aortic surgery: analgesic, respiratory, and myocardial effects. *Anesthesiology* 1998; 89:585-593
23. Brockway MS, Noble DW, Sharwood-Smith GH, McClure JH: Profound respiratory depression after extradural fentanyl. *Br J Anaesth* 1990; 64:243-245
24. Bromage PR, Camporesi E, Leslie J, Chestnut D: Epidural narcotics for postoperative analgesia. *Anesth Analg* 1990; 59:473-480
25. Burstal R, Wegener F, Hayes C, Lantry G: Epidural analgesia: prospective audit of 1062 patients. *Anaesth Intens Care* 1998; 26:165-172
26. Camann WR, Loferski BL, Fanciullo GJ, Stone ML, Datta S: Does epidural administration of butorphanol offer any clinical advantage over the intravenous route? *Anesthesiology* 1992; 72:216-220
27. Camu F, Debucquoy F: Alfentanil infusion for postoperative pain: a comparison of epidural and intravenous routes. *Anesthesiology* 1991; 75:171-178
28. Capdevila X, Barthelet Y, Biboulet P, Ryckwaert Y, Rubenovitch J, d'Athis F: Effects of perioperative analgesic technique on the surgical outcome and duration of rehabilitation after major knee surgery. *Anesthesiology* 1999; 91:8-15
29. Carvalho B, Riley E, Cohen SE, Gambling D, Palmer C, Huffnagle HJ, Polley L, Muir H, Segal S, Lihou C, Manvelian G: Single-dose, sustained-release epidural morphine in the management of postoperative pain after elective cesarean delivery: results of a multicenter randomized controlled study. *Anesth Analg* 2005; 100:1150-1158
30. Carvalho B, Roland LM, Chu LF, Campitelli VA, 3d, Riley ET: Single-dose, extended-release epidural morphine (DeopDur) compared to conventional epidural morphine for post-cesarean pain. *Anesth Analg* 2007; 105:176-183
31. Chauvin M, Hongnat JM, Mourgeon E, Lebrault C, Bellenfant P, Alfonsi P: Equivalence of postoperative analgesia with patient-controlled intravenous or epidural alfentanil. *Anesth Analg* 1993; 76:1251-1258
32. Chauvin M, Salbaing J, Perrin D, Levron JC, Viars P: Clinical assessment and plasma pharmacokinetics associated with intramuscular or extradural alfentanil. *Br J Anaesth* 1985; 57:886-891

33. Christensen V: Respiratory depression after epidural morphine. *Br J Anaesth* 1980; 52:841
34. Clergue F, Montembault C, Despierres O, Ghesquiere F, Harari A, Viars P: Respiratory effects of intrathecal morphine after upper abdominal surgery. *Anesthesiology* 1984; 61:677-685
35. Cohen SE, Labaille T, Benhamou D, Levron JC: Respiratory effects of epidural sufentanil after cesarean section. *Anesth Analg* 1992; 74:677-682
36. Cohen SE, Tan S, White PF: Sufentanil analgesia following cesarian section: epidural versus intravenous administration. *Anesthesiology* 1988; 68:129-134
37. Cohen SE, Woods WA: The role of epidural morphine in the postcesarean patient: efficacy and effects on bonding. *Anesthesiology* 1983; 58:500-504
38. Coppe E, Willaert J: Postoperative analgesia for major abdominal surgery with continuous thoracic epidural infusion of bupivacaine with sufentanil, versus bupivacaine with morphine. A randomized double blind study. *Acta Anaesthesiol Belg* 1992; 43:131-137
39. Cote CJ, Goldstein EA, Cote MA, Hoaglin DC, Ryan JF: A single-blinded study of pulse oximetry in children. *Anesthesiology* 1988; 68:184-188
40. Cowan CM, Kendall JB, Barclay PM, Wilkes RG: Comparison of intrathecal fentanyl and diamorphine in addition to bupivacaine for caesarean section under spinal anaesthesia. *Br J Anaesth* 2002; 89:452-458
41. Daley MD, Sandler AN, Turner KE, Vosu H, Slavchenko P: A comparison of epidural and intramuscular morphine in patients following cesarean section. *Anesthesiology* 1990; 72:289-294
42. Davies GK, Tolhurst-Cleaver CL, James TL: CNS depression from intrathecal morphine. *Anesthesiology* 1980; 52:280
43. Davies GK, Tolhurst-Cleaver CL, James TL: Respiratory depression after intrathecal narcotics. *Anaesthesia* 1980; 35:1080-1083
44. Donadoni R, Rolly G: Epidural sufentanil versus intramuscular buprenorphine for postoperative analgesia. A double-blind comparative trial. *Anaesthesia* 1987; 42:1171-1175
45. Duarte LTD, Fernandes MCBC, Costa VV, Saraiva RA: The incidence of postoperative respiratory depression in patients undergoing intravenous or epidural analgesia with opioids. *Revista Brasileira de Anestesiologia* 2009; 59:409-420
46. Dyer RA, Anderson BJ, Michell WL, Hall JM: Postoperative pain control with a continuous infusion of epidural sufentanil in the intensive care unit: a comparison with epidural morphine. *Anesth Analg* 1990; 71:130-136
47. El-Baz N, Goldin M: Continuous epidural infusion of morphine for pain relief after cardiac operations. *J Thorac Cardiovasc Surg* 1987; 93:878-883
48. Ellis DJ, Millar WL, Reisner LS: A randomized double-blind comparison of epidural versus intravenous fentanyl infusion for analgesia after cesarean section. *Anesthesiology* 1990; 72:981-986
49. Ferouz F, Norris MC, Leighton BL: Risk of respiratory arrest after intrathecal sufentanil. *Anesth Analg* 1997; 85:1088-1090
50. Flisberg P, Rudin A, Linner R, Lundberg CJ: Pain relief and safety after major surgery: a prospective study of epidural and intravenous analgesia in 2696 patients. *Acta Anaesth Scand* 2003; 47:457-465

51. Fournier R, Weber A, Gamulin Z: Intrathecal sufentanil is more potent than intravenous for postoperative analgesia after total-hip replacement. *Reg Anesth Pain Med* 2005; 30:249-254
52. Fu ES, Downs JB, Schweiger JW, Miguel RV, Smith RA: Supplemental oxygen impairs detection of hypoventilation by pulse oximetry. *Chest* 2004; 126:1552-1558
53. Gambling D, Hughes T, Martin G, Horton W, Manvelian G. A comparison of Depodur, a novel, single-dose extended-release epidural morphine, with standard epidural morphine for pain relief after lower abdominal surgery. *Anesth Analg* 2005; 100:1065-1074
54. Gambling DR, Hughes TL, Manvelian GZ: Extended-release epidural morphine (DepoDur) following epidural bupivacaine in patients undergoing lower abdominal surgery: a randomized controlled pharmacokinetic study. *Reg Anesth Pain Medicine* 2009; 34:316-325
55. Gedney JA, Liu EH: Side-effects of epidural infusions of opioid bupivacaine mixtures. *Anaesthesia* 1998; 53:1148-1155
56. Geller E, Chrubasik J, Graf R, Chrubasik S, Schulte-Monting J: A randomized double-blind comparison of epidural sufentanil versus intravenous sufentanil or epidural fentanyl analgesia after major abdominal surgery. *Anesth Analg* 1993; 76:1243-1250
57. George KA, Wright PMC, Chisakuta AM, Rao NVS: Thoracic epidural analgesia compared with patient controlled intravenous morphine after upper abdominal surgery. *Acta Anaesth Scand* 1994; 38:808-812
58. Gjessing J, Tomlin PJ: Postoperative pain control with intrathecal morphine. *Anaesthesia* 1981; 36:268-276
59. Glass PS, Estok P, Ginsberg B, Goldberg JS, Sladen RN: Use of patient-controlled analgesia to compare the efficacy of epidural to intravenous fentanyl administration. *Anesth Analg* 1992; 74:345-351
60. Glass PSA: Respiratory depression following only 0.4 mg of intrathecal morphine. *Anesthesiology* 1984; 60:256-257
61. Glynn CJ, Mather LE, Cousins MJ, Wilson PR, Graham JR: Spinal narcotics and respiratory depression. *Lancet* 1979; 2:356-357
62. Goodarzi M: Comparison of epidural morphine, hydromorphone and fentanyl for postoperative pain control in children undergoing orthopaedic surgery. *Paediatr Anaesth* 1999; 9:419-422
63. Grant RP, Dolman JF, Harper JA, White SA, Parsons DG, Evans KG, Merrick CP: Patient-controlled lumbar epidural fentanyl compared with patient-controlled intravenous fentanyl for postthoracotomy pain. *Can J Anaesth* 1992; 39:214-219
64. Greenhalgh CA: Respiratory arrest in a parturient following intrathecal injection of sufentanil and bupivacaine. *Anaesthesia* 1996; 51:173-175
65. Gueneron JP, Ecoffey C, Carli P, Benhamou D, Gross JB: Effect of naloxone infusion on analgesia and respiratory depression after epidural fentanyl. *Anesth Analg* 1988; 67:35-38
66. Guinard JP, Mavrocordatos P, Chiolero R, Carpenter RL: A randomized comparison of intravenous versus lumbar and thoracic epidural fentanyl for analgesia after thoracotomy. *Anesthesiology* 1992; 77:1108-1115
67. Gustafsson LL, Friberg-Nielsen S, Garle M, Mohall A, Rane A, Schildt B, Symreng T: Extradural and parenteral morphine: kinetics and effects in postoperative pain. A controlled clinical study. *Br J Anaesth* 1982; 54:1167-1174

68. Gustafsson LL, Schildt B, Jacobsen K: Adverse effects of extradural and intrathecal opiates: report of a nationwide survey in Sweden. *Br J Anaesth* 1982; 54:479-486
69. Gwartz KH, Young JV, Byers RS, Alley C, Levin K, Walker SG, Stoelting RK: The safety and efficacy of intrathecal opioid analgesia for acute postoperative pain: seven years' experience with 5969 surgical patients at Indiana University Hospital. *Anesth Analg* 1999; 88:599-604
70. Halpern SH, Muir H, Breen TW, Campbell DC, Barrett J, Liston R, Blanchard JW. A multicenter randomized controlled trial comparing patient-controlled epidural with intravenous analgesia for pain relief in labor. *Anesth Analg.* 2004; 99:1532-1538
71. Hansdottir V, Philip J, Olsen MF, Eduard C, Houltz E, Ricksten SE: Thoracic epidural versus intravenous patient-controlled analgesia after cardiac surgery: a randomized controlled trial on length of hospital stay and patient-perceived quality of recovery. *Anesthesiology* 2006; 104:142-151
72. Hartrick CT, Martin G, Kantor G, Koncelik J, Manvelian G: Evaluation of a single-dose, extended-release epidural morphine formulation for pain after knee arthroplasty. *J Bone Joint Surg Am* 2006; 88:273-281
73. Hasenbos M, Simon M, van Egmond J, Folgering H, van Hoorn P: Postoperative analgesia by nicomorphine intramuscularly versus high thoracic epidural administration. Effects on ventilatory and airway occlusion pressure responses to CO₂. *Acta Anaesth Scand* 1986; 30:426-430
74. Hasenbos M, van Egmond J, Gielen M, Crul JF: Post-operative analgesia by epidural versus intramuscular nicomorphine after thoracotomy. Part II. *Acta Anaesth Scand* 1985; 29:577-582
75. Hasenbos M, van Egmond J, Gielen M, Crul JF: Post-operative analgesia by high thoracic epidural versus intramuscular nicomorphine after thoracotomy. Part III. The effects of per- and post-operative analgesia on morbidity. *Acta Anaesth Scand* 1987; 31:608-615
76. Hasenbos MA, Eckhaus MN, Slappendel R, Gielen MJ: Continuous high thoracic epidural administration of bupivacaine with sufentanil or nicomorphine for postoperative pain relief after thoracic surgery. *Reg Anesth* 1989; 14:212-218
77. Hays RL, Palmer CM: Respiratory depression after intrathecal sufentanil during labor. *Anesthesiology* 1994; 81:511-512
78. Hein A, Rösblad P, Gillis-Haegerstrand C, Schedvins K, Jakobsson J, Dahlgren G: Low dose intrathecal morphine effects on post-hysterectomy pain: a randomized placebo-controlled study. *Acta Anaesthesiol Scand* 2012; 56:102-109
79. Henderson SK, Matthew EB, Cohen H, Avram MJ: Epidural hydromorphone: a double-blind comparison with intramuscular hydromorphone for postcesarean section analgesia. *Anesthesiology* 1987; 66:825-830
80. Holland RB, Levitt MWD, Whitton LA, Shadbolt N: Carbon dioxide response after epidural morphine. *Anaesthesia* 1982; 37:753-757
81. Horlocker TT, Abel MD, Messick JM Jr, Schroeder DR: Small risk of serious neurologic complications related to lumbar epidural catheter placement in anesthetized patients. *Anesth Analg* 2003; 96:1547-1552
82. Ismail MT, Hassanin MZ: Neuraxial analgesia versus intravenous remifentanil for pain relief in early labor in nulliparous women. *Arch Gynecol Obstet* 2012; 286:1375-1381

83. Isono S, Suzukawa M, Sho Y, Ohmura A, Kudo Y, Misawa K, Inaba S, Nishino T: Preoperative nocturnal desaturations as a risk factor for late postoperative nocturnal desaturations. *Br J Anaesth* 1998; 80:602-605
84. Jacobson L, Chabal C, Brody MC: A dose-response study of intrathecal morphine: efficacy, duration, optimal dose, and side effects. *Anesth Analg* 1988; 67:1082-1088
85. Jacobson L, Phillips PD, Hull CJ, Conacher ID: Extradural versus intramuscular diamorphine. A controlled study of analgesic and adverse effects in the postoperative period. *Anaesthesia* 1983; 38:10-18
86. Jaffee JB, Drease GE, Kelly T, Newman LM: Severe respiratory depression in the obstetric patient after intrathecal meperidine or sufentanil. *Int J Obstet Anesth* 1997; 6:182-184
87. Kahl L, Parvizi J, Viscusi ER, Hozack WJ, Sharkey PF, Rothman RH: Lessons learned with extended-release epidural morphine after total hip arthroplasty. *Clin Orthop Relat Res* 2010; 468:1082-1087
88. Karaman S, Kocabas S, Uyar M, Hayzaran S, Firat V: The effects of sufentanil or morphine added to hyperbaric bupivacaine in spinal anaesthesia for caesarean section. *Eur J Anaesthesiol* 2006; 23:285-291
89. Karl HW, Tyler DC, Krane EJ: Respiratory depression after low-dose caudal morphine. *Can J Anaesth* 1996; 43:1065-1067
90. Klinck JR, Lindop MJ: Epidural morphine in the elderly. A controlled trial after upper abdominal surgery. *Anaesthesia* 1982; 37:907-912
91. Krane EJ, Tyler DC, Jacobson LE: The dose response of caudal morphine in children. *Anesthesiology* 1989; 71:48-52
92. Krane EJ: Delayed respiratory depression in a child after caudal epidural morphine. *Anesth Analg* 1988; 67:79-82
93. Lamarche Y, Martin R, Reiher J, Blaise G: The sleep apnoea syndrome and epidural morphine. *Can Anaesth Soc J* 1986; 33:231-233
94. Lomessy A, Magnin C, Viale JP, Motin J, Cohen R: Clinical advantages of fentanyl given epidurally for post-operative analgesia. *Anesthesiology* 1984; 61:466-469
95. Mackersie RC, Karagianes TG, Hoyt DB, Davis JW: Prospective evaluation of epidural and intravenous administration of fentanyl for pain control and restoration of ventilatory function following multiple rib fractures. *J Trauma* 1991; 31:443-451
96. Madsen JV, Rybro L, Schurizek BA, Husegaard HC, Joensen F, Moller LV, Wernberg M: Respiratory depression following postoperative analgesia with epidural morphine. *Acta Anaesthesiol Scand* 1986; 30:417-420
97. Mann C1, Pouzeratte Y, Boccara G, Peccoux C, Vergne C, Brunat G, Domergue J, Millat B, Colson P: Comparison of intravenous or epidural patient-controlled analgesia in the elderly after major abdominal surgery. *Anesthesiology* 2000; 92:433-441
98. McNeely JK, Farber NE, Rusy LM, Hoffman GM: Epidural analgesia improves outcome following pediatric fundoplication: a retrospective analysis. *Reg Anesth* 1997; 22:16-23
99. Mehnert JH, Dupont TJ, Rose DH: Intermittent epidural morphine instillation for control of postoperative pain. *Am J Surg* 1983; 146:145-149
100. Menigaux C, Guignard B, Fletcher D, Sessler DI, Levron JC, Chauvin M: More epidural than intravenous sufentanil is required to provide comparable postoperative pain relief. *Anesth Analg* 2001; 93:472-476

101. Moller JT, Jensen PF, Johannessen NW, Espersen K: Hypoxaemia is reduced by pulse oximetry monitoring in the operating theatre and in the recovery room. *Br J Anaesth* 1992; 68:146-150
102. Moller JT, Johannessen NW, Espersen K, Ravio O, Pedersen BD, Jensen PF, Rasmussen NH, Rasmussen LS, Pedersen T, Cooper JB, Gravenstein JS, Chraemmer-Jorgensen B, Djernes M, Wiberg-Jorgensen F, Heslet L, Johansen SH: Randomized evaluation of pulse oximetry in 20,802 patients: II. Perioperative events and postoperative complications. *Anesthesiology* 1993; 78:445-453
103. Moller JT, Svennild I, Johannessen NW, Jensen PF, Espersen K, Gravenstein JS, Cooper JB, Djernes M, Johansen SH: Perioperative monitoring with pulse oximetry and late postoperative cognitive dysfunction. *Br J Anaesth* 1993; 71:340-347
104. Moon RE, Clements FM: Accidental epidural overdose of hydromorphone: a case report. *Anesthesiology* 1985; 63:238-239
105. Morisot R, Dessanges JF, Regnard J, Lockhart A: Ventilatory response to carbon dioxide during extradural anaesthesia with lignocaine and fentanyl. *Br J Anaesth* 1989; 63:97-102
106. Murphy PM, Stack D, Kinirons B, Laffey JG: Optimizing the dose of intrathecal morphine in older patients undergoing hip arthroplasty. *Anesth Analg* 2003; 97:1709-1715
107. Norris MC, Fogel ST, Holtmann B: Intrathecal sufentanil (5 vs. 10 microg) for labor analgesia: efficacy and side effects. *Reg Anesth Pain Med* 1998; 23:252-257
108. Ogawa K, Iranami H, Yoshiyama T, Maeda H, Hatano Y: Severe respiratory depression after epidural morphine in a patient with myotonic dystrophy. *Can J Anaesth* 1993; 40:968-970
109. Ostermeier AM, Roizen MF, Hautkappe M, Klock PA, Klawns JM: Three sudden postoperative respiratory arrests associated with epidural opioids in patients with sleep apnea. *Anesth Analg* 1997; 85:452-460
110. Palmer CM: Early respiratory depression following intrathecal fentanyl-morphine combination. *Anesthesiology* 1991; 74:1153-1155
111. Park W, Thompson J, Lee K: Effect of epidural anesthesia and analgesia on perioperative outcome: a randomized, controlled Veterans Affairs cooperative study. *Ann Surg* 2001; 234:560-571
112. Parker RK, White PF: Epidural patient-controlled analgesia: an alternative to intravenous patient-controlled analgesia for pain relief after cesarean delivery. *Anesth Analg* 1992; 75:245-251
113. Paulus DA, Paul WL, Munson ES: Neurologic depression after intrathecal morphine. *Anesthesiology* 1981; 54:517-518
114. Perriss BW, Latham BV, Wilson IH: Analgesia following extradural and IM pethidine in post-cesarean section patients. *Br J Anaesth* 1990; 64:355-357
115. Peyton PJ, Myles PS, Silbert BS, Rigg JA, Jamrozik K, Parsons R: Perioperative epidural analgesia and outcome after major abdominal surgery in high-risk patients. *Anesth Analg* 2003; 96:548-554
116. Rathmell JP, Pino CA, Taylor R, Patrin T, Viani BA: Intrathecal morphine for postoperative analgesia: a randomized, controlled, dose-ranging study after hip and knee arthroplasty. *Anesth Analg* 2003; 97:1452-1457

117. Rawal N, Schott U, Dahlstrom B, Inturrisi CE, Tandon B, Sjostrand U, Wennhager M: Influence of naloxone infusion on analgesia and respiratory depression following epidural morphine. *Anesthesiology* 1986; 64:194-201
118. Rawal N, Sjostrand U, Christoffersson E, Dahlstrom B, Arvill A, Rydman H: Comparison of intramuscular and epidural morphine for postoperative analgesia in the grossly obese: influence on postoperative ambulation and pulmonary function. *Anesth Analg* 1984; 63:583-592
119. Reeder MK, Goldman MD, Loh L, Muir AD, Casey KR, Lehane JR: Late postoperative nocturnal dips in oxygen saturation in patients undergoing major abdominal vascular surgery: predictive value of pre-operative overnight pulse oximetry. *Anaesthesia* 1992; 47:110-115
120. Renaud B, Brichant JF, Clergue F, Chauvin M, Levron JC, Viars P: Ventilatory effects of continuous epidural infusion of fentanyl. *Anesth Analg* 1988; 67:971-975
121. Reynvoet M, Dionys J, Vermaut G, Van Aken H: Surgical analgesia for knee arthroscopy with epidural lignocaine and sufentanil--effect of varying sufentanil doses. *Acta Anaesthesiol Belg* 1990; 41:319-325
122. Rheineck-Leyssius AT, Kalkman CJ: Influence of pulse oximeter lower alarm limit on the incidence of hypoxaemia in the recovery room. *Br J Anaesth* 1997; 79:460-464
123. Rosenberg PH, Heino A, Schein B: Comparison of intramuscular analgesia, intercostal block, epidural morphine, and on-demand-i.v.-fentanyl in the control of pain after upper abdominal surgery. *Acta Anaesth Scand* 1984; 28:603-607
124. Rosseel PM, van den Broek WG, Boer EC, Prakash O: Epidural sufentanil for intra- and postoperative analgesia in thoracic surgery: a comparative study with intravenous sufentanil. *Acta Anaesthesiol Scand* 1988; 32:193-198
125. Royse C, Royse A, Soeding P, Blake D, Pang J: Prospective randomized trial of high thoracic epidural analgesia for coronary artery bypass surgery. *Ann Thorac Surg* 2003; 75:93-100
126. Rybro L, Schurizek BA, Petersen TK, Wernberg M: Postoperative analgesia and lung function: a comparison of intramuscular with epidural morphine. *Acta Anaesth Scand* 1982; 26:514-518
127. Saito Y, Uchida H, Kaneko M, Nakatani T, Kosaka Y: Comparison of continuous epidural infusion of morphine/bupivacaine with fentanyl/bupivacaine for postoperative pain relief. *Acta Anaesthesiol Scand* 1994; 38:398-401
128. Salomaki TE, Laitinen JO, Nuutinen LS: A randomized double-blind comparison of epidural versus intravenous fentanyl infusion for analgesia after thoracotomy. *Anesthesiology* 1991; 75:790-795
129. Samii K, Chauvin M, Viars P: Postoperative spinal analgesia with morphine. *Br J Anaesth* 1981; 53:817-820
130. Sandler AN, Chovaz P, Whiting W: Respiratory depression following epidural morphine: a clinical study. *Can Anaesth Soc J* 1986; 33:542-549
131. Sandler AN, Stringer D, Panos L, Badner N, Friedlander M, Koren G, Katz J, Klein J: A randomized, double-blind comparison of lumbar epidural and intravenous fentanyl infusions for postthoracotomy pain relief. Analgesic, pharmacokinetic, and respiratory effects. *Anesthesiology* 1992; 77:626-634
132. Sarma VJ, Bostrom UV: Intrathecal morphine for the relief of post-hysterectomy pain--a double-blind, dose-response study. *Acta Anaesthesiol Scand* 1993; 37:223-227

133. Scott DA, Beilby DS, McClymont C: Postoperative analgesia using epidural infusions of fentanyl with bupivacaine: a prospective analysis of 1,014 patients. *Anesthesiology* 1995; 83:727-737
134. Scott DB, McClure J: Selective epidural analgesia. *Lancet* 1979; 1:1410-1411
135. Shapiro A, Zohar E, Zaslansky R, Hoppenstein D, Shabat S, Fredman B: The frequency and timing of respiratory depression in 1524 postoperative patients treated with systemic or neuraxial morphine. *J Clin Anesth* 2005; 17:537-542
136. Shulman M, Sandler AN, Bradley JW, Young PS, Brebner J: Postthoracotomy pain and pulmonary function following epidural and systemic morphine. *Anesthesiology* 1984; 61:569-575
137. Sidi A, Davidson JT, Behar M, Olshwang D: Spinal narcotics and central nervous system depression. *Anaesthesia* 1981; 36:1044-1047
138. Sinatra RS, Sevarino FB, Chung JH, Graf G, Paige D, Takla V, Silverman DG: Comparison of epidurally administered sufentanil, morphine, and sufentanil-morphine combination for postoperative analgesia. *Anesth Analg* 1991; 72:522-527
139. Singelyn FJ, Bouverneur JM: Postoperative analgesia after total hip arthroplasty: IV PCA with morphine, patient-controlled epidural analgesia, or continuous "3-in-1" block?: A prospective evaluation by our acute pain service in more than 1,300 patients. *J Clin Anesth* 1999; 11:550-554
140. Sjogren P, Jakobsen S, Valentin N: Respiratory depression during epidural morphine treatment. *Acta Anaesth Scand* 1991; 35:553-555
141. Sjostrom S, Blass J: Postoperative analgesia with epidural bupivacaine and low-dose fentanyl—a comparison of two concentrations. *Acta Anaesthesiol Scand* 1998; 42:776-782
142. Smith DC, Canning JJ, Crul JF: Pulse oximetry in the recovery room. *Anaesthesia* 44:345-348, 1989
143. Stausholm K, Rosenberg-Adamsen S, Evarnsen L, Kehlet H, Rosenberg J: Validation of pulse oximetry for monitoring of hypoxaemic episodes in the late postoperative period. *Br J Anaesth* 1997; 78:86-87
144. Stenseth R, Sellevold O, Breivik H: Epidural morphine for postoperative pain: experience with 1085 patients. *Acta Anaesth Scand* 1985; 29:148-156
145. Teng YH, Hu JS, Tsai SK, Liew C, Lui PW: Efficacy and adverse effects of patient-controlled epidural or intravenous analgesia after major surgery. *Chang Gung Med J* 2004; 27:877-886
146. Thind GS, Wells JC, Wilkes RG: The effects of continuous intravenous naloxone on epidural morphine analgesia. *Anaesthesia* 1986; 41:582-585
147. Thomson CA, Becker DR, Messick JM, de-Castro MA, Pairolero PC, Trastek VF, Murray MJ, Schulte NK, Offord KP, Ferguson JA: Analgesia after thoracotomy: effects of epidural fentanyl concentration/infusion rate. *Anesth Analg* 1995; 81:973-981
148. Tinker JH, Dull DL, Caplan RA, Ward RJ, Cheney FW: Role of monitoring devices in prevention of anesthetic mishaps: a closed-claims analysis. *Anesthesiology* 1989; 71:541-546
149. Torda TA, Pybus DA: Comparison of four narcotic analgesics for extradural analgesia. *Br J Anaesth* 1982; 54:291-295
150. Van der Auwera A, Venborgh C, Camu F: Analgesic and cardiorespiratory effects of epidural sufentanil and morphine. *Anesth Analg* 1987; 66:999-1003

151. van Lersberghe C, Camu F, de Keersmaecker E, Sacre S: Continuous administration of fentanyl for postoperative pain: a comparison of the epidural, intravenous, and transdermal routes. *J Clin Anesth* 1994; 6:308-314
152. Vanterpool S, Coombs R, Fecho K: Continuous epidural infusion of morphine versus single epidural injection of extended-release morphine for postoperative pain control after arthroplasty: a retrospective analysis. *Ther Clin Risk Manag* 2010; 6:271-277
153. Varrassi G, Celleno D, Capogna G, Costantino P, Emanuelli M, Sebastiani M, Pesce AF, Niv D: Ventilatory effects of subarachnoid fentanyl in the elderly. *Anaesthesia* 1992; 47:558-562
154. Viscusi ER, Kopacz D, Hartrick C, Martin G, Manvelian G: Single-dose extended-release epidural morphine for pain following hip arthroplasty. *Am J Therapeutics* 2006; 13:423-431
155. Viscusi ER, Martin G, Hartrick CT, Singla N, Manvelian G; EREM Study Group. Forty-eight hours of postoperative pain relief after total hip arthroplasty with a novel, extended-release epidural morphine formulation. *Anesthesiology* 2005; 102:1014-1022
156. Welchew EA, Thornton JA: Continuous thoracic epidural fentanyl. A comparison of epidural fentanyl with intramuscular papaveretum for postoperative pain. *Anaesthesia* 1982; 37:309-316
157. Welchew EA: The optimum concentration of epidural fentanyl. *Anaesth* 1983; 38:1037-1041
158. Weller R, Rosenblum M, Conard P, Gross JB: Comparison of epidural and patient-controlled intravenous morphine following joint replacement surgery. *Can J Anaesth* 1991; 38:582-586
159. Wheatley RG, Sommerville ID, Sapsford DJ, Jones JG: Postoperative hypoxaemia: comparison of extradural, IM and patient-controlled opioid analgesia. *Br J Anaesth* 1990; 64:267-275
160. White MJ, Berghausen EJ, Dumont SW, Tsueda K, Schroeder JA, Vogel RL, Heine MF, Huang KC: Side effects during continuous epidural infusion of morphine and fentanyl. *Can J Anaesth* 1992; 39:576-582
161. Whiting WC, Sandler AN, Lau LC, Chovaz PM, Slavchenko P, Daley D, Koren G: Analgesic and respiratory effects of epidural sufentanil in patients following thoracotomy. *Anesthesiology* 1988; 69:36-43
162. Wittels B, Glosten B, Faure EA, Moawad AH, Ismail M, Hibbard J, Amundsen L, Binstock W, Senal JA, Cox SM: Opioid antagonist adjuncts to epidural morphine for postcesarean analgesia: maternal outcomes. *Anesth Analg* 1993; 77:925-932
163. Wood CE, Goresky GV, Klassen KA, Kuwahara B, Neil SG: Complications of continuous epidural infusions for postoperative analgesia in children. *Can J Anaesth* 1994; 41:613-620
164. Yamaguchi H, Watanabe S, Harukuni I, Hamaya Y: Effective doses of epidural morphine for relief of postcholecystectomy pain. *Anesth Analg* 1991; 72:80-83
165. Yarnell RW, Polis T, Reid GN, Murphy IL, Penning JP: Patient-controlled analgesia with epidural meperidine after elective cesarean section. *Reg Anesth* 1992; 17:329-333
166. Yeager MP, Glass DD, Neff RK, Brinck-Johnsen T: Epidural anesthesia and analgesia in high-risk surgical patients. *Anesthesiology* 1987; 66:729-736

167. Yu PY, Gambling DR: A comparative study of patient-controlled epidural fentanyl and single dose epidural morphine for post-caesarean analgesia. *Can J Anaesth* 1993; 40:416-420