

## Odporúčania Európskej resuscitačnej rady pre resuscitáciu 2010

### Sekcia 4 Rozšírená neodkladná resuscitácia dospelých

Resuscitation 2010;81:1305-1352

#### Zoznam literatúry

1. Nolan J, Soar J, Eikeland H. The chain of survival. *Resuscitation* 2006;71:270–1.
2. Gwinnutt CL, Columb M, Harris R. Outcome after cardiac arrest in adults in UK hospitals: effect of the 1997 guidelines. *Resuscitation* 2000;47:125–35.
3. Peberdy MA, Kaye W, Ornato JP, et al. Cardiopulmonary resuscitation of adults in the hospital: a report of 14720 cardiac arrests from the National Registry of Cardiopulmonary Resuscitation. *Resuscitation* 2003;58:297–308.
4. Meaney PA, Nadkarni VM, Kern KB, Indik JH, Halperin HR, Berg RA. Rhythms and outcomes of adult in-hospital cardiac arrest. *Crit Care Med* 2010;38:101–8.
5. Smith GB. In-hospital cardiac arrest: is it time for an in-hospital ‘chain of prevention’? *Resuscitation* 2010.
6. National Confidential Enquiry into Patient Outcome and Death. An acute problem? London: NCEPOD; 2005.
7. Hodgetts TJ, Kenward G, Vlackonikolis I, et al. Incidence, location and reasons for avoidable in-hospital cardiac arrest in a district general hospital. *Resuscitation* 2002;54:115–23.
8. Kause J, Smith G, Prytherch D, Parr M, Flabouris A, Hillman K. A comparison of antecedents to cardiac arrests, deaths and emergency intensive care admissions in Australia and New Zealand, and the United Kingdom—the ACADEMIA study. *Resuscitation* 2004;62:275–82.
9. Castagna J, Weil MH, Shubin H. Factors determining survival in patients with cardiac arrest. *Chest* 1974;65:527–9.
10. Herlitz J, Bang A, Aune S, Ekstrom L, Lundstrom G, Holmberg S. Characteristics and outcome among patients suffering in-hospital cardiac arrest in monitored and nonmonitored areas. *Resuscitation* 2001;48:125–35.
11. Buist M, Bernard S, Nguyen TV, Moore G, Anderson J. Association between clinically abnormal observations and subsequent in-hospital mortality: a prospective study. *Resuscitation* 2004;62:137–41.
12. Franklin C, Mathew J. Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. *Crit Care Med* 1994;22:244–7.
13. Hodgetts TJ, Kenward G, Vlachonikolis IG, Payne S, Castle N. The identification of risk factors for cardiac arrest and formulation of activation criteria to alert a medical emergency team. *Resuscitation* 2002;54:125–31.
14. McQuillan P, Pilkington S, Allan A, et al. Confidential inquiry into quality of care before admission to intensive care. *BMJ* 1998;316:1853–8.
15. Jacques T, Harrison GA, McLaws ML, Kilborn G. Signs of critical conditions and emergency responses (SOCCER): a model for predicting adverse events in the inpatient setting. *Resuscitation* 2006;69:175–83.
16. McGain F, Cretikos MA, Jones D, et al. Documentation of clinical review and vital signs after major surgery. *Med J Aust* 2008;189:380–3.
17. Cashman JN. In-hospital cardiac arrest: what happens to the false arrests? *Resuscitation* 2002;53:271–6.
18. Hein A, Thoren AB, Herlitz J. Characteristics and outcome of false cardiac arrests in hospital. *Resuscitation* 2006;69:191–7.
19. Kenward G, Robinson A, Bradburn S, Steeds R. False cardiac arrests: the right time to turn away? *Postgrad Med J* 2007;83:344–7.
20. Fuhrmann L, Lippert A, Perner A, Ostergaard D. Incidence, staff awareness and mortality of patients at risk on general wards. *Resuscitation* 2008;77:325–30.
21. Chatterjee MT, Moon JC, Murphy R, McCrea D. The “OBS” chart: an evidence based approach to redesign of the patient observation chart in a district general hospital setting. *Postgrad Med J* 2005;81:663–6.
22. Smith GB, Prytherch DR, Schmidt PE, Featherstone PI. Review and performance evaluation of aggregate weighted ‘track and trigger’ systems. *Resuscitation* 2008;77:170–9.
23. Smith GB, Prytherch DR, Schmidt PE, Featherstone PI, Higgins B. A review, and performance evaluation, of single parameter “track and trigger” systems. *Resuscitation* 2008;79:11–21.

24. Hillman K, Chen J, Cretikos M, et al. Introduction of the medical emergency team (MET) system: a cluster randomised controlled trial. *Lancet* 2005;365:2091–7.
25. Needleman J, Buerhaus P, Mattke S, Stewart M, Zelevinsky K. Nurse staffing levels and the quality of care in hospitals. *N Engl J Med* 2002;346:1715–22.
26. DeVita MA, Smith GB, Adam SK, et al. Identifying the hospitalised patient in crisis?—a consensus conference on the afferent limb of rapid response systems. *Resuscitation* 2010;81:375–82.
27. Hogan J. Why don't nurses monitor the respiratory rates of patients? *Br J Nurs* 2006;15:489–92.
28. Buist M. The rapid response team paradox: why doesn't anyone call for help? *Crit Care Med* 2008;36:634–6.
29. Andrews T, Waterman H. Packaging: a grounded theory of how to report physiological deterioration effectively. *J Adv Nurs* 2005;52:473–81.
30. Derham C. Achieving comprehensive critical care. *Nurs Crit Care* 2007;12:124–31.
31. Smith GB, Poplett N. Knowledge of aspects of acute care in trainee doctors. *Postgrad Med J* 2002;78:335–8.
32. Meek T. New house officers' knowledge of resuscitation, fluid balance and analgesia. *Anaesthesia* 2000;55:1128–9.
33. Gould TH, Upton PM, Collins P. A survey of the intended management of acute postoperative pain by newly qualified doctors in the south west region of England in August 1992. *Anaesthesia* 1994;49:807–10.
34. Jackson E, Warner J. How much do doctors know about consent and capacity? *J R Soc Med* 2002;95:601–3.
35. Kruger PS, Longden PJ. A study of hospital staff's knowledge of pulse oximetry. *Anaesth Intensive Care* 1997;25:38–41.
36. Howell M. Pulse oximetry: an audit of nursing and medical staff understanding. *Br J Nurs* 2002;11:191–7.
37. Wheeler DW, Remondos DD, Whittlestone KD, et al. Doctors' confusion over ratios and percentages in drug solutions: the case for standard labelling. *J R Soc Med* 2004;97:380–3.
38. Goldacre MJ, Lambert T, Evans J, Turner G. Preregistration house officers' views on whether their experience at medical school prepared them well for their jobs: national questionnaire survey. *BMJ* 2003;326:1011–2.
39. Perkins GD, Barrett H, Bullock I, et al. The Acute Care Undergraduate Teaching (ACUTE) Initiative: consensus development of core competencies in acute care for undergraduates in the United Kingdom. *Intensive Care Med* 2005;31:1627–33.
40. Smith CM, Perkins GD, Bullock I, Bion JF. Undergraduate training in the care of the acutely ill patient: a literature review. *Intensive Care Med* 2007;33: 901–7.
41. Thwaites BC, Shankar S, Niblett D, Saunders J. Can consultants resuscitate? *J R Coll Physicians Lond* 1992;26:265–7.
42. Saravanan P, Soar J. A survey of resuscitation training needs of senior anaesthetists. *Resuscitation* 2005;64:93–6.
43. Featherstone P, Smith GB, Linnell M, Easton S, Osgood VM. Impact of a one day interprofessional course (ALERT trade mark) on attitudes and confidence in managing critically ill adult patients. *Resuscitation* 2005;65: 329–36.
44. Campello G, Granja C, Carvalho F, Dias C, Azevedo LF, Costa Pereira A. Immediate and long term impact of medical emergency teams on cardiac arrest prevalence and mortality: a plea for periodic basic life support training programs. *Crit Care Med* 2009;37:3054–61.
45. Bellomo R, Goldsmith D, Uchino S, et al. A prospective before and after trial of a medical emergency team. *Med J Aust* 2003;179:283–7.
46. Bellomo R, Goldsmith D, Uchino S, et al. Prospective controlled trial of effect of medical emergency team on postoperative morbidity and mortality rates. *Crit Care Med* 2004;32:916–21.
47. DeVita MA, Braithwaite RS, Mahidhara R, Stuart S, Foraida M, Simmons RL. Use of medical emergency team responses to reduce hospital cardiopulmonary arrests. *Qual Saf Health Care* 2004;13:251–4.
48. Foraida MI, DeVita MA, Braithwaite RS, Stuart SA, Brooks MM, Simmons RL. Improving the utilization of medical crisis teams (Condition C) at an urban tertiary care hospital. *J Crit Care* 2003;18:87–94.
49. Green AL, Williams A. An evaluation of a nearly warning clinical marker referral tool. *Intensive Crit Care Nurs* 2006;22:274–82.
50. Spearpoint KG, Gruber PC, Brett SJ. Impact of the Immediate Life Support course on the incidence and outcome of in-hospital cardiac arrest calls: an observational study over 6 years. *Resuscitation* 2009;80:638–43.
51. Soar J, Perkins GD, Harris S, et al. The immediate life support course. *Resuscitation* 2003;57:21–6.
52. Harrison GA, Jacques TC, Kilborn G, McLaw ML. The prevalence of recordings of the signs of critical conditions and emergency responses in hospital wards—the SOCCER study. *Resuscitation* 2005;65:149–57.
53. Hall S, Williams E, Richards S, Subbe C, Gemmell L. Waiting to exhale: critical care outreach and recording of ventilatory frequency. *Br J Anaesth* 2003;90:570–1.

54. McBride J, Knight D, Piper J, Smith G. Longterm effect of introducing an early warning score on respiratory rate charting on general wards. *Resuscitation* 2005;65:41–4.
55. Goldhill DR, Worthington L, Mulcahy A, Tarling M, Sumner A. The patientatrisk team: identifying and managing seriously ill ward patients. *Anaesthesia* 1999;54:853–60.
56. Subbe CP, Davies RG, Williams E, Rutherford P, Gemmel L. Effect of introducing the Modified Early Warning score on clinical outcomes, cardiopulmonary arrests and intensive care utilisation in acute medical admissions. *Anaesthesia* 2003;58:797–802.
57. Armitage M, Eddleston J, Stokes T. Recognising and responding to acute illness in adults in hospital: summary of NICE guidance. *BMJ* 2007;335:258–9.
58. Chen J, Hillman K, Bellomo R, Flabouris A, Finfer S, Cretikos M. The impact of introducing medical emergency team system on the documentations of vital signs. *Resuscitation* 2009;80:35–43.
59. Odell M, Rechner IJ, Kapila A, et al. The effect of a critical care outreach service and an early warning scoring system on respiratory rate recording on the general wards. *Resuscitation* 2007;74:470–5.
60. Critical care outreach 2003: progress in developing services. The National Outreach Report. London, UK: Department of Health and National Health Service Modernisation Agency; 2003.
61. Gao H, McDonnell A, Harrison DA, et al. Systematic review and evaluation of physiological track and trigger warning systems for identifying atrisk patients on the ward. *Intensive Care Med* 2007;33:667–79.
62. Cuthbertson BH. Optimising early warning scoring systems. *Resuscitation* 2008;77:153–4.
63. Cretikos M, Chen J, Hillman K, Bellomo R, Finfer S, Flabouris A. The objective medical emergency team activation criteria: a case–control study. *Resuscitation* 2007;73:62–72.
64. Fieselmann J, Hendryx M, Helms C, Wakefield D. Respiratory rate predicts cardiopulmonary arrest for internal medicine patients. *J Gen Intern Med* 1993;8:354–60.
65. Henry OF, BlacherJ, VerdavaineJ, DuviquetM, SafarME. Alpha 1acid glycoprotein is an independent predictor of inhospital death in the elderly. *Age Ageing* 2003;32:37–42.
66. Barlow G, Nathwani D, Davey P. The CURB65 pneumonia severity score outperforms generic sepsis and early warning scores in predicting mortality in communityacquired pneumonia. *Thorax* 2007;62:253–9.
67. Sleiman I, Morandi A, Sabatini T, et al. Hyperglycemia as a predictor of inhospital mortality in elderly patients without diabetes mellitus admitted to a subintensive care unit. *JAm Geriatr Soc* 2008;56:1106–10.
68. Alarcon T, Barcena A, GonzalezMontalvo JI, Penalosa C, Salgado A. Factors predictive of outcome on admission to an acute geriatric ward. *Age Ageing* 1999;28:429–32.
69. Goel A, Pinckney RG, Littenberg B. APACHE II predicts longterm survival in COPD patients admitted to a general medical ward. *J Gen Intern Med* 2003;18:824–30.
70. Rowat AM, Dennis MS, Wardlaw JM. Central periodic breathing observed on hospital admission is associated with an adverse prognosis in conscious acute stroke patients. *Cerebrovasc Dis* 2006;21:340–7.
71. Neary WD, Prytherch D, Foy C, Heather BP, Earnshaw JJ. Comparison of different methods of risk stratification in urgent and emergency surgery. *BrJ Surg* 2007;94:1300–5.
72. Asadollahi K, Hastings IM, Beeching NJ, Gill GV. Laboratory risk factors for hospital mortality in acutely admitted patients. *QJM* 2007;100:501–7.
73. Jones AE, Aborn LS, Kline JA. Severity of emergency department hypotension predicts adverse hospital outcome. *Shock* 2004;22:410–4.
74. Duckitt RW, BuxtonThomas R, Walker J, et al. Worthing physiological scoring system: derivation and validation of a physiological earlywarning system for medical admissions. An observational, populationbased singlecentre study. *BrJAnaesth* 2007;98:769–74.
75. Kellett J, Deane B. The Simple Clinical Score predicts mortality for 30 days after admission to an acute medical unit. *QJM* 2006;99:771–81.
76. Prytherch DR, Sirl JS, Schmidt P, Featherstone PI, Weaver PC, Smith GB. The use of routine laboratory data to predict inhospital death in medical admissions. *Resuscitation* 2005;66:203–7.
77. Smith GB, Prytherch DR, Schmidt PE, et al. Should age be included as a component of track and trigger systems used to identify sick adult patients? *Resuscitation* 2008;78:109–15.
78. Olsson T, Terent A, Lind L. Rapid Emergency Medicine score: a new prognostic tool for inhospital mortality in nonsurgical emergency department patients. *JIntern Med* 2004;255:579–87.
79. Prytherch DR, Sirl JS, Weaver PC, Schmidt P, Higgins B, Sutton GL. Towards a national clinical minimum data set for general surgery. *Br J Surg* 2003;90:1300–5.
80. Subbe CP, Kruger M, Rutherford P, Gemmel L. Validation of a modified Early Warning Score in medical admissions. *QJM* 2001;94:521–6.
81. Goodacre S, Turner J, Nicholl J. Prediction of mortality among emergency medical admissions. *Emerg MedJ* 2006;23:372–5.
82. Paterson R, MacLeod DC, Thetford D, et al. Prediction of inhospital mortality and length of stay using an early warning scoring system: clinical audit. *Clin Med* 2006;6:281–4.

83. Cuthbertson BH, Boroujerdi M, McKie L, Aucott L, Prescott G. Can physiological variables and early warning scoring systems allow early recognition of the deteriorating surgical patient? *Crit Care Med* 2007;35:402–9.
84. Goldhill DR, McNarry AF. Physiological abnormalities in early warning scores are related to mortality in adult inpatients. *Br J Anaesth* 2004;92: 882–4.
85. Harrison GA, Jacques T, McLaws ML, Kilborn G. Combinations of early signs of critical illness predict inhospital death the SOCCER study (signs of critical conditions and emergency responses). *Resuscitation* 2006;71: 327–34.
86. Bell MB, Konrad D, Granath F, Ekbom A, Martling CR. Prevalence and sensitivity of MET criteria in a Scandinavian University Hospital. *Resuscitation* 2006;70:66–73.
87. GardnerThorpe J, Love N, Wrightson J, Walsh S, Keeling N. The value of Modified Early Warning Score (MEWS) in surgical inpatients: a prospective observational study. *Ann R Coll Surg Engl* 2006;88:571–5.
88. Quarterman CP, Thomas AN, McKenna M, McNamee R. Use of a patient information system to audit the introduction of modified early warning scoring. *J Eval Clin Pract* 2005;11:133–8.
89. Goldhill DR, McNarry AF, Hadjianastassiou VG, Tekkis PP. The longer patients are in hospital before Intensive Care admission the higher their mortality. *Intensive Care Med* 2004;30:1908–13.
90. Goldhill DR, McNarry AF, Mandersloot G, McGinley A. A physiologically based early warning score for ward patients: the association between score and outcome. *Anaesthesia* 2005;60:547–53.
91. Boniatti MM, Azzolini N, da Fonseca DL, et al. Prognostic value of the calling criteria in patients receiving a medical emergency team review. *Resuscitation* 2010;81:667–70.
92. Prytherch DR, Smith GB, Schmidt PE, Featherstone PI. ViEWSTowards a national early warning score for detecting adult inpatient deterioration. *Resuscitation* 2010;81:932–7.
93. Mitchell IA, McKay H, Van Leuvan C, et al. A prospective controlled trial of the effect of a multifaceted intervention on early recognition and intervention in deteriorating hospital patients. *Resuscitation* 2010.
94. Smith GB, Prytherch DR, Schmidt P, et al. Hospitalwide physiological surveillance: a new approach to the early identification and management of the sick patient. *Resuscitation* 2006;71:19–28.
95. Sandroni C, Ferro G, Santangelo S, et al. Inhospital cardiac arrest: survival depends mainly on the effectiveness of the emergency response. *Resuscitation* 2004;62:291–7.
96. Soar J, McKay U. A revised role for the hospital cardiac arrest team? *Resuscitation* 1998;38:145–9.
97. Featherstone P, Chalmers T, Smith GB. RSVP: a system for communication of deterioration in hospital patients. *Br J Nurs* 2008;17:860–4.
98. Marshall S, Harrison J, Flanagan B. The teaching of a structured tool improves the clarity and content of interprofessional clinical communication. *Qual Saf Health Care* 2009;18:137–40.
99. Lee A, Bishop G, Hillman KM, Daffurn K. The Medical Emergency Team. *Anaesth Intensive Care* 1995;23:183–6.
100. Devita MA, Bellomo R, Hillman K, et al. Findings of the first consensus conference on medical emergency teams. *Crit Care Med* 2006;34:2463–78.
101. Ball C, Kirkby M, Williams S. Effect of the critical care outreach team on patient survival to discharge from hospital and readmission to critical care: nonrandomised population based study. *BMJ* 2003;327:1014. C.D. Deakin et al./*Resuscitation* 81 (2010) 1305–1352
102. Zenker P, Schlesinger A, Hauck M, et al. Implementation and impact of a rapid response team in a children's hospital. *Jt Comm J Qual Patient Saf* 2007;33:418–25.
103. Dean BS, Decker MJ, Hupp D, Urbach AH, Lewis E, Benes Stickle J. Condition HELP: a pediatric rapid response team triggered by patients and parents. *J Healthc Qual* 2008;30:28–31.
104. Ray EM, Smith R, Massie S, et al. Family alert: implementing direct family activation of a pediatric rapid response team. *Jt Comm J Qual Patient Saf* 2009;35:575–80.
105. Kenward G, Castle N, Hodgetts T, Shaikh L. Evaluation of a medical emergency team one year after implementation. *Resuscitation* 2004;61:257–63.
106. Chan PS, Khalid A, Longmore LS, Berg RA, Kosiborod M, Spertus JA. Hospitalwide code rates and mortality before and after implementation of a rapid response team. *JAMA* 2008;300:2506–13.
107. Dacey MJ, Mirza ER, Wilcox V, et al. The effect of a rapid response team on major clinical outcome measures in a community hospital. *Crit Care Med* 2007;35:2076–82.
108. Story DA, Shelton AC, Poustie SJ, Colin Thome NJ, McNicol PL. The effect of critical care outreach on postoperative serious adverse events. *Anaesthesia* 2004;59:762–6.
109. Story DA, Shelton AC, Poustie SJ, Colin Thome NJ, McIntyre RE, McNicol PL. Effect of an anaesthesia department led critical care outreach and acute pain service on postoperative serious adverse events. *Anaesthesia* 2006;61: 24–8.

110. Flabouris A, Chen J, Hillman K, Bellomo R, Finfer S. Timing and interventions of emergency teams during the MERIT study. *Resuscitation* 2010;81: 25–30.
111. Jones D, Bellomo R, Bates S, et al. Long term effect of a medical emergency team on cardiac arrests in a teaching hospital. *Crit Care* 2005;9:R808–15.
112. Galhotra S, DeVita MA, Simmons RL, Schmid A. Impact of patient monitoring on the diurnal pattern of medical emergency team activation. *Crit Care Med* 2006;34:1700–6.
113. Baxter AD, Cardinal P, Hooper J, Patel R. Medical emergency teams at The Ottawa Hospital: the first two years. *Can J Anaesth* 2008;55:223–31.
114. Benson L, Mitchell C, Link M, Carlson G, Fisher J. Using an advanced practice nursing model for a rapid response team. *Jt Comm J Qual Patient Saf* 2008;34:743–7.
115. Bertaut Y, Campbell A, Goodlett D. Implementing a rapid response team using a nurse-to-nurse consult approach. *J Vasc Nurs* 2008;26:37–42.
116. Buist MD, Moore GE, Bernard SA, Waxman BP, Anderson JN, Nguyen TV. Effects of a medical emergency team on reduction of incidence of and mortality from unexpected cardiac arrests in hospital: preliminary study. *BMJ* 2002;324:387–90.
117. Buist M, Harrison J, Abaloz E, Van Dyke S. Six year audit of cardiac arrests and medical emergency team calls in an Australian outer metropolitan teaching hospital. *BMJ* 2007;335:1210–2.
118. Chamberlain B, Donley K, Maddison J. Patient outcomes using a rapid response team. *Clin Nurse Spec* 2009;23:11–2.
119. Hatler C, Mast D, Bedker D, et al. Implementing a rapid response team to decrease emergencies outside the ICU: one hospital's experience. *Medsurg Nurs* 2009;18, 8490,126.
120. Jones D, Bellomo R, Bates S, et al. Patient monitoring and the timing of cardiac arrests and medical emergency team calls in a teaching hospital. *Intensive Care Med* 2006;32:1352–6.
121. Moldenhauer K, Sabel A, Chu ES, Mehler PS. Clinical triggers: an alternative to a rapid response team. *Jt Comm J Qual Patient Saf* 2009;35:164–74.
122. Offner PJ, Heit J, Roberts R. Implementation of a rapid response team decreases cardiac arrest outside of the intensive care unit. *J Trauma* 2007;62:1223–7 [discussion 7–8].
123. Gould D. Promoting patient safety: The Rapid Medical Response Team. *Perm J* 2007;11:26–34.
124. Jolley J, Bendyk H, Holaday B, Lombardozi KA, Harmon C. Rapid response teams: do they make a difference? *Dimens Crit Care Nurs* 2007;26:253–60, quiz 612.
125. Konrad D, Jaderling G, Bell M, Granath F, Ekbohm A, Martling CR. Reducing in-hospital cardiac arrests and hospital mortality by introducing a medical emergency team. *Intensive Care Med* 2010;36:100–6.
126. Chen J, Bellomo R, Flabouris A, Hillman K, Finfer S. The relationship between early emergency team calls and serious adverse events. *Crit Care Med* 2009;37:148–53.
127. Bristow PJ, Hillman KM, Chey T, et al. Rates of in-hospital arrests, deaths and intensive care admissions: the effect of a medical emergency team. *Med J Aust* 2000;173:236–40.
128. King E, Horvath R, Shulkin DJ. Establishing a rapid response team (RRT) in an academic hospital: one year's experience. *J Hosp Med* 2006;1:296–305.
129. McFarlan SJ, Hensley S. Implementation and outcomes of a rapid response team. *J Nurs Care Qual* 2007;22:307–13, quiz 145.
130. Rothschild JM, Woolf S, Finn KM, et al. A controlled trial of a rapid response system in an academic medical center. *Jt Comm J Qual Patient Saf* 2008;34, 41725,365.
131. Chan PS, Jain R, Nallmothu BK, Berg RA, Sasson C. Rapid Response Teams: a systematic review and meta-analysis. *Arch Intern Med* 2010;170:18–26.
132. Leeson Payne CG, Aitkenhead AR. A prospective study to assess the demand for a high dependency unit. *Anaesthesia* 1995;50:383–7.
133. Guidelines for the utilisation of intensive care units. European Society of Intensive Care Medicine. *Intensive Care Med* 1994;20:163–4.
134. Haupt MT, Bekes CE, Brill R, et al. Guidelines on critical care services and personnel: recommendations based on a system of categorization of three levels of care. *Crit Care Med* 2003;31:2677–83.
135. Peberdy MA, Ornato JP, Larkin GL, et al. Survival from in-hospital cardiac arrest during nights and weekends. *JAMA* 2008;299:785–92.
136. Hillson SD, Rich EC, Dowd B, Luxenberg MG. Call nights and patients care: effects on inpatients at one teaching hospital. *J Gen Intern Med* 1992;7:405–10.
137. Bell CM, Redelmeier DA. Mortality among patients admitted to hospitals on weekends as compared with weekdays. *N Engl J Med* 2001;345:663–8.

138. Beck DH, McQuillan P, Smith GB. Waiting for the break of dawn? The effects of discharge time, discharge TISS scores and discharge facility on hospital mortality after intensive care. *Intensive Care Med* 2002;28:1287–93.
139. Goldfrad C, Rowan K. Consequences of discharges from intensive care at night. *Lancet* 2000;355:1138–42.
140. Tourangeau AE, Cranley LA, Jeffs L. Impact of nursing on hospital patient mortality: a focused review and related policy implications. *Qual Saf Health Care* 2006;15:4–8.
141. Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA* 2002;288:1987–93.
142. Parr MJ, Hadfield JH, Flabouris A, Bishop G, Hillman K. The Medical Emergency Team: 12 month analysis of reasons for activation, immediate outcome and notforresuscitation orders. *Resuscitation* 2001;50:39–44.
143. BaskettPJ, LimA. The varying ethical attitudes towards resuscitation in Europe. *Resuscitation* 2004;62:267–73.
144. Baskett PJ, Steen PA, Bossaert L. European Resuscitation Council guidelines for resuscitation 2005, Section 8. The ethics of resuscitation and endoflife decisions. *Resuscitation* 2005;67(Suppl. 1):S171–80.
145. Lippert FK, Raffay V, Georgiou M, Steen PA, Bossaert L. European Resuscitation Council Guidelines for Resuscitation 2010, Section 10. The ethics of resuscitation and endoflife decisions. *Resuscitation* 2010;81:1445–51.
146. Smith GB. Increased do not attempt resuscitation decision making in hospitals with a medical emergency teams system cause and effect? *Resuscitation* 2008;79:346–7.
147. Chen J, Flabouris A, Bellomo R, Hillman K, Finfer S. The Medical Emergency Team System and notforresuscitation orders: results from the MERIT study. *Resuscitation* 2008;79:391–7.
148. Jones DA, McIntyre T, Baldwin I, Mercer I, Kattula A, Bellomo R. The medical emergency team and endoflife care: a pilot study. *Crit Care Resusc* 2007;9:151–6.
149. Excellence NifHaC. NICE clinical guideline 50 Acutely ill patients in hospital: recognition of and response to acute illness in adults in hospital. London: National Institute for Health and Clinical Excellence; 2007.
150. Muller D, Agrawal R, Arntz HR. How sudden is sudden cardiac death? *Circulation* 2006;114:1146–50.
151. Nava A, Bauce B, Basso C, et al. Clinical profile and longterm followup of 37 families with arrhythmogenic right ventricular cardiomyopathy. *JAm Coll Cardiol* 2000;36:2226–33.
152. BrugadaJ, BrugadaR, BrugadaP. Determinantsof sudden cardiac death in individuals with the electrocardiographic pattern of Brugada syndrome and no previous cardiac arrest. *Circulation* 2003;108:3092–6.
153. Elliott PM, Poloniecki J, Dickie S, et al. Sudden death in hypertrophic cardiomyopathy: identification of high risk patients. *JAm Coll Cardiol* 2000;36:2212–8.
154. Goldenberg I, Moss AJ, Peterson DR, et al. Risk factors for aborted cardiac arrest and sudden cardiac death in children with the congenital longQT syndrome. *Circulation* 2008;117:2184–91.
155. Hobbs JB, Peterson DR, Moss AJ, et al. Risk of aborted cardiac arrest or sudden cardiac death during adolescence in the longQT syndrome. *JAMA* 2006;296:1249–54.
156. Hulot JS, Jouven X, Empana JP, Frank R, Fontaine G. Natural history and risk stratification of arrhythmogenic right ventricular dysplasia/cardiomyopathy. *Circulation* 2004;110:1879–84.
157. Kofflard MJ, Ten Cate FJ, van der Lee C, van Domburg RT. Hypertrophic cardiomyopathy in a large communitybased population: clinical outcome and identification of risk factors for sudden cardiac death and clinical deterioration. *JAm Coll Cardiol* 2003;41:987–93.
158. Peters S. Longterm followup and risk assessment of arrhythmogenic right ventricular dysplasia/cardiomyopathy: personal experience from different primary and tertiary centres. *JCardiovasc Med (Hagerstown)* 2007;8:521–6.
159. Priori SG, Napolitano C, Gasparini M, et al. Natural history of Brugada syndrome: insights for risk stratification and management. *Circulation* 2002;105:1342–7.
160. Spirito P, Autore C, Rapezzi C, et al. Syncope and risk of sudden death in hypertrophic cardiomyopathy. *Circulation* 2009;119:1703–10.
161. Sumitomo N, Harada K, Nagashima M, et al. Catecholaminergic polymorphic ventricular tachycardia: electrocardiographic characteristics and optimal therapeutic strategies to prevent sudden death. *Heart* 2003;89:66–70.
162. Amital H, Glikson M, Burstein M, et al. Clinical characteristics of unexpected death among young enlisted military personnel: results of a three decade retrospective surveillance. *Chest* 2004;126:528–33.

163. Basso C, Maron BJ, Corrado D, Thiene G. Clinical profile of congenital coronary artery anomalies with origin from the wrong aortic sinus leading to sudden death in young competitive athletes. *J Am Coll Cardiol* 2000;35:1493–501.
164. Corrado D, Basso C, Thiene G. Sudden cardiac death in young people with apparently normal heart. *Cardiovasc Res* 2001;50:399–408. C.D. Deakin et al./Resuscitation 81 (2010) 1305–1352
165. Drory Y, Turetz Y, Hiss Y, et al. Sudden unexpected death in persons less than 40 years of age. *Am J Cardiol* 1991;68:1388–92.
166. Kramer MR, Drori Y, Lev B. Sudden death in young soldiers. High incidence of syncope prior to death. *Chest* 1988;93:345–7.
167. Quigley F, Greene M, O'Connor D, Kelly F. A survey of the causes of sudden cardiac death in the under 35 year age group. *Ir Med J* 2005;98:232–5.
168. Wisten A, Forsberg H, Krantz P, Messner T. Sudden cardiac death in 1535 year olds in Sweden during 1992–99. *J Intern Med* 2002;252:529–36.
169. Wisten A, Messner T. Young Swedish patients with sudden cardiac death have a lifestyle very similar to a control population. *Scand Cardiovasc J* 2005;39:137–42.
170. Wisten A, Messner T. Symptoms preceding sudden cardiac death in the young are common but often misinterpreted. *Scand Cardiovasc J* 2005;39:143–9.
171. Behr ER, Dalageorgou C, Christiansen M, et al. Sudden arrhythmic death syndrome: familial evaluation identifies inheritable heart disease in the majority of families. *Eur Heart J* 2008;29:1670–80.
172. Brothers JA, Stephens P, Gaynor JW, Lorber R, Vricella LA, Paridon SM. Anomalous aortic origin of a coronary artery with an interarterial course: should family screening be routine? *J Am Coll Cardiol* 2008;51:2062–4.
173. Gimeno JR, Lacunza J, Garcia-Alberola A, et al. Penetrance and risk profile in inherited cardiac diseases studied in a dedicated screening clinic. *Am J Cardiol* 2009;104:406–10.
174. Tan HL, Hofman N, van Langen IM, van der Wal AC, Wilde AA. Sudden unexplained death: heritability and diagnostic yield of cardiological and genetic examination in surviving relatives. *Circulation* 2005;112:207–13.
175. Moya A, Sutton R, Ammirati F, et al. Guidelines for the diagnosis and management of syncope (version 2009): the Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC). *Eur Heart J* 2009;30:2631–71.
176. Colman N, Bakker A, Linzer M, Reitsma JB, Wieling W, Wilde AA. Value of history taking in syncope patients: in whom to suspect long QT syndrome? *Europace* 2009;11:937–43.
177. Oh JH, Hanusa BH, Kapoor WN. Do symptoms predict cardiac arrhythmias and mortality in patients with syncope? *Arch Intern Med* 1999;159:375–80.
178. Calkins H, Shyr Y, Frumin H, Schork A, Morady F. The value of the clinical history in the differentiation of syncope due to ventricular tachycardia, atrioventricular block, and neurocardiogenic syncope. *Am J Med* 1995;98:365–73.
179. Tester DJ, Kopplin LJ, Creighton W, Burke AP, Ackerman MJ. Pathogenesis of unexplained drowning: new insights from a molecular autopsy. *Mayo Clin Proc* 2005;80:596–600.
180. Johnson JN, Hofman N, Haglund CM, Cascino GD, Wilde AA, Ackerman MJ. Identification of a possible pathogenic link between congenital long QT syndrome and epilepsy. *Neurology* 2009;72:224–31.
181. MacCormick JM, McAlister H, Crawford J, et al. Misdiagnosis of long QT syndrome as epilepsy at first presentation. *Ann Emerg Med* 2009;54: 26–32.
182. Chandra N, Papadakis M, Sharma S. Preparticipation screening of young competitive athletes for cardiovascular disorders. *Phys Sportsmed* 2010;38:54–63.
183. Olasveengen TM, Lund Kordahl I, Steen PA, Sunde K. Out of hospital advanced life support with or without a physician: effect on quality of CPR and outcome. *Resuscitation* 2009;80:1248–52.
184. Kirves H, Skrifvars MB, Vahakuopus M, Ekstrom K, Martikainen M, Castren M. Adherence to resuscitation guidelines during prehospital care of cardiac arrest patients. *Eur J Emerg Med* 2007;14:75–81.
185. Schneider T, Mauer D, Diehl P, Eberle B, Dick W. Quality of onsite performance in prehospital advanced cardiac life support (ACLS). *Resuscitation* 1994;27:207–13.
186. Arntz HR, Wenzel V, Dissmann R, Marschall A, Breckwoldt J, Muller D. Out of hospital thrombolysis during cardiopulmonary resuscitation in patients with high likelihood of ST elevation myocardial infarction. *Resuscitation* 2008;76:180–4.
187. Bell A, Lockey D, Coats T, Moore F, Davies G. Physician Response Unit—a feasibility study of an initiative to enhance the delivery of prehospital emergency medical care. *Resuscitation* 2006;69:389–93.
188. Lossius HM, Soreide E, Hotvedt R, et al. Prehospital advanced life support provided by specially trained physicians: is there a benefit in terms of life years gained? *Acta Anaesthesiol Scand* 2002;46:771–8.

189. Dickinson ET, Schneider RM, Verdile VP. The impact of prehospital physicians on outofhospital nonasystolic cardiac arrest. *Prehosp Emerg Care* 1997;1:132–5.
190. Soo LH, Gray D, Young T, Huff N, Skene A, Hampton JR. Resuscitation from outofhospital cardiac arrest: is survival dependent on who is available at the scene? *Heart* 1999;81:47–52.
191. Frandsen F, Nielsen JR, Gram L, et al. Evaluation of intensified prehospital treatment in outofhospital cardiac arrest: survival and cerebral prognosis. The Odense ambulance study. *Cardiology* 1991;79:256–64.
192. Sipria A, Talvik R, Korgvee A, Sarapuu S, Oopik A. Outofhospital resuscitation in Tartu: effect of reorganization of Estonian EMS system. *Am J Emerg Med* 2000;18:469–73.
193. Estner HL, Gunzel C, Ndrepepa G, et al. Outcome after outofhospital cardiac arrest in a physician staffed emergency medical system according to the Utstein style. *Am Heart J* 2007;153:792–9.
194. Eisenburger P, Czappek G, Sterz F, et al. Cardiac arrest patients in an alpine area during a six year period. *Resuscitation* 2001;51:39–46.
195. Gottschalk A, Burmeister MA, Freitag M, Cavus E, Standl T. Influence of early defibrillation on the survival rate and quality of life after CPR in prehospital emergency medical service in a German metropolitan area. *Resuscitation* 2002;53:15–20.
196. Hampton JR, Dowling M, Nicholas C. Comparison of results from a cardiac ambulance manned by medical or nonmedical personnel. *Lancet* 1977;1:526–9.
197. Schneider T, Mauer D, Diehl P, et al. Early defibrillation by emergency physicians or emergency medical technicians? A controlled, prospective multicentre study. *Resuscitation* 1994;27:197–206.
198. Soo LH, Gray D, Young T, Skene A, Hampton JR. Influence of ambulance crew's length of experience on the outcome of outofhospital cardiac arrest. *Eur Heart J* 1999;20:535–40.
199. Yen ZS, Chen YT, Ko PC, et al. Cost effectiveness of different advanced life support providers for victims of outofhospital cardiac arrests. *J Formos Med Assoc* 2006;105:1001–7.
200. Nichol G, Thomas E, Callaway CW, et al. Regional variation in outofhospital cardiac arrest incidence and outcome. *JAMA* 2008;300:1423–31.
201. Fischer M, Krep H, Wierich D, et al. Comparison of the emergency medical services systems of Birmingham and Bonn: process efficacy and cost effectiveness. *Anesthesiol Intensivmed Notfallmed Schmerzther* 2003;38:630–42.
202. Bottiger BW, Grabner C, Bauer H, et al. Long term outcome after outofhospital cardiac arrest with physician staffed emergency medical services: the Utstein style applied to a mid sized urban/suburban area. *Heart* 1999;82:674–9.
203. Bjornsson HM, Marelsson S, Magnusson V, Sigurdsson G, Thornorgeirsson G. Prehospital cardiac life support in the Reykjavik area 1999–2002. *Laeknabladid* 2006;92:591–7.
204. Mitchell RG, Brady W, Guly UM, Pirralo RG, Robertson CE. Comparison of two emergency response systems and their effect on survival from out of hospital cardiac arrest. *Resuscitation* 1997;35:225–9.
205. Lafuente C, Melero Bascones M. Active chest compression–decompression for cardiopulmonary resuscitation. *Cochrane Database Syst Rev* 2004;CD002751.
206. Lewis RP, Stang JM, Fulkerson PK, Sampson KL, Scoles A, Warren JV. Effectiveness of advanced paramedics in a mobile coronary care system. *JAMA* 1979;241:1902–4.
207. Silfvast T, Ekstrand A. The effect of experience of onsite physicians on survival from prehospital cardiac arrest. *Resuscitation* 1996;31:101–5.
208. Morrison LJ, Visentin LM, Kiss A, et al. Validation of a rule for termination of resuscitation in outofhospital cardiac arrest. *N Engl J Med* 2006;355:478–87.
209. Richman PB, Vadeboncoeur TF, Chikani V, Clark L, Bobrow BJ. Independent evaluation of an outofhospital termination of resuscitation (TOR) clinical decision rule. *Acad Emerg Med* 2008;15:517–21.
210. Morrison LJ, Verbeek PR, Zhan C, Kiss A, Allan KS. Validation of a universal prehospital termination of resuscitation clinical prediction rule for advanced and basic life support providers. *Resuscitation* 2009;80:324–8.
211. Sasson C, Hegg AJ, Macy M, Park A, Kellermann A, McNally B. Prehospital termination of resuscitation in cases of refractory outofhospital cardiac arrest. *JAMA* 2008;300:1432–8.
212. Skrifvars MB, Vayrynen T, Kuisma M, et al. Comparison of Helsinki and European Resuscitation Council “do not attempt to resuscitate” guidelines, and a termination of resuscitation clinical prediction rule for outofhospital cardiac arrest patients found in asystole or pulseless electrical activity. *Resuscitation* 2010.
213. Ong ME, Jaffey J, Stiell I, Nesbitt L. Comparison of termination of resuscitation guidelines for basic life support: defibrillator providers in outofhospital cardiac arrest. *Ann Emerg Med* 2006;47:337–43.
214. Morrison LJ, Verbeek PR, Vermeulen MJ, et al. Derivation and evaluation of a termination of resuscitation clinical prediction rule for advanced life support providers. *Resuscitation* 2007;74:266–75.



215. Bailey ED, Wydro GC, Cone DC. Termination of resuscitation in the prehospital setting for adult patients suffering nontraumatic cardiac arrest. National Association of EMS Physicians Standards and Clinical Practice Committee. *Prehosp Emerg Care* 2000;4:190–5.
216. Verbeek PR, Vermeulen MJ, Ali FH, Messenger DW, Summers J, Morrison LJ. Derivation of a termination of resuscitation guideline for emergency medical technicians using automated external defibrillators. *Acad Emerg Med* 2002;9:671–8.
217. Ong ME, Tan EH, Ng FS, et al. Comparison of termination of resuscitation guidelines for out of hospital cardiac arrest in Singapore EMS. *Resuscitation* 2007;75:244–51.
218. Pircher IR, Stadlbauer KH, Severing AC, et al. A prediction model for out of hospital cardiopulmonary resuscitation. *Anesth Analg* 2009;109:1196–201.
219. van Walraven C, Forster AJ, Parish DC, et al. Validation of a clinical decision aid to discontinue in hospital cardiac arrest resuscitations. *JAMA* 2001;285:1602–6.
220. van Walraven C, Forster AJ, Stiell IG. Derivation of a clinical decision rule for the discontinuation of in hospital cardiac arrest resuscitations. *Arch Intern Med* 1999;159:129–34.
221. McCullough PA, Thompson RJ, Tobin KJ, Kahn JK, O’Neill WW. Validation of a decision support tool for the evaluation of cardiac arrest victims. *Clin Cardiol* 1998;21:195–200.
222. Christenson J, Andrusiek D, Everson Stewart S, et al. Chest compression fraction determines survival in patients with out of hospital ventricular fibrillation. *Circulation* 2009;120:1241–7.
223. Deakin CD, Nolan JP, Sunde K, Koster RW. European Resuscitation Council Guidelines for Resuscitation 2010. Section 3. Electrical therapies: automated external defibrillators, defibrillation, cardioversion and pacing. *Resuscitation* 2010;81:1293–304. C.D. Deakin et al./Resuscitation 81 (2010) 1305–1352
224. Gabbott D, Smith G, Mitchell S, et al. Cardiopulmonary resuscitation standards for clinical practice and training in the UK. *Resuscitation* 2005;64:13–9.
225. Dyson E, Smith GB. Common faults in resuscitation equipment—guidelines for checking equipment and drugs used in adult cardiopulmonary resuscitation. *Resuscitation* 2002;55:137–49.
226. Brennan RT, Braslow A. Skill mastery in public CPR classes. *Am J Emerg Med* 1998;16:653–7. 227. Chamberlain D, Smith A, Woollard M, et al. Trials of teaching methods in basic life support (3): comparison of simulated CPR performance after first training and at 6 months, with a note on the value of retraining. *Resuscitation* 2002;53:179–87. Df
228. Eberle B, Dick WF, Schneider T, Wisser G, Doetsch S, Tzanova I. Checking the carotid pulse check: diagnostic accuracy of first responders in patients with and without a pulse. *Resuscitation* 1996;33:107–16.
229. Lapostolle F, Le Toumelin P, Agostinucci JM, Catineau J, Adnet F. Basic cardiac life support providers checking the carotid pulse: performance, degree of conviction, and influencing factors. *Acad Emerg Med* 2004;11:878–80.
230. Liberman M, Lavoie A, Mulder D, Sampalis J. Cardiopulmonary resuscitation: errors made by prehospital emergency medical personnel. *Resuscitation* 1999;42:47–55.
231. Moule P. Checking the carotid pulse: diagnostic accuracy in students of the healthcare professions. *Resuscitation* 2000;44:195–201.
232. Nyman J, Sihvonen M. Cardiopulmonary resuscitation skills in nurses and nursing students. *Resuscitation* 2000;47:179–84.
233. Perkins GD, Stephenson B, Hulme J, Monsieurs KG. Birmingham assessment of breathing study (BABS). *Resuscitation* 2005;64:109–13.
234. Ruppert M, Reith MW, Widmann JH, et al. Checking for breathing: evaluation of the diagnostic capability of emergency medical services personnel, physicians, medical students, and medical laypersons. *Ann Emerg Med* 1999;34: 720–9.
235. Tibballs J, Russell P. Reliability of pulse palpation by healthcare personnel to diagnose paediatric cardiac arrest. *Resuscitation* 2009;80:61–4.
236. Bang A, Herlitz J, Martinell S. Interaction between emergency medical dispatcher and caller in suspected out of hospital cardiac arrest calls with focus on agonal breathing. A review of 100 tape recordings of true cardiac arrest cases. *Resuscitation* 2003;56:25–34.
237. Bohm K, Rosenqvist M, Hollenberg J, Biber B, Engerstrom L, Svensson L. Dispatcher assisted telephone guided cardiopulmonary resuscitation: an underused lifesaving system. *Eur J Emerg Med* 2007;14:256–9.
238. Bobrow BJ, Zuercher M, Ewy GA, et al. Gasping during cardiac arrest in humans is frequent and associated with improved survival. *Circulation* 2008;118:2550–4.
239. Vaillancourt C, Verma A, Trickett J, et al. Evaluating the effectiveness of dispatch assisted cardiopulmonary resuscitation instructions. *Acad Emerg Med* 2007;14:877–83.

240. White L, Rogers J, Bloomingdale M, et al. Dispatcher-assisted cardiopulmonary resuscitation: risks for patients not in cardiac arrest. *Circulation* 2010;121:91–7.
241. Perkins GD, Roberts C, Gao F. Delays in defibrillation: influence of different monitoring techniques. *Br J Anaesth* 2002;89:405–8.
242. Abella BS, Alvarado JP, Myklebust H, et al. Quality of cardiopulmonary resuscitation during in-hospital cardiac arrest. *JAMA* 2005;293:305–10.
243. Abella BS, Sandbo N, Vassilatos P, et al. Chest compression rates during cardiopulmonary resuscitation are suboptimal: a prospective study during in-hospital cardiac arrest. *Circulation* 2005;111:428–34.
244. Stiell IG, Wells GA, Field B, et al. Advanced cardiac life support in out-of-hospital cardiac arrest. *N Engl J Med* 2004;351:647–56.
245. Olasveengen TM, Sunde K, Brunborg C, Thowsen J, Steen PA, Wik L. Intravenous drug administration during out-of-hospital cardiac arrest: a randomized trial. *JAMA* 2009;302:2222–9.
246. Herlitz J, Ekstrom L, Wennerblom B, Axelsson A, Bang A, Holmberg S. Adrenaline in out-of-hospital ventricular fibrillation. Does it make any difference? *Resuscitation* 1995;29:195–201.
247. Holmberg M, Holmberg S, Herlitz J. Low chance of survival among patients requiring adrenaline (epinephrine) or intubation after out-of-hospital cardiac arrest in Sweden. *Resuscitation* 2002;54:37–45.
248. Bradley SM, Gabriel EE, Aufderheide TP, et al. Survival increases with CPR by Emergency Medical Services before defibrillation of out-of-hospital ventricular fibrillation or ventricular tachycardia: observations from the Resuscitation Outcomes Consortium. *Resuscitation* 2010;81:155–62.
249. Hollenberg J, Herlitz J, Lindqvist J, et al. Improved survival after out-of-hospital cardiac arrest is associated with an increase in proportion of emergency crew—witnessed cases and bystander cardiopulmonary resuscitation. *Circulation* 2008;118:389–96.
250. Iwami T, Nichol G, Hiraide A, et al. Continuous improvements in “chain of survival” increased survival after out-of-hospital cardiac arrests: a large-scale population-based study. *Circulation* 2009;119:728–34.
251. Edelson DP, Abella BS, Kramer-Johansen J, et al. Effects of compression depth and pre-shock pauses predict defibrillation failure during cardiac arrest. *Resuscitation* 2006;71:137–45.
252. Eftestol T, Sunde K, Steen PA. Effects of interrupting precordial compressions on the calculated probability of defibrillation success during out-of-hospital cardiac arrest. *Circulation* 2002;105:2270–3.
253. Sunde K, Eftestol T, Askenberg C, Steen PA. Quality assessment of defibrillation and advanced life support using data from the medical control module of the defibrillator. *Resuscitation* 1999;41:237–47.
254. Rea TD, Shah S, Kudenchuk PJ, Copass MK, Cobb LA. Automated external defibrillators: to what extent does the algorithm delay CPR? *Ann Emerg Med* 2005;46:132–41.
255. van Alem AP, Sanou BT, Koster RW. Interruption of cardiopulmonary resuscitation with the use of the automated external defibrillator in out-of-hospital cardiac arrest. *Ann Emerg Med* 2003;42:449–57.
256. Pytte M, Kramer-Johansen J, Eilevstjonn J, et al. Haemodynamic effects of adrenaline (epinephrine) depend on chest compression quality during cardiopulmonary resuscitation in pigs. *Resuscitation* 2006;71:369–78.
257. Prengel AW, Lindner KH, Ensinger H, Grunert A. Plasma catecholamine concentrations after successful resuscitation in patients. *Crit Care Med* 1992;20:609–14.
258. Bhende MS, Thompson AE. Evaluation of an end-tidal CO<sub>2</sub> detector during pediatric cardiopulmonary resuscitation. *Pediatrics* 1995;95:395–9.
259. Sehra R, Underwood K, Checchia P. End-tidal CO<sub>2</sub> is a quantitative measure of cardiac arrest. *Pacing Clin Electrophysiol* 2003;26:515–7.
260. Eftestol T, Wik L, Sunde K, Steen PA. Effects of cardiopulmonary resuscitation on predictors of ventricular fibrillation defibrillation success during out-of-hospital cardiac arrest. *Circulation* 2004;110:10–5.
261. Eftestol T, Sunde K, Aase SO, Husoy JH, Steen PA. Predicting outcome of defibrillation by spectral characterization and nonparametric classification of ventricular fibrillation in patients with out-of-hospital cardiac arrest. *Circulation* 2000;102:1523–9.
262. Amir O, Schliamser JE, Nemer S, Arie M. Ineffectiveness of precordial thump for cardioversion of malignant ventricular tachyarrhythmias. *Pacing Clin Electrophysiol* 2007;30:153–6.
263. Haman L, Parizek P, Vojacek J. Precordial thump efficacy in termination of induced ventricular arrhythmias. *Resuscitation* 2009;80:14–6.
264. Pellis T, Kette F, Lovisa D, et al. Utility of precordial thump for treatment of out-of-hospital cardiac arrest: a prospective study. *Resuscitation* 2009;80:17–23.
265. Kohl P, King AM, Boulin C. Antiarrhythmic effects of acute mechanical stimulation. In: Kohl P, Sachs F, Franz MR, editors. *Cardiac mechanoelectric feedback and arrhythmias: from pipette to patient*. Philadelphia: Elsevier Saunders; 2005. p. 304–14.

266. Caldwell G, Millar G, Quinn E, Vincent R, Chamberlain DA. Simple mechanical methods for cardioversion: defence of the precordial thump and cough version. *Br Med J (Clin Res Ed)* 1985;291:627–30.
267. Krijne R. Rate acceleration of ventricular tachycardia after a precordial chest thump. *Am J Cardiol* 1984;53:964–5.
268. Emerman CL, Pinchak AC, Hancock D, Hagen JF. Effect of injection site on circulation times during cardiac arrest. *Crit Care Med* 1988;16:1138–41.
269. Glaeser PW, Hellmich TR, Szewczuga D, Losek JD, Smith DS. Five year experience in prehospital intraosseous infusions in children and adults. *Ann Emerg Med* 1993;22:1119–24.
270. Wenzel V, Lindner KH, Augenstein S, et al. Intraosseous vasopressin improves coronary perfusion pressure rapidly during cardiopulmonary resuscitation in pigs. *Crit Care Med* 1999;27:1565–9.
271. Shavit I, Hoffmann Y, Galbraith R, Waisman Y. Comparison of two mechanical intraosseous infusion devices: a pilot, randomized crossover trial. *Resuscitation* 2009;80:1029–33.
272. Schuttler J, Bartsch A, Ebeling BJ, et al. Endobronchial administration of adrenaline in preclinical cardiopulmonary resuscitation. *Anasth Intensivther Notfallmed* 1987;22:63–8.
273. Hornchen U, Schuttler J, Stoeckel H, Eichelkraut W, Hahn N. Endobronchial instillation of epinephrine during cardiopulmonary resuscitation. *Crit Care Med* 1987;15:1037–9.
274. Vaknin Z, Manisterski Y, BenAbraham R, et al. Is endotracheal adrenaline deleterious because of the beta adrenergic effect? *Anesth Analg* 2001;92:1408–12.
275. Manisterski Y, Vaknin Z, BenAbraham R, et al. Endotracheal epinephrine: a call for larger doses. *Anesth Analg* 2002;95:1037–41, table of contents.
276. Efrati O, BenAbraham R, Barak A, et al. Endobronchial adrenaline: should it be reconsidered? Dose response and haemodynamic effect in dogs. *Resuscitation* 2003;59:117–22.
277. Elizur A, BenAbraham R, Manisterski Y, et al. Tracheal epinephrine or norepinephrine preceded by beta blockade in a dog model. Can beta blockade bestow any benefits? *Resuscitation* 2003;59:271–6.
278. Prengel AW, Rembecki M, Wenzel V, Steinbach G. A comparison of the endotracheal tube and the laryngeal mask airway as a route for endobronchial lidocaine administration. *Anesth Analg* 2001;92:1505–9.
279. Berg RA, Hilwig RW, Kern KB, Ewy GA. Precursors of shock cardiopulmonary resuscitation improves ventricular fibrillation median frequency and myocardial readiness for successful defibrillation from prolonged ventricular fibrillation: a randomized, controlled swine study. *Ann Emerg Med* 2002;40:563–70.
280. Achleitner U, Wenzel V, Strohmenger HU, et al. The beneficial effect of basic life support on ventricular fibrillation mean frequency and coronary perfusion pressure. *Resuscitation* 2001;51:151–8.
281. Fries M, Tang W, Chang YT, Wang J, Castillo C, Weil MH. Microvascular blood flow during cardiopulmonary resuscitation is predictive of outcome. *Resuscitation* 2006;71:248–53.
282. Ristagno G, Tang W, Huang L, et al. Epinephrine reduces cerebral perfusion during cardiopulmonary resuscitation. *Crit Care Med* 2009;37:1408–15.
283. Tang W, Weil MH, Sun S, Gazmuri RJ, Bisera J. Progressive myocardial dysfunction after cardiac resuscitation. *Crit Care Med* 1993;21:1046–50. C.D. Deakin et al./*Resuscitation* 81 (2010) 1305–1352
284. Angelos MG, Butke RL, Panchal AR, et al. Cardiovascular response to epinephrine varies with increasing duration of cardiac arrest. *Resuscitation* 2008;77:101–10.
285. Kudenchuk PJ, Cobb LA, Copass MK, et al. Amiodarone for resuscitation after out of hospital cardiac arrest due to ventricular fibrillation. *N Engl J Med* 1999;341:871–8.
286. Dorian P, Cass D, Schwartz B, Cooper R, Gelaznikas R, Barr A. Amiodarone as compared with lidocaine for shock resistant ventricular fibrillation. *N Engl J Med* 2002;346:884–90.
287. Thel MC, Armstrong AL, McNulty SE, Califf RM, O'Connor CM. Randomised trial of magnesium in in-hospital cardiac arrest. Duke Internal Medicine Housestaff. *Lancet* 1997;350:1272–6.
288. Allegra J, Lavery R, Cody R, et al. Magnesium sulfate in the treatment of refractory ventricular fibrillation in the prehospital setting. *Resuscitation* 2001;49:245–9.
289. Fatovich D, Prentice D, Dobb G. Magnesium in in-hospital cardiac arrest. *Lancet* 1998;351:446.
290. Hassan TB, Jagger C, Barnett DB. A randomised trial to investigate the efficacy of magnesium sulphate for refractory ventricular fibrillation. *Emerg Med J* 2002;19:57–62.
291. Miller B, Craddock L, Hoffenberg S, et al. Pilot study of intravenous magnesium sulfate in refractory cardiac arrest: safety data and recommendations for future studies. *Resuscitation* 1995;30:3–14.
292. Weil MH, Rackow EC, Trevino R, Grundler W, Falk JL, Griffel MI. Difference in acidbase state between venous and arterial blood during cardiopulmonary resuscitation. *N Engl J Med* 1986;315:153–6.
293. Wagner H, Terkelsen CJ, Friberg H, et al. Cardiac arrest in the catheterisation laboratory: a 5 year experience of using mechanical chest compressions to facilitate PCI during prolonged resuscitation efforts. *Resuscitation* 2010;81:383–7.
294. Soar J, Perkins GD, Abbas G, et al. European Resuscitation Council Guidelines for Resuscitation 2010. Section 8. Cardiac arrest in special circumstances: electrolyte abnormalities, poisoning, drowning,

- accidental hypothermia, hyperthermia, asthma, anaphylaxis, cardiac surgery, trauma, pregnancy, electrocution. *Resuscitation* 2010;81:1400–33.
295. Price S, Uddin S, Quinn T. Echocardiography in cardiac arrest. *Curr Opin Crit Care* 2010;16:211–5.
  296. Memtsoudis SG, Rosenberger P, Loffler M, et al. The usefulness of transesophageal echocardiography during intraoperative cardiac arrest in noncardiac surgery. *Anesth Analg* 2006;102:1653–7.
  297. Comess KA, DeRook FA, Russell ML, Tognazzi Evans TA, Beach KW. The incidence of pulmonary embolism in unexplained sudden cardiac arrest with pulseless electrical activity. *Am J Med* 2000;109:351–6.
  298. Niendorff DF, Rassias AJ, Palac R, Beach ML, Costa S, Greenberg M. Rapid cardiac ultrasound of inpatients suffering PEA arrest performed by nonexpert sonographers. *Resuscitation* 2005;67:81–7.
  299. Tayal VS, Kline JA. Emergency echocardiography to detect pericardial effusion in patients in PEA and near PEA states. *Resuscitation* 2003;59:315–8.
  300. van der Wouw PA, Koster RW, Delemarre BJ, de Vos R, Lampe Schoenmaeckers AJ, Lie KI. Diagnostic accuracy of transesophageal echocardiography during cardiopulmonary resuscitation. *J Am Coll Cardiol* 1997;30:780–3.
  301. Hernandez C, Shuler K, Hannan H, Sonyika C, Likourezos A, Marshall J. C.A.U.S.E.: Cardiac arrest ultrasound exam—a better approach to managing patients in primary nonarrhythmic cardiac arrest. *Resuscitation* 2008;76:198–206.
  302. Steiger HV, Rimbach K, Muller E, Breitzkreutz R. Focused emergency echocardiography: lifesaving tool for a 14-year-old girl suffering out of hospital pulseless electrical activity arrest because of cardiac tamponade. *Eur J Emerg Med* 2009;16:103–5.
  303. Breitzkreutz R, Walcher F, Seeger FH. Focused echocardiographic evaluation in resuscitation management: concept of an advanced life support conforming algorithm. *Crit Care Med* 2007;35:S150–61.
  304. Blaivas M, Fox JC. Outcome in cardiac arrest patients found to have cardiac standstill on the bedside emergency department echocardiogram. *Acad Emerg Med* 2001;8:616–21.
  305. Salen P, O'Connor R, Sierzanski P, et al. Can cardiac sonography and capnography be used independently and in combination to predict resuscitation outcomes? *Acad Emerg Med* 2001;8:610–5.
  306. Salen P, Melniker L, Chooljian C, et al. Does the presence or absence of sonographically identified cardiac activity predict resuscitation outcomes of cardiac arrest patients? *Am J Emerg Med* 2005;23:459–62.
  307. Bottiger BW, Bode C, Kern S, et al. Efficacy and safety of thrombolytic therapy after initially unsuccessful cardiopulmonary resuscitation: a prospective clinical trial. *Lancet* 2001;357:1583–5.
  308. Boidin MP. Airway patency in the unconscious patient. *Br J Anaesth* 1985;57:306–10.
  309. Nandi PR, Charlesworth CH, Taylor SJ, Nunn JF, Dore CJ. Effect of general anaesthesia on the pharynx. *Br J Anaesth* 1991;66:157–62.
  310. Guildner CW. Resuscitation: opening the airway. A comparative study of techniques for opening an airway obstructed by the tongue. *JACEP* 1976;5:588–90.
  311. Safar P, Escarraga LA, Chang F. Upper airway obstruction in the unconscious patient. *J Appl Physiol* 1959;14:760–4.
  312. Greene DG, Elam JO, Dobkin AB, Studley CL. Cinefluorographic study of hyperextension of the neck and upper airway patency. *JAMA* 1961;176:570–3.
  313. Morikawa S, Safar P, Decarlo J. Influence of the head/jaw position upon upper airway patency. *Anesthesiology* 1961;22:265–70.
  314. Ruben HM, Elam JO, Ruben AM, Greene DG. Investigation of upper airway problems in resuscitation, I: studies of pharyngeal xrays and performance by laymen. *Anesthesiology* 1961;22:271–9.
  315. Elam JO, Greene DG, Schneider MA, et al. Head tilt method for oral resuscitation. *JAMA* 1960;172:812–5.
  316. Aprahamian C, Thompson BM, Finger WA, Darin JC. Experimental cervical spine injury model: evaluation of airway management and splinting techniques. *Ann Emerg Med* 1984;13:584–7.
  317. Donaldson 3rd WF, Heil BV, Donaldson VP, Silvaggio VJ. The effect of airway maneuvers on the unstable C1/C2 segment. A cadaver study. *Spine* 1997;22:1215–8.
  318. Donaldson 3rd WF, Towers JD, Doctor A, Brand A, Donaldson VP. A methodology to evaluate motion of the unstable spine during intubation techniques. *Spine* 1993;18:2020–3.
  319. Hauswald M, Sklar DP, Tandberg D, Garcia JF. Cervical spine movement during airway management: cinefluoroscopic appraisal in human cadavers. *Am J Emerg Med* 1991;9:535–8.
  320. Brimacombe J, Keller C, Kunzel KH, Gaber O, Boehler M, Puhlinger F. Cervical spine motion during airway management: a cinefluoroscopic study of the posteriorly destabilized third cervical vertebrae in human cadavers. *Anesth Analg* 2000;91:1274–8.
  321. Majernick TG, Bieniek R, Houston JB, Hughes HG. Cervical spine movement during orotracheal intubation. *Ann Emerg Med* 1986;15:417–20.
  322. Lennarson PJ, Smith DW, Sawin PD, Todd MM, Sato Y, Traynelis VC. Cervical spinal motion during intubation: efficacy of stabilization maneuvers in the setting of complete segmental instability. *J Neurosurg Spine* 2001;94:265–70.

323. Marsh AM, Nunn JF, Taylor SJ, Charlesworth CH. Airway obstruction associated with the use of the Guedel airway. *Br J Anaesth* 1991;67:517–23.
324. Schade K, Borzotta A, Michaels A. Intracranial malposition of nasopharyngeal airway. *J Trauma* 2000;49:967–8.
325. Muzzi DA, Losasso TJ, Cucchiara RF. Complication from a nasopharyngeal airway in a patient with a basilar skull fracture. *Anesthesiology* 1991;74:366–8.
326. Roberts K, Porter K. How do you size a nasopharyngeal airway. *Resuscitation* 2003;56:19–23.
327. Stoneham MD. The nasopharyngeal airway. Assessment of position by fiberoptic laryngoscopy. *Anaesthesia* 1993;48:575–80.
328. Balan IS, Fiskum G, Hazelton J, Cotto Cumba C, Rosenthal RE. Oximetry-guided reoxygenation improves neurological outcome after experimental cardiac arrest. *Stroke* 2006;37:3008–13.
329. Kilgannon JH, Jones AE, Shapiro NI, et al. Association between arterial hyperoxia following resuscitation from cardiac arrest and in-hospital mortality. *JAMA* 2010;303:2165–71.
330. Alexander R, Hodgson P, Lomax D, Bullen C. A comparison of the laryngeal mask airway and Guedel airway, bag and face mask for manual ventilation following formal training. *Anaesthesia* 1993;48:231–4.
331. Doerges V, Sauer C, Ocker H, Wenzel V, Schmucker P. Smaller tidal volumes during cardiopulmonary resuscitation: comparison of adult and paediatric self-inflatable bags with three different ventilatory devices. *Resuscitation* 1999;43:31–7.
332. Ocker H, Wenzel V, Schmucker P, Dorges V. Effectiveness of various airway management techniques in a bench model simulating a cardiac arrest patient. *J Emerg Med* 2001;20:7–12.
333. Stone BJ, Chantler PJ, Baskett PJ. The incidence of regurgitation during cardiopulmonary resuscitation: a comparison between the bag valve mask and laryngeal mask airway. *Resuscitation* 1998;38:3–6.
334. Petito SP, Russell WJ. The prevention of gastric inflation—a neglected benefit of cricoid pressure. *Anaesth Intensive Care* 1988;16:139–43.
335. Lawes EG, Campbell I, Mercer D. Inflation pressure, gastric insufflation and rapid sequence induction. *Br J Anaesth* 1987;59:315–8.
336. Hartsilver EL, Vanner RG. Airway obstruction with cricoid pressure. *Anaesthesia* 2000;55:208–11.
337. Allman KG. The effect of cricoid pressure application on airway patency. *J Clin Anesth* 1995;7:197–9.
338. Hocking G, Roberts FL, Thew ME. Airway obstruction with cricoid pressure and lateral tilt. *Anaesthesia* 2001;56:825–8.
339. Mac GPJH, Ball DR. The effect of cricoid pressure on the cricoid cartilage and vocal cords: an endoscopic study in anaesthetised patients. *Anaesthesia* 2000;55:263–8.
340. Aufderheide TP, Sigurdsson G, Pirralo RG, et al. Hyperventilation-induced hypotension during cardiopulmonary resuscitation. *Circulation* 2004;109:1960–5.
341. O’Neill JF, Deakin CD. Do we hyperventilate cardiac arrest patients? *Resuscitation* 2007;73:82–5.
342. Olasveengen TM, Vik E, Kuzovlev A, Sunde K. Effect of implementation of new resuscitation guidelines on quality of cardiopulmonary resuscitation and survival. *Resuscitation* 2009;80:407–11.
343. Olasveengen TM, Wik L, Steen PA. Quality of cardiopulmonary resuscitation before and during transport in out-of-hospital cardiac arrest. *Resuscitation* 2008;76:185–90.
344. Weiss SJ, Ernst AA, Jones R, et al. Automatic transport ventilator versus bag valve in the EMS setting: a prospective, randomized trial. *South Med J* 2005;98:970–6.
345. Stallinger A, Wenzel V, Wagner Berger H, et al. Effects of decreasing inspiratory flow rate during simulated basic life support ventilation of a cardiac arrest patient on lung and stomach tidal volumes. *Resuscitation* 2002;54: 167–73. C.D. Deakin et al. / *Resuscitation* 81 (2010) 1305–1352
346. Noordergraaf GJ, van Dun PJ, Kramer BP, et al. Can first responders achieve and maintain normocapnia when sequentially ventilating with a bag valve device and two oxygen-driven resuscitators? A controlled clinical trial in 104 patients. *Eur J Anaesthesiol* 2004;21:367–72.
347. Deakin CD, O’Neill JF, Tabor T. Does compression-only cardiopulmonary resuscitation generate adequate passive ventilation during cardiac arrest? *Resuscitation* 2007;75:53–9.
348. Saissy JM, Boussignac G, Cheptel E, et al. Efficacy of continuous insufflation of oxygen combined with active cardiac compression–decompression during out-of-hospital cardiorespiratory arrest. *Anesthesiology* 2000;92: 1523–30.
349. Bertrand C, Hemery F, Carli P, et al. Constant flow insufflation of oxygen as the sole mode of ventilation during out-of-hospital cardiac arrest. *Intensive Care Med* 2006;32:843–51.
350. Bobrow BJ, Ewy GA, Clark L, et al. Passive oxygen insufflation is superior to bag valve mask ventilation for witnessed ventricular fibrillation out-of-hospital cardiac arrest. *Ann Emerg Med* 2009;54, 65662 e1.
351. Jones JH, Murphy MP, Dickson RL, Somerville GG, Brizendine EJ. Emergency physician-verified out-of-hospital intubation: miss rates by paramedics. *Acad Emerg Med* 2004;11:707–9.

352. Pelucio M, Halligan L, Dhindsa H. Outofhospital experience with the syringe esophageal detector device. *Acad Emerg Med* 1997;4:563–8.
353. Jemmett ME, Kendal KM, Fourre MW, Burton JH. Unrecognized misplacement of endotracheal tubes in a mixed urban to rural emergency medical services setting. *Acad Emerg Med* 2003;10:961–5.
354. Katz SH, Falk JL. Misplaced endotracheal tubes by paramedics in an urban emergency medical services system. *Ann Emerg Med* 2001;37:32–7.
355. Nolan JP, Soar J. Airway techniques and ventilation strategies. *Curr Opin Crit Care* 2008;14:279–86.
356. Gatward JJ, Thomas MJ, Nolan JP, Cook TM. Effect of chest compressions on the time taken to insert airway devices in a manikin. *Br J Anaesth* 2008;100: 351–6.
357. Davies PR, Tighe SQ, Greenslade GL, Evans GH. Laryngeal mask airway and tracheal tube insertion by unskilled personnel. *Lancet* 1990;336:977–9.
358. Flaishon R, Sotman A, Ben Abraham R, Rudick V, Varssano D, Weinbroum AA. Antichemical protective gear prolongs time to successful airway management: a randomized, crossover study in humans. *Anesthesiology* 2004;100:260–6.
359. Ho BY, Skinner HJ, Mahajan RP. Gastroesophageal reflux during day case gynaecological laparoscopy under positive pressure ventilation: laryngeal mask vs. tracheal intubation. *Anaesthesia* 1998;53:921–4.
360. Reinhart DJ, Simmons G. Comparison of placement of the laryngeal mask airway with endotracheal tube by paramedics and respiratory therapists. *Ann Emerg Med* 1994;24:260–3.
361. Rewari W, Kaul HL. Regurgitation and aspiration during gynaecological laparoscopy: comparison between laryngeal mask airway and tracheal intubation. *J Anaesthesiol Clin Pharmacol* 1999;15:67–70.
362. Pennant JH, Walker MB. Comparison of the endotracheal tube and laryngeal mask in airway management by paramedical personnel. *Anesth Analg* 1992;74:531–4.
363. Maltby JR, Beriault MT, Watson NC, Liepert DJ, Fick GH. LMA Classic and LMA ProSeal are effective alternatives to endotracheal intubation for gynecologic laparoscopy. *Can J Anaesth* 2003;50:71–7.
364. Deakin CD, Peters R, Tomlinson P, Cassidy M. Securing the prehospital airway: a comparison of laryngeal mask insertion and endotracheal intubation by UK paramedics. *Emerg Med J* 2005;22:64–7.
365. Cook TM, Hommers C. New airways for resuscitation? *Resuscitation* 2006;69:371–87.
366. Verghese C, Prior Willeard PF, Baskett PJ. Immediate management of the airway during cardiopulmonary resuscitation in a hospital without a resident anaesthesiologist. *Eur J Emerg Med* 1994;1:123–5.
367. Kokkinis K. The use of the laryngeal mask airway in CPR. *Resuscitation* 1994;27:9–12.
368. Leach A, Alexander CA, Stone B. The laryngeal mask in cardiopulmonary resuscitation in a district general hospital: a preliminary communication. *Resuscitation* 1993;25:245–8.
369. The use of the laryngeal mask airway by nurses during cardiopulmonary resuscitation: results of a multicentre trial. *Anaesthesia* 1994;49:3–7.
370. Rumball CJ, MacDonald D. The PTL, Combitube, laryngeal mask, and oral airway: a randomized prehospital comparative study of ventilatory device effectiveness and cost effectiveness in 470 cases of cardiorespiratory arrest. *Prehosp Emerg Care* 1997;1:1–10.
371. Tanigawa K, Shigematsu A. Choice of airway devices for 12,020 cases of nontraumatic cardiac arrest in Japan. *Prehosp Emerg Care* 1998;2:96–100.
372. Grantham H, Phillips G, Gilligan JE. The laryngeal mask in prehospital emergency care 1994;6:193–7.
373. Comparison of arterial blood gases of laryngeal mask airway and bag-valve-mask ventilation in outofhospital cardiac arrests. *Circ J* 2009;73:490–6.
374. Staudinger T, Brugger S, Watschinger B, et al. Emergency intubation with the Combitube: comparison with the endotracheal airway. *Ann Emerg Med* 1993;22:1573–5.
375. Lefrancois DP, Dufour DG. Use of the esophageal tracheal combitube by basic emergency medical technicians. *Resuscitation* 2002;52:77–83.
376. Ochs M, Vilke GM, Chan TC, Moats T, Buchanan J. Successful prehospital airway management by EMTDs using the combitube. *Prehosp Emerg Care* 2000;4:333–7.
377. Vezina D, Lessard MR, Bussieres J, Topping C, Trepanier CA. Complications associated with the use of the Esophageal Tracheal Combitube. *Can J Anaesth* 1998;45:76–80.
378. Richards CF. Piriform sinus perforation during Esophageal Tracheal Combitube placement. *J Emerg Med* 1998;16:37–9.
379. Rumball C, Macdonald D, Barber P, Wong H, Smecher C. Endotracheal intubation and esophageal tracheal Combitube insertion by regular ambulance attendants: a comparative trial. *Prehosp Emerg Care* 2004;8:15–22.

380. Rabitsch W, Schellongowski P, Staudinger T, et al. Comparison of a conventional tracheal airway with the Combitube in an urban emergency medical services system run by physicians. *Resuscitation* 2003;57:27–32.
381. Goldenberg IF, Campion BC, Siebold CM, McBride JW, Long LA. Esophageal gastric tube airway vs endotracheal tube in prehospital cardiopulmonary arrest. *Chest* 1986;90:90–6.
382. Cook TM, McCormick B, Asai T. Randomized comparison of laryngeal tube with classic laryngeal mask airway for anaesthesia with controlled ventilation. *Br J Anaesth* 2003;91:373–8.
383. Cook TM, McKinsty C, Hardy R, Twigg S. Randomized crossover comparison of the ProSeal laryngeal mask airway with the Laryngeal Tube during anaesthesia with controlled ventilation. *Br J Anaesth* 2003;91:678–83.
384. Kette F, Reffo I, Giordani G, et al. The use of laryngeal tube by nurses in out of hospital emergencies: preliminary experience. *Resuscitation* 2005;66:21–5.
385. Wiese CH, Semmel T, Muller JU, Bahr J, Ocker H, Graf BM. The use of the laryngeal tube disposable (LTD) by paramedics during out of hospital resuscitation an observational study concerning ERC guidelines 2005. *Resuscitation* 2009;80:194–8.
386. Wiese CH, Bartels U, Schultens A, et al. Using a Laryngeal Tube Suction Device (LTSD) reduces the “No Flow Time” in a single rescuer Manikin study. *J Emerg Med* 2009.
387. Wharton NM, Gibbison B, Gabbott DA, Haslam GM, Muchatuta N, Cook TM. Igel insertion by novices in manikins and patients. *Anaesthesia* 2008;63:991–5.
388. Gatward JJ, Cook TM, Sellar C, et al. Evaluation of the size 4 igel airway in one hundred nonparalysed patients. *Anaesthesia* 2008;63:1124–30.
389. Jackson KM, Cook TM. Evaluation of four airway training manikins as patient simulators for the insertion of eight types of supraglottic airway devices. *Anaesthesia* 2007;62:388–93.
390. Soar J. The Igel supraglottic airway and resuscitation—some initial thoughts. *Resuscitation* 2007;74:197.
391. Thomas M, Bengler J. Prehospital resuscitation using the iGEL. *Resuscitation* 2009;80:1437.
392. Cook TM, Nolan JP, Verghese C, et al. Randomized crossover comparison of the proSeal with the classic laryngeal mask airway in unparalysed anaesthetized patients. *Br J Anaesth* 2002;88:527–33.
393. Timmermann A, Cremer S, Eich C, et al. Prospective clinical and fiberoptic evaluation of the Supreme laryngeal mask airway. *Anesthesiology* 2009;110:262–5.
394. Cook TM, Gatward JJ, Handel J, et al. Evaluation of the LMA Supreme in 100 nonparalysed patients. *Anaesthesia* 2009;64:555–62.
395. Hosten T, Gurkan Y, Ozdamar D, Tekin M, Toker K, Solak M. A new supraglottic airway device: LMA Supreme, comparison with LMA ProSeal. *Acta Anaesthesiol Scand* 2009;53:852–7.
396. Burgoyne L, Cyna A. Laryngeal mask vs intubating laryngeal mask: insertion and ventilation by inexperienced resuscitators. *Anaesth Intensive Care* 2001;29:604–8.
397. Choyce A, Avidan MS, Shariff A, Del Aguila M, Radcliffe JJ, Chan T. A comparison of the intubating and standard laryngeal mask airways for airway management by inexperienced personnel. *Anaesthesia* 2001;56:357–60.
398. Baskett PJ, Parr MJ, Nolan JP. The intubating laryngeal mask. Results of a multicentre trial with experience of 500 cases. *Anaesthesia* 1998;53:1174–9.
399. Tentillier E, Heydenreich C, Cros AM, Schmitt V, Dindart JM, Thicoipe M. Use of the intubating laryngeal mask airway in emergency prehospital difficult intubation. *Resuscitation* 2008;77:30–4.
400. Lecky F, Bryden D, Little R, Tong N, Moulton C. Emergency intubation for acutely ill and injured patients. *Cochrane Database Syst Rev* 2008:CD001429.
401. Gausche M, Lewis RJ, Stratton SJ, et al. Effect of out of hospital pediatric endotracheal intubation on survival and neurological outcome: a controlled clinical trial. *JAMA* 2000;283:783–90.
402. Kramer Johansen J, Wik L, Steen PA. Advanced cardiac life support before and after tracheal intubation—direct measurements of quality. *Resuscitation* 2006;68:61–9.
403. Grmec S. Comparison of three different methods to confirm tracheal tube placement in emergency intubation. *Intensive Care Med* 2002;28:701–4.
404. Lyon RM, Ferris JD, Young DM, McKeown DW, Oglesby AJ, Robertson C. Field intubation of cardiac arrest patients: a diary. *J Emerg Med* 2010;27:321–3.
405. Wang HE, Simeone SJ, Weaver MD, Callaway CW. Interruptions in cardiopulmonary resuscitation from paramedic endotracheal intubation. *Ann Emerg Med* 2009;54:645e1–52e1.
406. Garza AG, Gratton MC, Coontz D, Noble E, Ma OJ. Effect of paramedic experience on orotracheal intubation success rates. *J Emerg Med* 2003;25:251–6.
407. Sayre MR, Sakles JC, Mistler AF, Evans JL, Kramer AT, Pancioli AM. Field trial of endotracheal intubation by basic EMTs. *Ann Emerg Med* 1998;31:228–33.

408. Bradley JS, Billows GL, Olinger ML, Boha SP, Cordell WH, Nelson DR. Prehospital oral endotracheal intubation by rural basic emergency medical technicians. *Ann Emerg Med* 1998;32:26–32.
409. Bobrow BJ, Clark LL, Ewy GA, et al. Minimally interrupted cardiac resuscitation by emergency medical services for outofhospital cardiac arrest. *JAMA* 2008;299:1158–65. C.D. Deakin et al./Resuscitation 81 (2010) 1305–1352
410. Takeda T, Tanigawa K, Tanaka H, Hayashi Y, Goto E, Tanaka K. The assessment of three methods to identify tracheal tube placement in the emergency setting. *Resuscitation* 2003;56.
411. Knapp S, Kofler J, Stoiser B, et al. The assessment of four different methods to verify tracheal tube placement in the critical care setting. *Anesth Analg* 1999;88:766–70.
412. Grmec S, Mally S. Prehospital determination of tracheal tube placement in severe head injury. *Emerg Med J* 2004;21:518–20.
413. Yao YX, Jiang Z, Lu XH, He JH, Ma XX, Zhu JH. A clinical study of impedance graph in verifying tracheal intubation. *Zhonghua Yi Xue Za Zhi* 2007;87: 898–901.
414. Li J. Capnography alone is imperfect for endotracheal tube placement confirmation during emergency intubation. *JEmerg Med* 2001;20:223–9.
415. Tanigawa K, Takeda T, Goto E, Tanaka K. Accuracy and reliability of the selfinflating bulb to verify tracheal intubation in outofhospital cardiac arrest patients. *Anesthesiology* 2000;93:1432–6.
416. Baraka A, Khoury PJ, Siddik SS, Salem MR, Joseph NJ. Efficacy of the selfinflating bulb in differentiating esophageal from tracheal intubation in the parturient undergoing cesarean section. *Anesth Analg* 1997;84:533–7.
417. Davis DP, Stephen KA, Vilke GM. Inaccuracy in endotracheal tube verification using a Toomey syringe. *JEmerg Med* 1999;17:35–8.
418. Bozeman WP, Hexter D, Liang HK, Kelen GD. Esophageal detector device versus detection of endtidal carbon dioxide level in emergency intubation. *Ann Emerg Med* 1996;27:595–9.
419. Jenkins WA, Verdile VP, Paris PM. The syringe aspiration technique to verify endotracheal tube position. *AmJEmerg Med* 1994;12:413–6.
420. Schaller RJ, Huff JS, Zahn A. Comparison of a colorimetric endtidal CO<sub>2</sub> detector and an esophageal aspiration device for verifying endotracheal tube placement in the prehospital setting: a six month experience. *Prehosp Disaster Med* 1997;12:57–63.
421. Tanigawa K, Takeda T, Goto E, Tanaka K. The efficacy of esophageal detector devices in verifying tracheal tube placement: a randomized crossover study of outofhospital cardiac arrest patients. *Anesth Analg* 2001;92:375–8.
422. Anton WR, Gordon RW, Jordan TM, Posner KL, Cheney FW. A disposable endtidal CO<sub>2</sub> detector to verify endotracheal intubation. *Ann Emerg Med* 1991;20:271–5.
423. MacLeod BA, Heller MB, Gerard J, Yealy DM, Menegazzi JJ. Verification of endotracheal tube placement with colorimetric endtidal CO<sub>2</sub> detection. *Ann Emerg Med* 1991;20:267–70.
424. Ornato JP, Shipley JB, Racht EM, et al. Multicenter study of a portable, handsize, colorimetric endtidal carbon dioxide detection device. *Ann Emerg Med* 1992;21:518–23.
425. Sanders KC, Clum 3rd WB, Nguyen SS, Balasubramaniam S. Endtidal carbon dioxide detection in emergency intubation in four groups of patients. *JEmerg Med* 1994;12:771–7.
426. Varon AJ, Morrino J, Civetta JM. Clinical utility of a colorimetric endtidal CO<sub>2</sub> detector in cardiopulmonary resuscitation and emergency intubation. *J Clin Monit* 1991;7:289–93.
427. Vukmir RB, Heller MB, Stein KL. Confirmation of endotracheal tube placement: a miniaturized infrared qualitative CO<sub>2</sub> detector. *Ann Emerg Med* 1991;20:726–9.
428. Silvestri S, Ralls GA, Krauss B, et al. The effectiveness of outofhospital use of continuous endtidal carbon dioxide monitoring on the rate of unrecognized misplaced intubation within a regional emergency medical services system. *Ann Emerg Med* 2005;45:497–503.
429. Mehta KH, Turley A, Peyrasse P, Janes J, Hall JE. An assessment of the ability of impedance respirometry distinguish oesophageal from tracheal intubation. *Anaesthesia* 2002;57:1090–3.
430. Absolom M, Roberts R, Bahlmann UB, Hall JE, Armstrong T, Turley A. The use of impedance respirometry to confirm tracheal intubation in children. *Anaesthesia* 2006;61:1145–8.
431. Kramer Johansen J, Eilevstjonn J, Olasveengen TM, Tomlinson AE, Dorph E, Steen PA. Transthoracic impedance changes as a tool to detect malpositioned tracheal tubes. *Resuscitation* 2008;76:11–6.
432. Risdal M, Aase SO, Stavland M, Eftestol T. Impedancebased ventilation detection during cardiopulmonary resuscitation. *IEEE Trans Biomed Eng* 2007;54:2237–45.
433. Pytte M, Olasveengen TM, Steen PA, Sunde K. Misplaced and dislodged endotracheal tubes may be detected by the defibrillator during cardiopulmonary resuscitation. *Acta Anaesthesiol Scand* 2007;51:770–2.
434. Salem MR, Wong AY, Mani M, Sellick BA. Efficacy of cricoid pressure in preventing gastric inflation during bagmask ventilation in pediatric patients. *Anesthesiology* 1974;40:96–8.



435. Moynihan RJ, BrockUtne JG, Archer JH, Feld LH, Kreitzman TR. The effect of cricoid pressure on preventing gastric insufflation in infants and children. *Anesthesiology* 1993;78:652–6.
436. Ho AM, Wong W, Ling E, Chung DC, Tay BA. Airway difficulties caused by improperly applied cricoid pressure. *J Emerg Med* 2001;20:29–31.
437. Shorten GD, Alfille PH, Gliklich RE. Airway obstruction following application of cricoid pressure. *J Clin Anesth* 1991;3:403–5.
438. Proceedings of the guidelines 2000 conference for cardiopulmonary resuscitation and emergency cardiovascular care: an international consensus on science. *Ann Emerg Med* 2001;37:S1–200.
439. Lindner KH, Dirks B, Strohmenger HU, Pregel AW, Lindner IM, Lurie KG. Randomised comparison of epinephrine and vasopressin in patients with outofhospital ventricular fibrillation. *Lancet* 1997;349:535–7.
440. Wenzel V, Krismer AC, Arntz HR, Sitter H, Stadlbauer KH, Lindner KH. A comparison of vasopressin and epinephrine for outofhospital cardiopulmonary resuscitation. *N Engl J Med* 2004;350:105–13.
441. Stiell IG, Hebert PC, Wells GA, et al. Vasopressin versus epinephrine for inhospital cardiac arrest: a randomised controlled trial. *Lancet* 2001;358:105–9.
442. Aung K, Htay T. Vasopressin for cardiac arrest: a systematic review and metaanalysis. *Arch Intern Med* 2005;165:17–24.
443. Callaway CW, Hostler D, Doshi AA, et al. Usefulness of vasopressin administered with epinephrine during outofhospital cardiac arrest. *Am J Cardiol* 2006;98:1316–21.
444. Gueugniaud PY, David JS, Chanzy E, et al. Vasopressin and epinephrine vs. epinephrine alone in cardiopulmonary resuscitation. *N Engl J Med* 2008;359:21–30.
445. Masini E, Planchenault J, Pezziardi F, Gautier P, Gagnol JP. Histamine-releasing properties of Polysorbate 80 in vitro and in vivo: correlation with its hypotensive action in the dog. *Agents Actions* 1985;16:470–7.
446. Somberg JC, Bailin SJ, Haffajee CI, et al. Intravenous lidocaine versus intravenous amiodarone (in a new aqueous formulation) for incessant ventricular tachycardia. *Am J Cardiol* 2002;90:853–9.
447. Somberg JC, Timar S, Bailin SJ, et al. Lack of a hypotensive effect with rapid administration of a new aqueous formulation of intravenous amiodarone. *Am J Cardiol* 2004;93:576–81.
448. Skrifvars MB, Kuisma M, Boyd J, et al. The use of undiluted amiodarone in the management of outofhospital cardiac arrest. *Acta Anaesthesiol Scand* 2004;48:582–7.
449. Petrovic T, Adnet F, Lapandry C. Successful resuscitation of ventricular fibrillation after lowdose amiodarone. *Ann Emerg Med* 1998;32:518–9.
450. Levine JH, Massumi A, Scheinman MM, et al. Intravenous amiodarone for recurrent sustained hypotensive ventricular tachyarrhythmias. Intravenous Amiodarone Multicenter Trial Group. *J Am Coll Cardiol* 1996;27:67–75.
451. Matsusaka T, Hasebe N, Jin YT, Kawabe J, Kikuchi K. Magnesium reduces myocardial infarct size via enhancement of adenosine mechanism in rabbits. *Cardiovasc Res* 2002;54:568–75.
452. Longstreth Jr WT, Fahrenbruch CE, Olsufka M, Walsh TR, Copass MK, Cobb LA. Randomized clinical trial of magnesium, diazepam, or both after outofhospital cardiac arrest. *Neurology* 2002;59:506–14.
453. Stiell IG, Wells GA, Hebert PC, Laupacis A, Weitzman BN. Association of drug therapy with survival in cardiac arrest: limited role of advanced cardiac life support drugs. *Acad Emerg Med* 1995;2:264–73.
454. Engdahl J, Bang A, Lindqvist J, Herlitz J. Can we define patients with no and those with some chance of survival when found in asystole out of hospital? *Am J Cardiol* 2000;86:610–4.
455. Engdahl J, Bang A, Lindqvist J, Herlitz J. Factors affecting short and long term prognosis among 1069 patients with outofhospital cardiac arrest and pulseless electrical activity. *Resuscitation* 2001;51:17–25.
456. Dumot JA, Burval DJ, Sprung J, et al. Outcome of adult cardiopulmonary resuscitations at a tertiary referral center including results of “limited” resuscitations. *Arch Intern Med* 2001;161:1751–8.
457. Tortolani AJ, Risucci DA, Powell SR, Dixon R. Inhospital cardiopulmonary resuscitation during asystole. Therapeutic factors associated with 24 hour survival. *Chest* 1989;96:622–6.
458. Coon GA, Clinton JE, Ruiz E. Use of atropine for bradyasystolic prehospital cardiac arrest. *Ann Emerg Med* 1981;10:462–7.
459. Harrison EE, Amey BD. The use of calcium in cardiac resuscitation. *Am J Emerg Med* 1983;1:267–73.
460. Stueven HA, Thompson B, Aprahamian C, Tonsfeldt DJ, Kastenson EH. The effectiveness of calcium chloride in refractory electromechanical dissociation. *Ann Emerg Med* 1985;14:626–9.
461. Stueven HA, Thompson B, Aprahamian C, Tonsfeldt DJ, Kastenson EH. Lack of effectiveness of calcium chloride in refractory asystole. *Ann Emerg Med* 1985;14:630–2.
462. Stueven HA, Thompson BM, Aprahamian C, Tonsfeldt DJ. Calcium chloride: reassessment of use in asystole. *Ann Emerg Med* 1984;13:820–2.

463. Gando S, Tedo I, Tujinaga H, Kubota M. Variation in serum ionized calcium on cardiopulmonary resuscitation. *JAnesth* 1988;2:154–60.
464. Stueven H, Thompson BM, Aprahamian C, Darin JC. Use of calcium in prehospital cardiac arrest. *Ann Emerg Med* 1983;12:136–9.
465. van Walraven C, Stiell IG, Wells GA, Hebert PC, Vandemheen K. Do advanced cardiac life support drugs increase resuscitation rates from inhospital cardiac arrest? The OTAC Study Group. *Ann Emerg Med* 1998;32:544–53.
466. Dybvik T, Strand T, Steen PA. Buffer therapy during outofhospital cardiopulmonary resuscitation. *Resuscitation* 1995;29:89–95.
467. Aufderheide TP, Martin DR, Olson DW, et al. Prehospital bicarbonate use in cardiac arrest: a 3year experience. *AmJEmerg Med* 1992;10:4–7.
468. Deloos H, Lewi PJ. Are intercenter differences in EMS management and sodium bicarbonate administration important for the outcome of CPR? The Cerebral Resuscitation Study Group. *Resuscitation* 1989;17(Suppl.):S199–206.
469. Roberts D, Landolfo K, Light R, Dobson K. Early predictors of mortality for hospitalized patients suffering cardiopulmonary arrest. *Chest* 1990;97:413–9.
470. SuljagaPechtel K, Goldberg E, Strickon P, Berger M, Skovron ML. Cardiopulmonary resuscitation in a hospitalized population: prospective study of factors associated with outcome. *Resuscitation* 1984;12:77–95.
471. Weil MH, Trevino RP, Rackow EC. Sodium bicarbonate during CPR. Does it help or hinder? *Chest* 1985;88:487.
472. Vukmir RB, Katz L. Sodium bicarbonate improves outcome in prolonged prehospital cardiac arrest. *AmJEmerg Med* 2006;24:156–61. C.D. Deakin et al./*Resuscitation* 81 (2010) 1305–1352
473. BarJoseph G, Abramson NS, Kelsey SF, Mashlach T, Craig MT, Safar P. Improved resuscitation outcome in emergency medical systems with increased usage of sodium bicarbonate during cardiopulmonary resuscitation. *Acta Anaesthesiol Scand* 2005;49:6–15.
474. Weaver WD, Eisenberg MS, Martin JS, et al. Myocardial Infarction Triage and Intervention Project, phase I: patient characteristics and feasibility of prehospital initiation of thrombolytic therapy. *JAm Coll Cardiol* 1990;15:925–31.
475. Sandeman DJ, Alahakoon TI, Bentley SC. Tricyclic poisoning—successful management of ventricular fibrillation following massive overdose of imipramine. *Anaesth Intensive Care* 1997;25:542–5.
476. Lin SR. The effect of dextran and streptokinase on cerebral function and blood flow after cardiac arrest. An experimental study on the dog. *Neuroradiology* 1978;16:340–2.
477. Fischer M, Bottiger BW, Popov Cenic S, Hossmann KA. Thrombolysis using plasminogen activator and heparin reduces cerebral noreflow after resuscitation from cardiac arrest: an experimental study in the cat. *Intensive Care Med* 1996;22:1214–23.
478. Ruiz Bailen M, Aguayo de Hoyos E, Serrano Corcoles MC, Diaz Castellanos MA, Ramos Cuadra JA, Reina Toral A. Efficacy of thrombolysis in patients with acute myocardial infarction requiring cardiopulmonary resuscitation. *Intensive Care Med* 2001;27:1050–7.
479. Janata K, Holzer M, Kurkciyan I, et al. Major bleeding complications in cardiopulmonary resuscitation: the place of thrombolytic therapy in cardiac arrest due to massive pulmonary embolism. *Resuscitation* 2003;57:49–55.
480. Kurkciyan I, Meron G, Sterz F, et al. Pulmonary embolism as a cause of cardiac arrest: presentation and outcome. *Arch Intern Med* 2000;160:1529–35.
481. Lederer W, Lichtenberger C, Pechlaner C, Kroesen G, Baubin M. Recombinant tissue plasminogen activator during cardiopulmonary resuscitation in 108 patients with outofhospital cardiac arrest. *Resuscitation* 2001;50:71–6.
482. Bozeman WP, Kleiner DM, Ferguson KL. Empiric tenecteplase is associated with increased return of spontaneous circulation and short term survival in cardiac arrest patients unresponsive to standard interventions. *Resuscitation* 2006;69:399–406.
483. Stadlbauer KH, Krismer AC, Arntz HR, et al. Effects of thrombolysis during outofhospital cardiopulmonary resuscitation. *AmJCardiol* 2006;97:305–8.
484. Fatovich DM, Dobb GJ, Clugston RA. A pilot randomised trial of thrombolysis in cardiac arrest (The TICA trial). *Resuscitation* 2004;61:309–13.
485. Tiffany PA, Schultz M, Stueven H. Bolus thrombolytic infusions during CPR for patients with refractory arrest rhythms: outcome of a case series. *Ann Emerg Med* 1998;31:124–6.
486. AbuLaban RB, Christenson JM, Innes GD, et al. Tissue plasminogen activator in cardiac arrest with pulseless electrical activity. *N Engl J Med* 2002;346:1522–8.

487. Bottiger BW, Arntz HR, Chamberlain DA, et al. Thrombolysis during resuscitation for outofhospital cardiac arrest. *N Engl J Med* 2008;359:2651–62.
488. Li X, Fu QL, Jing XL, et al. A metaanalysis of cardiopulmonary resuscitation with and without the administration of thrombolytic agents. *Resuscitation* 2006;70:31–6.
489. Fava M, Loyola S, Bertoni H, Dougnac A. Massive pulmonary embolism: percutaneous mechanical thrombectomy during cardiopulmonary resuscitation. *J Vasc Interv Radiol* 2005;16:119–23.
490. Lederer W, Lichtenberger C, Pechlaner C, Kinzl J, Kroesen G, Baubin M. Longterm survival and neurological outcome of patients who received recombinant tissue plasminogen activator during outofhospital cardiac arrest. *Resuscitation* 2004;61:123–9.
491. Zahorec R. Rescue systemic thrombolysis during cardiopulmonary resuscitation. *Bratisl Lek Listy* 2002;103:266–9.
492. Konstantinov IE, Saxena P, Koniuszko MD, Alvarez J, Newman MA. Acute massive pulmonary embolism with cardiopulmonary resuscitation: management and results. *Tex Heart Inst J* 2007;34:41–5 [discussion 5–6].
493. Scholz KH, Hilmer T, Schuster S, Wojcik J, Kreuzer H, Tebbe U. Thrombolysis in resuscitated patients with pulmonary embolism. *Dtsch Med Wochenschr* 1990;115:930–5.
494. Gramann J, Lange Braun P, Bodemann T, Hochrein H. Der Einsatz von Thrombolytika in der Reanimation als Ultima ratio zur Überwindung des Herztodes. *Intensiv und Notfallbehandlung* 1991;16:134–7.
495. Klefisch F, Gareis R, Störck T, Möckel M, Danne O. Praktische ultimario thrombolys bei therapierefraktärer kardiopulmonaler reanimation. *Intensivmedizin* 1995;32:155–62.
496. Böttiger BW, Martin E. Thrombolytic therapy during cardiopulmonary resuscitation and the role of coagulation activation after cardiac arrest. *Curr Opin Crit Care* 2001;7:176–83.
497. Spöhr F, Böttiger BW. Safety of thrombolysis during cardiopulmonary resuscitation. *Drug Saf* 2003;26:367–79.
498. Langhelle A, Tyvold SS, Lexow K, Hapnes SA, Sunde K, Steen PA. Inhospital factors associated with improved outcome after outofhospital cardiac arrest. A comparison between four regions in Norway. *Resuscitation* 2003;56:247–63.
499. Calle PA, Buylaert WA, Vanhaute OA. Glycemia in the postresuscitation period. The Cerebral Resuscitation Study Group. *Resuscitation* 1989;17(Suppl.):S181–8 [discussion S99–206].
500. Longstreth Jr WT, Diehr P, Inui TS. Prediction of awakening after outofhospital cardiac arrest. *N Engl J Med* 1983;308:1378–82.
501. Longstreth Jr WT, Inui TS. High blood glucose level on hospital admission and poor neurological recovery after cardiac arrest. *Ann Neurol* 1984;15:59–63.
502. Longstreth Jr WT, Copass MK, Dennis LK, Rauch Matthews ME, Stark MS, Cobb LA. Intravenous glucose after outofhospital cardiopulmonary arrest: a community based randomized trial. *Neurology* 1993;43:2534–41.
503. Mackenzie CF. A review of 100 cases of cardiac arrest and the relation of potassium, glucose, and haemoglobin levels to survival. *West Indian Med J* 1975;24:39–45.
504. Mullner M, Sterz F, Binder M, Schreiber W, Deimel A, Lagner AN. Blood glucose concentration after cardiopulmonary resuscitation influences functional neurological recovery in human cardiac arrest survivors. *J Cereb Blood Flow Metab* 1997;17:430–6.
505. Skrifvars MB, Pettila V, Rosenberg PH, Castren M. A multiple logistic regression analysis of inhospital factors related to survival at six months in patients resuscitated from outofhospital ventricular fibrillation. *Resuscitation* 2003;59:319–28.
506. Ditchey RV, Lindenfeld J. Potential adverse effects of volume loading on perfusion of vital organs during closed chest resuscitation. *Circulation* 1984;69:181–9.
507. Voorhees WD, Ralston SH, Kougiaris C, Schmitz PM. Fluid loading with whole blood or Ringer's lactate solution during CPR in dogs. *Resuscitation* 1987;15:113–23.
508. Gentile NT, Martin GB, Appleton TJ, Moeggenberg J, Paradis NA, Nowak RM. Effects of arterial and venous volume infusion on coronary perfusion pressures during canine CPR. *Resuscitation* 1991;22:55–63.
509. Bender R, Breil M, Heister U, et al. Hypertonic saline during CPR: feasibility and safety of a new protocol of fluid management during resuscitation. *Resuscitation* 2007;72:74–81.
510. Bruel C, Parienti JJ, Marie W, et al. Mild hypothermia during advanced life support: a preliminary study in outofhospital cardiac arrest. *Crit Care* 2008;12:R31.
511. Kamarainen A, Virkkunen I, Tenhunen J, Yli-Hankala A, Silfvast T. Prehospital induction of therapeutic hypothermia during CPR: a pilot study. *Resuscitation* 2008;76:360–3.

512. Krep H, Breil M, Sinn D, Hagendorff A, Hoeft A, Fischer M. Effects of hypertonic versus isotonic infusion therapy on regional cerebral blood flow after experimental cardiac arrest cardiopulmonary resuscitation in pigs. *Resuscitation* 2004;63:73–83.
513. Soar J, Foster J, Breitzkreutz R. Fluid infusion during CPR and after ROSC—is it safe? *Resuscitation* 2009;80:1221–2.
514. Ong ME, Chan YH, Oh JJ, Ngo AS. An observational, prospective study comparing tibial and humeral intraosseous access using the EZIO. *AmJ Emerg Med* 2009;27:8–15.
515. Gerritse BM, Scheffer GJ, Draaisma JM. Prehospital intraosseous access with the bone injection gun by a helicoptertransported emergency medical team. *J Trauma* 2009;66:1739–41.
516. Brenner T, Bernhard M, Helm M, et al. Comparison of two intraosseous infusion systems for adult emergency medical use. *Resuscitation* 2008;78:314–9.
517. Frascone RJ, Jensen JP, Kaye K, Salzman JG. Consecutive field trials using two different intraosseous devices. *Prehosp Emerg Care* 2007;11:164–71.
518. Banerjee S, Singhi SC, Singh S, Singh M. The intraosseous route is a suitable alternative to intravenous route for fluid resuscitation in severely dehydrated children. *Indian Pediatr* 1994;31:1511–20.
519. Brickman KR, Krupp K, Rega P, Alexander J, Guinness M. Typing and screening of blood from intraosseous access. *Ann Emerg Med* 1992;21:414–7.
520. Fiser RT, Walker WM, Seibert JJ, McCarthy R, Fiser DH. Tibial length following intraosseous infusion: a prospective, radiographic analysis. *Pediatr Emerg Care* 1997;13:186–8.
521. Ummerhofer W, Frei FJ, Urwyler A, Drewe J. Are laboratory values in bone marrow aspirate predictable for venous blood in paediatric patients? *Resuscitation* 1994;27:123–8.
522. Guy J, Haley K, Zuspan SJ. Use of intraosseous infusion in the pediatric trauma patient. *J Pediatr Surg* 1993;28:158–61.
523. Macnab A, Christenson J, Findlay J, et al. A new system for sternal intraosseous infusion in adults. *Prehosp Emerg Care* 2000;4:173–7.
524. Ellemunter H, Simma B, Trawoger R, Maurer H. Intraosseous lines in preterm and full term neonates. *Arch Dis Child Fetal Neonatal Ed* 1999;80:F74–5.
525. Delguercio LR, Feins NR, Cohn JD, Coomaraswamy RP, Wollman SB, State D. Comparison of blood flow during external and internal cardiac massage in man. *Circulation* 1965;31(Suppl. 1):171–80.
526. Wik L, Kramer-Johansen J, Myklebust H, et al. Quality of cardiopulmonary resuscitation during out-of-hospital cardiac arrest. *JAMA* 2005;293: 299–304.
527. Kramer-Johansen J, Myklebust H, Wik L, et al. Quality of out-of-hospital cardiopulmonary resuscitation with real time automated feedback: a prospective interventional study. *Resuscitation* 2006;71:283–92.
528. Sutton RM, Maltese MR, Niles D, et al. Quantitative analysis of chest compression interruptions during in-hospital resuscitation of older children and adolescents. *Resuscitation* 2009;80:1259–63.
529. Sutton RM, Niles D, Nysaether J, et al. Quantitative analysis of CPR quality during in-hospital resuscitation of older children and adolescents. *Pediatrics* 2009;124:494–9.
530. Boczar ME, Howard MA, Rivers EP, et al. A technique revisited: hemodynamic comparison of closed and open chest cardiac massage during human cardiopulmonary resuscitation. *Crit Care Med* 1995;23:498–503.
531. Anthi A, Tzelepis GE, Alivizatos P, Michalis A, Palatianos GM, Geroulanos S. Unexpected cardiac arrest after cardiac surgery: incidence, predisposing causes, and outcome of open chest cardiopulmonary resuscitation. *Chest* 1998;113:15–9.
532. Pottle A, Bullock I, Thomas J, Scott L. Survival to discharge following Open Chest Cardiac Compression (OCCC). A 4 year retrospective audit in a cardiothoracic C.D. Deakin et al. *Resuscitation* 81 (2010) 1305–1352 specialist centre Royal Brompton and Harefield NHS Trust, United Kingdom. *Resuscitation* 2002;52:269–72.
533. Babbs CF. Interposed abdominal compression CPR: a comprehensive evidence based review. *Resuscitation* 2003;59:71–82.
534. Babbs CF, Nadkarni V. Optimizing chest compression to rescue ventilation ratios during one rescuer CPR by professionals and lay persons: children are not just little adults. *Resuscitation* 2004;61:173–81.
535. Beyar R, Kishon Y, Kimmel E, Neufeld H, Dinnar U. Intrathoracic and abdominal pressure variations as an efficient method for cardiopulmonary resuscitation: studies in dogs compared with computer model results. *Cardiovasc Res* 1985;19:335–42.
536. Voorhees WD, Niebauer MJ, Babbs CF. Improved oxygen delivery during cardiopulmonary resuscitation with interposed abdominal compressions. *Ann Emerg Med* 1983;12:128–35.
537. Sack JB, Kesselbrenner MB, Bregman D. Survival from in-hospital cardiac arrest with interposed abdominal counterpulsation during cardiopulmonary resuscitation. *JAMA* 1992;267:379–85.
538. Sack JB, Kesselbrenner MB, Jarrad A. Interposed abdominal compression cardiopulmonary resuscitation and resuscitation outcome during asystole and electromechanical dissociation. *Circulation* 1992;86:1692–700.

539. Mateer JR, Stueven HA, Thompson BM, Aprahamian C, Darin JC. Prehospital IACCPR versus standard CPR: paramedic resuscitation of cardiac arrests. *Am J Emerg Med* 1985;3:143–6.
540. Lindner KH, Pfenninger EG, Lurie KG, Schurmann W, Lindner IM, Ahnefeld FW. Effects of active compression–decompression resuscitation on myocardial and cerebral blood flow in pigs. *Circulation* 1993;88:1254–63.
541. Shultz JJ, Coffeen P, Sweeney M, et al. Evaluation of standard and active compression–decompression CPR in an acute human model of ventricular fibrillation. *Circulation* 1994;89:684–93.
542. Chang MW, Coffeen P, Lurie KG, Shultz J, Bache RJ, White CW. Active compression–decompression CPR improves vital organ perfusion in a dog model of ventricular fibrillation. *Chest* 1994;106:1250–9.
543. Orliaguet GA, Carli PA, Rozenberg A, Janniere D, Sauval P, Delpech P. Endtidal carbon dioxide during outofhospital cardiac arrest resuscitation: comparison of active compression–decompression and standard CPR. *Ann Emerg Med* 1995;25:48–51.
544. Guly UM, Mitchell RG, Cook R, Steedman DJ, Robertson CE. Paramedics and technicians are equally successful at managing cardiac arrest outside hospital. *BMJ* 1995;310:1091–4.
545. Tucker KJ, Galli F, Savitt MA, Kahsai D, Bresnahan L, Redberg RF. Active compression–decompression resuscitation: effect on resuscitation success after inhospital cardiac arrest. *J Am Coll Cardiol* 1994;24:201–9.
546. Malzer R, Zeiner A, Binder M, et al. Hemodynamic effects of active compression–decompression after prolonged CPR. *Resuscitation* 1996;31:243–53.
547. Lurie KG, Shultz JJ, Callaham ML, et al. Evaluation of active compression–decompression CPR in victims of outofhospital cardiac arrest. *JAMA* 1994;271:1405–11.
548. Cohen TJ, Goldner BG, Maccaro PC, et al. A comparison of active compression–decompression cardiopulmonary resuscitation with standard cardiopulmonary resuscitation for cardiac arrests occurring in the hospital. *N Engl J Med* 1993;329:1918–21.
549. Schwab TM, Callaham ML, Madsen CD, Utecht TA. A randomized clinical trial of active compression–decompression CPR vs standard CPR in outofhospital cardiac arrest in two cities. *JAMA* 1995;273:1261–8.
550. Stiell I, Hébert P, Well G, et al. The Ontario trial of active compression–decompression cardiopulmonary resuscitation for inhospital and prehospital cardiac arrest. *JAMA* 1996;275:1417–23.
551. Mauer D, Schneider T, Dick W, Wilhelm A, Elich D, Mauer M. Active compression–decompression resuscitation: a prospective, randomized study in a two-tiered EMS system with physicians in the field. *Resuscitation* 1996;33:125–34.
552. Nolan J, Smith G, Evans R, et al. The United Kingdom prehospital study of active compression–decompression resuscitation. *Resuscitation* 1998;37:119–25.
553. Luiz T, Ellinger K, Denz C. Active compression–decompression cardiopulmonary resuscitation does not improve survival in patients with prehospital cardiac arrest in a physician-manned emergency medical system. *J Cardiothorac Vasc Anesth* 1996;10:178–86.
554. Plaisance P, Lurie KG, Vicaut E, et al. A comparison of standard cardiopulmonary resuscitation and active compression–decompression resuscitation for outofhospital cardiac arrest. French Active Compression/Decompression Cardiopulmonary Resuscitation Study Group. *N Engl J Med* 1999;341:569–75.
555. Baubin M, Rabl W, Pfeiffer KP, Benzer A, Gilly H. Chest injuries after active compression–decompression cardiopulmonary resuscitation (ACDCPR) in cadavers. *Resuscitation* 1999;43:9–15.
556. Rabl W, Baubin M, Broinger G, Scheithauer R. Serious complications from active compression–decompression cardiopulmonary resuscitation. *Int J Legal Med* 1996;109:84–9.
557. Hoke RS, Chamberlain D. Skeletal chest injuries secondary to cardiopulmonary resuscitation. *Resuscitation* 2004;63:327–38.
558. Plaisance P, Lurie KG, Payen D. Inspiratory impedance during active compression–decompression cardiopulmonary resuscitation: a randomized evaluation in patients in cardiac arrest. *Circulation* 2000;101:989–94.
559. Plaisance P, Soleil C, Lurie KG, Vicaut E, Ducros L, Payen D. Use of an inspiratory impedance threshold device on a facemask and endotracheal tube to reduce intrathoracic pressures during the decompression phase of active compression–decompression cardiopulmonary resuscitation. *Crit Care Med* 2005;33:990–4.
560. Wolcke BB, Mauer DK, Schoefmann MF, et al. Comparison of standard cardiopulmonary resuscitation versus the combination of active compression–decompression cardiopulmonary resuscitation and an inspiratory impedance threshold device for outofhospital cardiac arrest. *Circulation* 2003;108:2201–5.
561. Aufderheide TP, Pirralo RG, Provo TA, Lurie KG. Clinical evaluation of an inspiratory impedance threshold device during standard cardiopulmonary resuscitation in patients with outofhospital cardiac arrest. *Crit Care Med* 2005;33:734–40.

562. Lurie KG, Barnes TA, Zielinski TM, McKnite SH. Evaluation of a prototypic inspiratory impedance threshold valve designed to enhance the efficiency of cardiopulmonary resuscitation. *Respir Care* 2003;48:52–7.
563. Lurie KG, Coffeen P, Shultz J, McKnite S, Detloff B, Mulligan K. Improving active compression–decompression cardiopulmonary resuscitation with an inspiratory impedance valve. *Circulation* 1995;91:1629–32.
564. Lurie KG, Mulligan KA, McKnite S, Detloff B, Lindstrom P, Lindner KH. Optimizing standard cardiopulmonary resuscitation with an inspiratory impedance threshold valve. *Chest* 1998;113:1084–90.
565. Lurie KG, Voelckel WG, Zielinski T, et al. Improving standard cardiopulmonary resuscitation with an inspiratory impedance threshold valve in a porcine model of cardiac arrest. *Anesth Analg* 2001;93:649–55.
566. Lurie KG, Zielinski T, McKnite S, Aufderheide T, Voelckel W. Use of an inspiratory impedance valve improves neurologically intact survival in a porcine model of ventricular fibrillation. *Circulation* 2002;105:124–9.
567. Raedler C, Voelckel WG, Wenzel V, et al. Vasopressor response in a porcine model of hypothermic cardiac arrest is improved with active compression–decompression cardiopulmonary resuscitation using the inspiratory impedance threshold valve. *Anesth Analg* 2002;95:1496–502.
568. Voelckel WG, Lurie KG, Zielinski T, et al. The effects of positive endexpiratory pressure during active compression decompression cardiopulmonary resuscitation with the inspiratory threshold valve. *Anesth Analg* 2001;92: 967–74.
569. Yannopoulos D, Aufderheide TP, Gabrielli A, et al. Clinical and hemodynamic comparison of 15:2 and 30:2 compression to ventilation ratios for cardiopulmonary resuscitation. *Crit Care Med* 2006;34:1444–9.
570. Mader TJ, Kellogg AR, Smith J, et al. A blinded, randomized controlled evaluation of an impedance threshold device during cardiopulmonary resuscitation in swine. *Resuscitation* 2008;77:387–94.
571. Menegazzi JJ, Salcido DD, Menegazzi MT, et al. Effects of an impedance threshold device on hemodynamics and restoration of spontaneous circulation in prolonged porcine ventricular fibrillation. *Prehosp Emerg Care* 2007;11:179–85.
572. Langhelle A, Stromme T, Sunde K, Wik L, Nicolaysen G, Steen PA. Inspiratory impedance threshold valve during CPR. *Resuscitation* 2002;52:39–48.
573. Herff H, Raedler C, Zander R, et al. Use of an inspiratory impedance threshold valve during chest compressions without assisted ventilation may result in hypoxaemia. *Resuscitation* 2007;72:466–76.
574. Plaisance P, Lurie KG, Vicaut E, et al. Evaluation of an impedance threshold device in patients receiving active compression–decompression cardiopulmonary resuscitation for out of hospital cardiac arrest. *Resuscitation* 2004;61:265–71.
575. Cabrini L, Beccaria P, Landoni G, et al. Impact of impedance threshold devices on cardiopulmonary resuscitation: a systematic review and metaanalysis of randomized controlled studies. *Crit Care Med* 2008;36:1625–32.
576. Wik L, Bircher NG, Safar P. A comparison of prolonged manual and mechanical external chest compression after cardiac arrest in dogs. *Resuscitation* 1996;32:241–50.
577. Dickinson ET, Verdile VP, Schneider RM, Salluzzo RF. Effectiveness of mechanical versus manual chest compressions in out of hospital cardiac arrest resuscitation: a pilot study. *Am J Emerg Med* 1998;16:289–92.
578. McDonald JL. Systolic and mean arterial pressures during manual and mechanical CPR in humans. *Ann Emerg Med* 1982;11:292–5.
579. Ward KR, Menegazzi JJ, Zelenak RR, Sullivan RJ, McSwain Jr NE. A comparison of chest compressions between mechanical and manual CPR by monitoring endtidal PCO<sub>2</sub> during human cardiac arrest. *Ann Emerg Med* 1993;22:669–74.
580. Wang HC, Chiang WC, Chen SY, et al. Videorecording and time motion analyses of manual versus mechanical cardiopulmonary resuscitation during ambulance transport. *Resuscitation* 2007;74:453–60.
581. Steen S, Liao Q, Pierre L, Paskevicius A, Sjoberg T. Evaluation of LUCAS, a new device for automatic mechanical compression and active decompression resuscitation. *Resuscitation* 2002;55:285–99.
582. Rubertsson S, Karlsten R. Increased cortical cerebral blood flow with LUCAS; a new device for mechanical chest compressions compared to standard external compressions during experimental cardiopulmonary resuscitation. *Resuscitation* 2005;65:357–63.
583. Axelsson C, Nestin J, Svensson L, Axelsson AB, Herlitz J. Clinical consequences of the introduction of mechanical chest compression in the EMS system for treatment of out of hospital cardiac arrest—a pilot study. *Resuscitation* 2006;71:47–55.
584. Steen S, Sjoberg T, Olsson P, Young M. Treatment of out of hospital cardiac arrest with LUCAS, a new device for automatic mechanical compression and active decompression resuscitation. *Resuscitation* 2005;67:25–30.

585. Larsen AI, Hjørnevik AS, Ellingsen CL, Nilsen DW. Cardiac arrest with continuous mechanical chest compression during percutaneous coronary C.D. Deakin et al./Resuscitation 81 (2010) 1305–1352 intervention. A report on the use of the LUCAS device. Resuscitation 2007;75:454–9.
586. Bonnemeier H, Olivecrona G, Simonis G, et al. Automated continuous chest compression for in-hospital cardiopulmonary resuscitation of patients with pulseless electrical activity: a report of five cases. Int J Cardiol 2009;136:e39–50.
587. Groggaard HK, Wik L, Eriksen M, Brekke M, Sunde K. Continuous mechanical chest compressions during cardiac arrest to facilitate restoration of coronary circulation with percutaneous coronary intervention. J Am Coll Cardiol 2007;50:1093–4.
588. Larsen AI, Hjørnevik A, Bonarjee V, Barvik S, Melberg T, Nilsen DW. Coronary blood flow and perfusion pressure during coronary angiography in patients with ongoing mechanical chest compression: a report on 6 cases. Resuscitation 2010;81:493–7.
589. Smekal D, Johansson J, Huzevka T, Rubertsson S. No difference in autopsy detected injuries in cardiac arrest patients treated with manual chest compressions compared with mechanical compressions with the LUCAS device—a pilot study. Resuscitation 2009;80:1104–7.
590. Deakin CD, Paul V, Fall E, Petley GW, Thompson F. Ambient oxygen concentrations resulting from use of the Lund University Cardiopulmonary Assist System (LUCAS) device during simulated cardiopulmonary resuscitation. Resuscitation 2007;74:303–9.
591. Timerman S, Cardoso LF, Ramirez JA, Halperin H. Improved hemodynamic performance with a novel chest compression device during treatment of in-hospital cardiac arrest. Resuscitation 2004;61:273–80.
592. Halperin H, Berger R, Chandra N, et al. Cardiopulmonary resuscitation with a hydraulic-pneumatic band. Crit Care Med 2000;28:N203–6.
593. Halperin HR, Paradis N, Ornato JP, et al. Cardiopulmonary resuscitation with a novel chest compression device in a porcine model of cardiac arrest: improved hemodynamics and mechanisms. J Am Coll Cardiol 2004;44: 2214–20.
594. Hallstrom A, Rea TD, Sayre MR, et al. Manual chest compression vs use of an automated chest compression device during resuscitation following out-of-hospital cardiac arrest: a randomized trial. JAMA 2006;295:2620–8.
595. Steinmetz J, Barnung S, Nielsen SL, Risom M, Rasmussen LS. Improved survival after an out-of-hospital cardiac arrest using new guidelines. Acta Anaesthesiol Scand 2008;52:908–13.
596. Casner M, Andersen D, Isaacs SM. Preliminary report of the impact of a new CPR assist device on the rate of return of spontaneous circulation in out of hospital cardiac arrest. PreHosp Emerg Med 2005;9:61–7.
597. Ong ME, Ornato JP, Edwards DP, et al. Use of an automated, load-distributing band chest compression device for out-of-hospital cardiac arrest resuscitation. JAMA 2006;295:2629–37.
598. Paradis N, Young G, Lemeshow S, Brewer J, Halperin H. Inhomogeneity and temporal effects in AutoPulse Assisted Prehospital International Resuscitation—an exception from consent trial terminated early. Am J Emerg Med 2010;28:391–8.
599. Tomte O, Sunde K, Lorentz T, et al. Advanced life support performance with manual and mechanical chest compressions in a randomized, multicentre manikin study. Resuscitation 2009;80:1152–7.
600. Wirth S, Korner M, Treitl M, et al. Computed tomography during cardiopulmonary resuscitation using automated chest compression devices—an initial study. Eur Radiol 2009;19:1857–66.
601. Holmstrom P, Boyd J, Sorsa M, Kuisma M. A case of hypothermic cardiac arrest treated with an external chest compression device (LUCAS) during transport to re-warming. Resuscitation 2005;67:139–41.
602. Wik L, Kiil S. Use of an automatic mechanical chest compression device (LUCAS) as a bridge to establishing cardiopulmonary bypass for a patient with hypothermic cardiac arrest. Resuscitation 2005;66:391–4.
603. Sunde K, Wik L, Steen PA. Quality of mechanical, manual standard and active compression–decompression CPR on the arrest site and during transport in a manikin model. Resuscitation 1997;34:235–42.
604. Lown B, Amarasingham R, Neuman J. New method for terminating cardiac arrhythmias. Use of synchronized capacitor discharge. JAMA 1962;182: 548–55.
605. Zipes DP, Camm AJ, Borggrefe M, et al. ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death: a report of the American College of Cardiology/American Heart Association Task Force and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Develop Guidelines for Management of Patients With Ventricular Arrhythmias and the Prevention of Sudden Cardiac Death). J Am Coll Cardiol 2006;48:e247–346.
606. Deakin CD, Morrison LJ, Morley PT, et al. 2010 International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. Part 8: advanced life support. Resuscitation; doi:10.1016/j.resuscitation.2010.08.027, in press.

607. Manz M, Pfeiffer D, Jung W, Lueritz B. Intravenous treatment with magnesium in recurrent persistent ventricular tachycardia. *New Trends Arrhythmias* 1991;7:437–42.
608. Tzivoni D, Banai S, Schuger C, et al. Treatment of torsade de pointes with magnesium sulfate. *Circulation* 1988;77:392–7.
609. Delacretaz E. Clinical practice. Supraventricular tachycardia. *N Engl J Med* 2006;354:1039–51.
610. DiMarco JP, Miles W, Akhtar M, et al. Adenosine for paroxysmal supraventricular tachycardia: dose ranging and comparison with verapamil: assessment in placebocontrolled, multicenter trials. The Adenosine for PSVT Study Group [published correction appears in *Ann Intern Med*. 1990; 113:996]. *Ann Intern Med* 1990;113:104–10.
611. Fuster V, Ryden LE, Cannom DS, et al. ACC/AHA/ESC 2006 guidelines for the management of patients with atrial fibrillation: a report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the European Society of Cardiology Committee for Practice Guidelines (Writing Committee to Revise the 2001 Guidelines for the Management of Patients With Atrial Fibrillation): developed in collaboration with the European Heart Rhythm Association and the Heart Rhythm Society. *Circulation* 2006;114:e257–354.
612. Sticherling C, Tada H, Hsu W, et al. Effects of diltiazem and esmolol on cycle length and spontaneous conversion of atrial fibrillation. *J Cardiovasc Pharmacol Ther* 2002;7:81–8.
613. Shettigar UR, Toole JG, Appunni DO. Combined use of esmolol and digoxin in the acute treatment of atrial fibrillation or flutter. *Am Heart J* 1993;126:368–74.
614. Demircan C, Cikrikler HI, Engindeniz Z, et al. Comparison of the effectiveness of intravenous diltiazem and metoprolol in the management of rapid ventricular rate in atrial fibrillation. *Emerg Med J* 2005;22:411–4.
615. Wattanasuwan N, Khan IA, Mehta NJ, et al. Acute ventricular rate control in atrial fibrillation: IV combination of diltiazem and digoxin vs. IV diltiazem alone. *Chest* 2001;119:502–6.
616. Davey MJ, Teubner D. A randomized controlled trial of magnesium sulfate, in addition to usual care, for rate control in atrial fibrillation. *Ann Emerg Med* 2005;45:347–53.
617. Chiladakis JA, Stathopoulos C, Davlouros P, Manolis AS. Intravenous magnesium sulfate versus diltiazem in paroxysmal atrial fibrillation. *Int J Cardiol* 2001;79:287–91.
618. Dauchot P, Gravenstein JS. Effects of atropine on the electrocardiogram in different age groups. *Clin Pharmacol Ther* 1971;12:274–80.
619. Chamberlain DA, Turner P, Sneddon JM. Effects of atropine on heart rate in healthy man. *Lancet* 1967;2:12–5.
620. Bernheim A, Fatio R, Kiowski W, Weilenmann D, Rickli H, Rocca HP. Atropine often results in complete atrioventricular block or sinus arrest after cardiac transplantation: an unpredictable and dose-independent phenomenon. *Transplantation* 2004;77:1181–5.
621. Klumbies A, Paliege R, Volkmann H. Mechanical emergency stimulation in asystole and extreme bradycardia. *Z Gesamte Inn Med* 1988;43:348–52.
622. Zeh E, Rahner E. The manual extrathoracic stimulation of the heart. Technique and effect of the precordial thump (author's transl). *Z Kardiol* 1978;67:299–304.
623. Chan L, Reid C, Taylor B. Effect of three emergency pacing modalities on cardiac output in cardiac arrest due to ventricular asystole. *Resuscitation* 2002;52:117–9.
624. Camm AJ, Garratt CJ. Adenosine and supraventricular tachycardia. *N Engl J Med* 1991;325:1621–9.
625. Wang HE, O'Connor RE, Megargel RE, et al. The use of diltiazem for treating rapid atrial fibrillation in the out-of-hospital setting. *Ann Emerg Med* 2001;37:38–45.
626. Martinez Marcos FJ, Garcia Garmendia JL, Ortega Carpio A, Fernandez Gomez JM, Santos JM, Camacho C. Comparison of intravenous flecainide, propafenone, and amiodarone for conversion of acute atrial fibrillation to sinus rhythm. *Am J Cardiol* 2000;86:950–3.
627. Kalus JS, Spencer AP, Tsikouris JP, et al. Impact of prophylactic i.v. magnesium on the efficacy of ibutilide for conversion of atrial fibrillation or flutter. *Am J Health Syst Pharm* 2003;60:2308–12.
628. Nolan JP, Neumar RW, Adrie C, et al. Postcardiac arrest syndrome: epidemiology, pathophysiology, treatment, and prognostication. A Scientific Statement from the International Liaison Committee on Resuscitation; the American Heart Association Emergency Cardiovascular Care Committee; the Council on Cardiovascular Surgery and Anesthesia; the Council on Cardiopulmonary, Perioperative, and Critical Care; the Council on Clinical Cardiology; the Council on Stroke. *Resuscitation* 2008;79:350–79.
629. Sunde K, Pytte M, Jacobsen D, et al. Implementation of a standardised treatment protocol for post resuscitation care after out-of-hospital cardiac arrest. *Resuscitation* 2007;73:29–39.
630. Gaijeski DF, Band RA, Abella BS, et al. Early goal-directed hemodynamic optimization combined with therapeutic hypothermia in comatose survivors of out-of-hospital cardiac arrest. *Resuscitation* 2009;80:418–24.



631. Carr BG, Goyal M, Band RA, et al. A national analysis of the relationship between hospital factors and postcardiac arrest mortality. *Intensive Care Med* 2009;35:505–11.
632. Oddo M, Schaller MD, Feihl F, Ribordy V, Liaudet L. From evidence to clinical practice: effective implementation of therapeutic hypothermia to improve patient outcome after cardiac arrest. *Crit Care Med* 2006;34:1865–73.
633. Knafelj R, Radsel P, Ploj T, Noc M. Primary percutaneous coronary intervention and mild induced hypothermia in comatose survivors of ventricular fibrillation with ST elevation acute myocardial infarction. *Resuscitation* 2007;74:227–34.
634. Nolan JP, Laver SR, Welch CA, Harrison DA, Gupta V, Rowan K. Outcome following admission to UK intensive care units after cardiac arrest: a secondary analysis of the ICNARC Case Mix Programme Database. *Anaesthesia* 2007;62:1207–16.
635. Keenan SP, Dodek P, Martin C, Priestap F, Norena M, Wong H. Variation in length of intensive care unit stay after cardiac arrest: where you are is as important as who you are. *Crit Care Med* 2007;35:836–41.
636. Carr BG, Kahn JM, Merchant RM, Kramer AA, Neumar RW. Interhospital variability in postcardiac arrest mortality. *Resuscitation* 2009;80:30–4. C.D. Deakin et al./*Resuscitation* 81 (2010) 1305–1352
637. Niskanen M, Reinikainen M, Kurola J. Outcome from intensive care after cardiac arrest: comparison between two patient samples treated in 1986/87 and 1999/2001 in Finnish ICUs. *Acta Anaesthesiol Scand* 2007;51:151–7.
638. Hovdenes J, Laake JH, Aaberge L, Haugaa H, Bugge JF. Therapeutic hypothermia after out of hospital cardiac arrest: experiences with patients treated with percutaneous coronary intervention and cardiogenic shock. *Acta Anaesthesiol Scand* 2007;51:137–42.
639. Soar J, Mancini ME, Bhanji F, et al. 2010 International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations. Part 12: education, implementation, and teams. *Resuscitation*; doi:10.1016/j.resuscitation.2010.08.030, in press.
640. Laver S, Farrow C, Turner D, Nolan J. Mode of death after admission to an intensive care unit following cardiac arrest. *Intensive Care Med* 2004;30:2126–8.
641. Laurent I, Monchi M, Chiche JD, et al. Reversible myocardial dysfunction in survivors of out of hospital cardiac arrest. *J Am Coll Cardiol* 2002;40:2110–6.
642. Ruiz Bailen M, Aguayo de Hoyos E, Ruiz Navarro S, et al. Reversible myocardial dysfunction after cardiopulmonary resuscitation. *Resuscitation* 2005;66:175–81.
643. Cerchiari EL, Safar P, Klein E, Diven W. Visceral, hematologic and bacteriologic changes and neurologic outcome after cardiac arrest in dogs. The visceral postresuscitation syndrome. *Resuscitation* 1993;25:119–36.
644. Adrie C, Monchi M, Laurent I, et al. Coagulopathy after successful cardiopulmonary resuscitation following cardiac arrest: implication of the protein C anticoagulant pathway. *J Am Coll Cardiol* 2005;46:21–8.
645. Adrie C, Adib Conquy M, Laurent I, et al. Successful cardiopulmonary resuscitation after cardiac arrest as a “sepsislike” syndrome. *Circulation* 2002;106:562–8.
646. Adrie C, Laurent I, Monchi M, Cariou A, Dhainau JF, Spaulding C. Postresuscitation disease after cardiac arrest: a sepsislike syndrome? *Curr Opin Crit Care* 2004;10:208–12.
647. Zwemer CF, Whitesall SE, D’Alecy LG. Cardiopulmonary cerebral resuscitation with 100 oxygen exacerbates neurological dysfunction following nine minutes of normothermic cardiac arrest in dogs. *Resuscitation* 1994;27:159–70.
648. Richards EM, Fiskum G, Rosenthal RE, Hopkins I, McKenna MC. Hyperoxic reperfusion after global ischemia decreases hippocampal energy metabolism. *Stroke* 2007;38:1578–84.
649. Vereczki V, Martin E, Rosenthal RE, Hof PR, Hoffman GE, Fiskum G. Normoxic resuscitation after cardiac arrest protects against hippocampal oxidative stress, metabolic dysfunction, and neuronal death. *J Cereb Blood Flow Metab* 2006;26:821–35.
650. Liu Y, Rosenthal RE, Haywood Y, Miljkovic Lolic M, Vanderhoek JY, Fiskum G. Normoxic ventilation after cardiac arrest reduces oxidation of brain lipids and improves neurological outcome. *Stroke* 1998;29:1679–86.
651. Menon DK, Coles JP, Gupta AK, et al. Diffusion limited oxygen delivery following head injury. *Crit Care Med* 2004;32:1384–90.
652. Buunk G, van der Hoeven JG, Meinders AE. Cerebrovascular reactivity in comatose patients resuscitated from cardiac arrest. *Stroke* 1997;28:1569–73.
653. Buunk G, van der Hoeven JG, Meinders AE. A comparison of near infrared spectroscopy and jugular bulb oximetry in comatose patients resuscitated from a cardiac arrest. *Anaesthesia* 1998;53:13–9.
654. Roine RO, Launes J, Nikkinen P, Lindroth L, Kaste M. Regional cerebral blood flow after human cardiac arrest. A hexamethylpropyleneamine oxime single photon emission computed tomographic study. *Arch Neurol* 1991;48:625–9.

655. Beckstead JE, Tweed WA, Lee J, MacKeen WL. Cerebral blood flow and metabolism in man following cardiac arrest. *Stroke* 1978;9:569–73.
656. Zheng ZJ, Croft JB, Giles WH, Mensah GA. Sudden cardiac death in the United States, 1989 to 1998. *Circulation* 2001;104:2158–63.
657. PellJP, SirelJM, MarsdenAK, FordI, WalkerNL, CobbeSM. Presentation, management, and outcome of out of hospital cardiopulmonary arrest: comparison by underlying aetiology. *Heart* 2003;89:839–42.
658. Zipes DP, Wellens HJ. Sudden cardiac death. *Circulation* 1998;98:2334–51.
659. Spaulding CM, Joly LM, Rosenberg A, et al. Immediate coronary angiography in survivors of out of hospital cardiac arrest. *N Engl J Med* 1997;336:1629–33.
660. Bendz B, Eritsland J, Nakstad AR, et al. Long term prognosis after out of hospital cardiac arrest and primary percutaneous coronary intervention. *Resuscitation* 2004;63:49–53.
661. Keelan PC, Bunch TJ, White RD, Packer DL, Holmes Jr DR. Early direct coronary angioplasty in survivors of out of hospital cardiac arrest. *Am J Cardiol* 2003;91:1461–3. A6.
662. Quintero Moran B, Moreno R, Villarreal S, et al. Percutaneous coronary intervention for cardiac arrest secondary to ST elevation acute myocardial infarction. Influence of immediate paramedical/medical assistance on clinical outcome. *Invasive Cardiol* 2006;18:269–72.
663. Garot P, Lefevre T, Eltchaninoff H, et al. Six month outcome of emergency percutaneous coronary intervention in resuscitated patients after cardiac arrest complicating ST elevation myocardial infarction. *Circulation* 2007;115:1354–62.
664. Nagao K, Hayashi N, Kanmatsuse K, et al. Cardiopulmonary cerebral resuscitation using emergency cardiopulmonary bypass, coronary reperfusion therapy and mild hypothermia in patients with cardiac arrest outside the hospital. *J Am Coll Cardiol* 2000;36:776–83.
665. Nielsen N, Hovdenes J, Nilsson F, et al. Outcome, timing and adverse events in therapeutic hypothermia after out of hospital cardiac arrest. *Acta Anaesthesiol Scand* 2009;53:926–34.
666. Wolfrum S, Pierau C, Radke PW, Schunkert H, Kurowski V. Mild therapeutic hypothermia in patients after out of hospital cardiac arrest due to acute ST segment elevation myocardial infarction undergoing immediate percutaneous coronary intervention. *Crit Care Med* 2008;36:1780–6.
667. Rivers E, Nguyen B, Havstad S, et al. Early goal directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med* 2001;345:1368–77.
668. Mullner M, Sterz F, Binder M, et al. Arterial blood pressure after human cardiac arrest and neurological recovery. *Stroke* 1996;27:59–62.
- 668a. Trzeciak S, Jones AE, Kilgannon JH, et al. Significance of arterial hypotension after resuscitation from cardiac arrest. *Crit Care Med* 2009;37:2895–903.
669. Bernard SA, Gray TW, Buist MD, et al. Treatment of comatose survivors of out of hospital cardiac arrest with induced hypothermia. *N Engl J Med* 2002;346:557–63.
670. Angelos MG, Ward KR, Hobson J, Beckley PD. Organ blood flow following cardiac arrest in a swine low flow cardiopulmonary bypass model. *Resuscitation* 1994;27:245–54.
671. Sakabe T, Tateishi A, Miyauchi Y, et al. Intracranial pressure following cardiopulmonary resuscitation. *Intensive Care Med* 1987;13:256–9.
672. Morimoto Y, Kemmotsu O, Kitami K, Matsubara I, Tedo I. Acute brain swelling after out of hospital cardiac arrest: pathogenesis and outcome. *Crit Care Med* 1993;21:104–10.
673. Nishizawa H, Kudoh I. Cerebral autoregulation is impaired in patients resuscitated after cardiac arrest. *Acta Anaesthesiol Scand* 1996;40:1149–53.
674. Sundgreen C, Larsen FS, Herzog TM, Knudsen GM, Boesgaard S, Aldershvile J. Autoregulation of cerebral blood flow in patients resuscitated from cardiac arrest. *Stroke* 2001;32:128–32.
675. Ely EW, Truman B, Shintani A, et al. Monitoring sedation status over time in ICU patients: reliability and validity of the Richmond Agitation Sedation Scale (RASS). *JAMA* 2003;289:2983–91.
676. De Jonghe B, Cook D, Appere De Vecchi C, Guyatt G, Meade M, Outin H. Using and understanding sedation scoring systems: a systematic review. *Intensive Care Med* 2000;26:275–85.
677. Snyder BD, Hauser WA, Loewenson RB, Leppik IE, Ramirez Lassepas M, Gumnit RJ. Neurologic prognosis after cardiopulmonary arrest. III: seizure activity. *Neurology* 1980;30:1292–7.
678. Levy DE, Caronna JJ, Singer BH, Lapinski RH, Frydman H, Plum F. Predicting outcome from hypoxic-ischemic coma. *JAMA* 1985;253:1420–6.
679. Krumholz A, Stern BJ, Weiss HD. Outcome from coma after cardiopulmonary resuscitation: relation to seizures and myoclonus. *Neurology* 1988;38:401–5.
680. Zandbergen EG, Hijdra A, Koelman JH, et al. Prediction of poor outcome within the first 3 days of postanoxic coma. *Neurology* 2006;66:62–8.
681. Ingvar M. Cerebral blood flow and metabolic rate during seizures. Relationship to epileptic brain damage. *Ann NY Acad Sci* 1986;462:194–206.

682. Caviness JN, Brown P. Myoclonus: current concepts and recent advances. *Lancet Neurol* 2004;3:598–607.
683. Losert H, Sterz F, Roine RO, et al. Strict normoglycaemic blood glucose levels in the therapeutic management of patients within 12h after cardiac arrest might not be necessary. *Resuscitation* 2007.
684. Skrifvars MB, Saarinen K, Ikola K, Kuisma M. Improved survival after inhospital cardiac arrest outside critical care areas. *Acta Anaesthesiol Scand* 2005;49:1534–9.
685. van den Berghe G, Wouters P, Weekers F, et al. Intensive insulin therapy in the critically ill patients. *N Engl J Med* 2001;345:1359–67.
686. Van den Berghe G, Wilmer A, Hermans G, et al. Intensive insulin therapy in the medical ICU. *N Engl J Med* 2006;354:449–61.
687. Oksanen T, Skrifvars MB, Varpula T, et al. Strict versus moderate glucose control after resuscitation from ventricular fibrillation. *Intensive Care Med* 2007;33:2093–100.
688. Finfer S, Chittock DR, Su SY, et al. Intensive versus conventional glucose control in critically ill patients. *N Engl J Med* 2009;360:1283–97.
689. Preiser JC, Devos P, Ruiz-Santana S, et al. A prospective randomised multicentre controlled trial on tight glucose control by intensive insulin therapy in adult intensive care units: the Glucontrol study. *Intensive Care Med* 2009;35:1738–48.
690. Griesdale DE, de Souza RJ, van Dam RM, et al. Intensive insulin therapy and mortality among critically ill patients: a metaanalysis including NICESUGAR study data. *CMAJ* 2009;180:821–7.
691. Wiener RS, Wiener DC, Larson RJ. Benefits and risks of tight glucose control in critically ill adults: a metaanalysis. *JAMA* 2008;300:933–44.
692. Krinsley JS, Grover A. Severe hypoglycemia in critically ill patients: risk factors and outcomes. *Crit Care Med* 2007;35:2262–7.
693. Meyfroidt G, Keenan DM, Wang X, Wouters PJ, Veldhuis JD, Van den Berghe G. Dynamic characteristics of blood glucose time series during the course of critical illness: effects of intensive insulin therapy and relative association with mortality. *Crit Care Med* 2010;38:1021–9.
694. Padkin A. Glucose control after cardiac arrest. *Resuscitation* 2009;80:611–2.
695. Takino M, Okada Y. Hyperthermia following cardiopulmonary resuscitation. *Intensive Care Med* 1991;17:419–20.
696. Hickey RW, Kochanek PM, Ferimer H, Alexander HL, Garman RH, Graham SH. Induced hyperthermia exacerbates neurologic neuronal histologic damage after asphyxial cardiac arrest in rats. *Crit Care Med* 2003;31:531–5.
697. Takasu A, Saitoh D, Kaneko N, Sakamoto T, Okada Y. Hyperthermia: is it an ominous sign after cardiac arrest? *Resuscitation* 2001;49:273–7.
698. Zeiner A, Holzer M, Sterz F, et al. Hyperthermia after cardiac arrest is associated with an unfavorable neurologic outcome. *Arch Intern Med* 2001;161:2007–12.
699. Hickey RW, Kochanek PM, Ferimer H, Graham SH, Safar P. Hypothermia and hyperthermia in children after resuscitation from cardiac arrest. *Pediatrics* 2000;106:118–22. C.D. Deakin et al. *Resuscitation* 81 (2010) 1305–1352
700. Diringner MN, Reaven NL, Funk SE, Uman GC. Elevated body temperature independently contributes to increased length of stay in neurologic intensive care unit patients. *Crit Care Med* 2004;32:1489–95.
701. Gunn AJ, Thoresen M. Hypothermic neuroprotection. *NeuroRx* 2006;3:154–69.
702. Froehler MT, Geocadin RG. Hypothermia for neuroprotection after cardiac arrest: mechanisms, clinical trials and patient care. *J Neurol Sci* 2007;261:118–26.
703. McCullough JN, Zhang N, Reich DL, et al. Cerebral metabolic suppression during hypothermic circulatory arrest in humans. *Ann Thorac Surg* 1999;67:1895–9 [discussion 919–21].
704. Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. *N Engl J Med* 2002;346:549–56.
705. Belliard G, Catez E, Charron C, et al. Efficacy of therapeutic hypothermia after out-of-hospital cardiac arrest due to ventricular fibrillation. *Resuscitation* 2007;75:252–9.
706. Castrejon S, Cortes M, Salto ML, et al. Improved prognosis after using mild hypothermia to treat cardiorespiratory arrest due to a cardiac cause: comparison with a control group. *Rev Esp Cardiol* 2009;62:733–41.
707. BroJeppesen J, Kjaergaard J, Horsted TI, et al. The impact of therapeutic hypothermia on neurological function and quality of life after cardiac arrest. *Resuscitation* 2009;80:171–6.
708. Hachimi-Idrissi S, Corne L, Ebinger G, Michotte Y, Huyghens L. Mild hypothermia induced by a helmet device: a clinical feasibility study. *Resuscitation* 2001;51:275–81.
709. Bernard SA, Jones BM, Horne MK. Clinical trial of induced hypothermia in comatose survivors of out-of-hospital cardiac arrest. *Ann Emerg Med* 1997;30:146–53.

710. Busch M, Soreide E, Lossius H M, Lexow K, Dickstein K. Rapid implementation of therapeutic hypothermia in comatose out-of-hospital cardiac arrest survivors. *Acta Anaesthesiol Scand* 2006;50:1277–83.
711. Storm C, Steffen I, Schefold J C, et al. Mild therapeutic hypothermia shortens intensive care unit stay of survivors after out-of-hospital cardiac arrest compared to historical controls. *Crit Care* 2008;12:R78.
712. Don CW, Longstreth Jr WT, Maynard C, et al. Active surface cooling protocol to induce mild therapeutic hypothermia after out-of-hospital cardiac arrest: a retrospective before-and-after comparison in a single hospital. *Crit Care Med* 2009;37:3062–9.
713. Arrich J. Clinical application of mild therapeutic hypothermia after cardiac arrest. *Crit Care Med* 2007;35:1041–7.
714. Holzer M, Mullner M, Sterz F, et al. Efficacy and safety of endovascular cooling after cardiac arrest: cohort study and Bayesian approach. *Stroke* 2006;37:1792–7.
715. Polderman K H, Herold I. Therapeutic hypothermia and controlled normothermia in the intensive care unit: practical considerations, side effects, and cooling methods. *Crit Care Med* 2009;37:1101–20.
716. Bernard S, Buist M, Monteiro O, Smith K. Induced hypothermia using large volume, ice-cold intravenous fluid in comatose survivors of out-of-hospital cardiac arrest: a preliminary report. *Resuscitation* 2003;56:9–13.
717. Virkkunen I, Yli-Hankala A, Silfvast T. Induction of therapeutic hypothermia after cardiac arrest in prehospital patients using ice-cold Ringer's solution: a pilot study. *Resuscitation* 2004;62:299–302.
718. Kliegel A, Losert H, Sterz F, et al. Cold simple intravenous infusions preceding special endovascular cooling for faster induction of mild hypothermia after cardiac arrest—a feasibility study. *Resuscitation* 2005;64:347–51.
719. Kliegel A, Janata A, Wandaller C, et al. Cold infusions alone are effective for induction of therapeutic hypothermia but do not keep patients cool after cardiac arrest. *Resuscitation* 2007;73:46–53.
720. Kilgannon J H, Roberts B W, Stauss M, et al. Use of a standardized order set for achieving target temperature in the implementation of therapeutic hypothermia after cardiac arrest: a feasibility study. *Acad Emerg Med* 2008;15: 499–505.
721. Scott B D, Hogue T, Fixley M S, Adamson P B. Induced hypothermia following out-of-hospital cardiac arrest; initial experience in a community hospital. *Clin Cardiol* 2006;29:525–9.
722. Kim F, Olsufka M, Carlom D, et al. Pilot study of rapid infusion of 2 L of 4 degrees C normal saline for induction of mild hypothermia in hospitalized, comatose survivors of out-of-hospital cardiac arrest. *Circulation* 2005;112: 715–9.
723. Jacobshagen C, Pax A, Unsold B W, et al. Effects of large volume, ice-cold intravenous fluid infusion on respiratory function in cardiac arrest survivors. *Resuscitation* 2009;80:1223–8.
724. Spiel A O, Kliegel A, Janata A, et al. Hemostasis in cardiac arrest patients treated with mild hypothermia initiated by cold fluids. *Resuscitation* 2009;80:762–5.
725. Larsson I M, Wallin E, Rubertsson S. Cold saline infusion and ice packs alone are effective in inducing and maintaining therapeutic hypothermia after cardiac arrest. *Resuscitation* 2010;81:15–9.
726. Skulec R, Kovarnik T, Dostalova G, Kolar J, Linhart A. Induction of mild hypothermia in cardiac arrest survivors presenting with cardiogenic shock syndrome. *Acta Anaesthesiol Scand* 2008;52:188–94.
727. Hoedemaekers C W, Ezzahti M, Gerritsen A, van der Hoeven J G. Comparison of cooling methods to induce and maintain normo- and hypothermia in intensive care unit patients: a prospective intervention study. *Crit Care* 2007;11:R91.
728. Kim F, Olsufka M, Longstreth Jr W T, et al. Pilot randomized clinical trial of prehospital induction of mild hypothermia in out-of-hospital cardiac arrest patients with a rapid infusion of 4 degrees C normal saline. *Circulation* 2007;115:3064–70.
729. Kamarainen A, Virkkunen I, Tenhunen J, Yli-Hankala A, Silfvast T. Prehospital therapeutic hypothermia for comatose survivors of cardiac arrest: a randomized controlled trial. *Acta Anaesthesiol Scand* 2009;53:900–7.
730. Kamarainen A, Virkkunen I, Tenhunen J, Yli-Hankala A, Silfvast T. Induction of therapeutic hypothermia during prehospital CPR using ice-cold intravenous fluid. *Resuscitation* 2008;79:205–11.
731. Hammer L, Vitrat F, Savary D, et al. Immediate prehospital hypothermia protocol in comatose survivors of out-of-hospital cardiac arrest. *Am J Emerg Med* 2009;27:570–3.
732. Aberle J, Kluge S, Prohl J, et al. Hypothermia after CPR through conduction and convection—initial experience on an ICU. *Intensivmed Notfallmed* 2006;43:37–43.
733. Feuchtl A, Gockel B, Lawrenz T, Bartelsmeier M, Stellbrink C. Endovascular cooling improves neurological short-term outcome after prehospital cardiac arrest. *Intensivmedizin* 2007;44:37–42.
734. Fries M, Stoppe C, Brucken D, Rossaint R, Kuhlen R. Influence of mild therapeutic hypothermia on the inflammatory response after successful resuscitation from cardiac arrest. *J Crit Care* 2009;24:453–7.

735. Benson DW, Williams Jr GR, Spencer FC, Yates AJ. The use of hypothermia after cardiac arrest. *Anesth Analg* 1959;38:423–8.
736. Yanagawa Y, Ishihara S, Norio H, et al. Preliminary clinical outcome study of mild resuscitative hypothermia after outofhospital cardiopulmonary arrest. *Resuscitation* 1998;39:61–6.
737. Damian MS, Ellenberg D, Gildemeister R, et al. Coenzyme Q10 combined with mild hypothermia after cardiac arrest: a preliminary study. *Circulation* 2004;110:3011–6.
738. Hay AW, Swann DG, Bell K, Walsh TS, Cook B. Therapeutic hypothermia in comatose patients after outofhospital cardiac arrest. *Anaesthesia* 2008;63:15–9.
739. Zeiner A, Holzer M, Sterz F, et al. Mild resuscitative hypothermia to improve neurological outcome after cardiac arrest. A clinical feasibility trial. Hypothermia After Cardiac Arrest (HACA) Study Group. *Stroke* 2000;31:86–94.
740. Uray T, Malzer R. Outofhospital surface cooling to induce mild hypothermia in human cardiac arrest: a feasibility trial. *Resuscitation* 2008;77:331–8.
- 740a. Castren M, Nordberg P, Svensson L, et al. Intraarrest transnasal evaporative cooling: a randomized, prehospital, multicenter study (PRINCE: PreROSC IntraNasal Cooling Effectiveness). *Circulation* 2010;122:729–36.
741. Felberg RA, Krieger DW, Chuang R, et al. Hypothermia after cardiac arrest: feasibility and safety of an external cooling protocol. *Circulation* 2001;104:1799–804.
742. Flint AC, Hemphill JC, Bonovich DC. Therapeutic hypothermia after cardiac arrest: performance characteristics and safety of surface cooling with or without endovascular cooling. *Neurocrit Care* 2007;7:109–18.
743. Heard KJ, Peberdy MA, Sayre MR, et al. A randomized controlled trial comparing the Arctic Sun to standard cooling for induction of hypothermia after cardiac arrest. *Resuscitation* 2010;81:9–14.
744. Merchant RM, Abella BS, Peberdy MA, et al. Therapeutic hypothermia after cardiac arrest: unintentional overcooling is common using ice packs and conventional cooling blankets. *Crit Care Med* 2006;34:S490–4.
745. Haugk M, Sterz F, Grassberger M, et al. Feasibility and efficacy of a new noninvasive surface cooling device in postresuscitation intensive care medicine. *Resuscitation* 2007;75:76–81.
746. AlSenani FM, Graffagnino C, Grotta JC, et al. A prospective, multicenter pilot study to evaluate the feasibility and safety of using the CoolGard System and Icy catheter following cardiac arrest. *Resuscitation* 2004;62:143–50.
747. Pichon N, Amiel JB, Francois B, Dugard A, Etchecopar C, Vignon P. Efficacy of and tolerance to mild induced hypothermia after outofhospital cardiac arrest using an endovascular cooling system. *Crit Care* 2007;11:R71.
748. Wolff B, Machill K, Schumacher D, Schulzki I, Werner D. Early achievement of mild therapeutic hypothermia and the neurologic outcome after cardiac arrest. *Int J Cardiol* 2009;133:223–8.
749. Nagao K, Kikushima K, Watanabe K, et al. Early induction of hypothermia during cardiac arrest improves neurological outcomes in patients with outofhospital cardiac arrest who undergo emergency cardiopulmonary bypass and percutaneous coronary intervention. *Circ J* 2010;74:77–85.
750. Mahmood MA, Zweifler RM. Progress in shivering control. *J Neurol Sci* 2007;261:47–54.
751. Wadhwa A, Sengupta P, Durrani J, et al. Magnesium sulphate only slightly reduces the shivering threshold in humans. *Br J Anaesth* 2005;94:756–62.
752. Kuboyama K, Safar P, Radovsky A, et al. Delay in cooling negates the beneficial effect of mild resuscitative cerebral hypothermia after cardiac arrest in dogs: a prospective, randomized study. *Crit Care Med* 1993;21:1348–58.
753. Riter HG, Brooks LA, Pretorius AM, Ackermann LW, Kerber RE. Intraarrest hypothermia: both cold liquid ventilation with perfluorocarbons and cold intravenous saline rapidly achieve hypothermia, but only cold liquid ventilation improves resumption of spontaneous circulation. *Resuscitation* 2009;80:561–6.
754. Staffey KS, Dendi R, Brooks LA, et al. Liquid ventilation with perfluorocarbons facilitates resumption of spontaneous circulation in a swine cardiac arrest model. *Resuscitation* 2008;78:77–84.
755. Polderman KH, Peerdeman SM, Girbes AR. Hypophosphatemia and hypomagnesemia induced by cooling in patients with severe head injury. *J Neurosurg* 2001;94:697–705.
756. Tortorici MA, Kochanek PM, Poloyac SM. Effects of hypothermia on drug disposition, metabolism, and response: a focus on hypothermia-mediated alterations on the cytochrome P450 enzyme system. *Crit Care Med* 2007;35:2196–204.
- C.D. Deakin et al. *Resuscitation* 81 (2010) 1305–1352
757. Randomized clinical study of thiopental loading in comatose survivors of cardiac arrest. Brain Resuscitation Clinical Trial I Study Group. *N Engl J Med* 1986;314:397–403.
758. Grafton ST, Longstreth Jr WT. Steroids after cardiac arrest: a retrospective study with concurrent, nonrandomized controls. *Neurology* 1988;38:1315–6.

759. Mentzelopoulos SD, Zakyntinos SG, Tzoufi M, et al. Vasopressin, epinephrine, and corticosteroids for in-hospital cardiac arrest. *Arch Intern Med* 2009;169:15–24.
760. Gueugniaud PY, Gaussorgues P, GarciaDarennes F, et al. Early effects of nimodipine on intracranial and cerebral perfusion pressures in cerebral anoxia after out-of-hospital cardiac arrest. *Resuscitation* 1990;20:203–12.
761. Roine RO, Kaste M, Kinnunen A, Nikki P, Sarna S, Kajaste S. Nimodipine after resuscitation from out-of-hospital ventricular fibrillation: a placebo-controlled, double-blind, randomized trial. *JAMA* 1990;264:3171–7.
762. A randomized clinical study of a calcium entry blocker (lidoflazine) in the treatment of comatose survivors of cardiac arrest. Brain Resuscitation Clinical Trial II Study Group. *N Engl J Med* 1991;324:1225–31.
763. Laurent I, Adrie C, Vinsonneau C, et al. High volume hemofiltration after out-of-hospital cardiac arrest: a randomized study. *J Am Coll Cardiol* 2005;46:432–7.
764. Edgren E, Hedstrand U, Nordin M, Rydin E, Ronquist G. Prediction of outcome after cardiac arrest. *Crit Care Med* 1987;15:820–5.
765. Young GB, Doig G, Ragazzoni A. Anoxic ischemic encephalopathy: clinical and electrophysiological associations with outcome. *Neurocrit Care* 2005;2:159–64.
766. Al Thenayan E, Savard M, Sharpe M, Norton L, Young B. Predictors of poor neurologic outcome after induced mild hypothermia following cardiac arrest. *Neurology* 2008;71:1535–7.
767. Wijdicks EF, Parisi JE, Sharbrough FW. Prognostic value of myoclonus status in comatose survivors of cardiac arrest. *Ann Neurol* 1994;35:239–43.
768. Thomke F, Marx JJ, Sauer O, et al. Observations on comatose survivors of cardiopulmonary resuscitation with generalized myoclonus. *BMC Neurol* 2005;5:14.
769. Arnoldus EP, Lammers GJ. Postanoxic coma: good recovery despite myoclonus status. *Ann Neurol* 1995;38:697–8.
770. Celesia GG, Grigg MM, Ross E. Generalized status myoclonicus in acute anoxic and toxic metabolic encephalopathies. *Arch Neurol* 1988;45:781–4.
771. Morris HR, Howard RS, Brown P. Early myoclonic status and outcome after cardiorespiratory arrest. *J Neurol Neurosurg Psychiatry* 1998;64:267–8.
772. Datta S, Hart GK, Opdam H, Gutteridge G, Archer J. Posthypoxic myoclonic status: the prognosis is not always hopeless. *Crit Care Resusc* 2009;11: 39–41.
773. English WA, Giffin NJ, Nolan JP. Myoclonus after cardiac arrest: pitfalls in diagnosis and prognosis. *Anaesthesia* 2009;64:908–11.
774. Wijdicks EF, Hijdra A, Young GB, Bassetti CL, Wiebe S. Practice parameter: prediction of outcome in comatose survivors after cardiopulmonary resuscitation (an evidence-based review): report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology* 2006;67:203–10.
775. Zandbergen EG, de Haan RJ, Hijdra A. Systematic review of prediction of poor outcome in anoxic-ischaemic coma with biochemical markers of brain damage. *Intensive Care Med* 2001;27:1661–7.
776. Grubb NR, Simpson C, Sherwood R, et al. Prediction of cognitive dysfunction after resuscitation from out-of-hospital cardiac arrest using serum neuron-specific enolase and protein S100. *Heart* 2007.
777. Martens P. Serum neuron-specific enolase as a prognostic marker for irreversible brain damage in comatose cardiac arrest survivors. *Acad Emerg Med* 1996;3:126–31.
778. Meynaar IA, Straaten HM, van der Wetering J, et al. Serum neuron-specific enolase predicts outcome in postanoxic coma: a prospective cohort study. *Intensive Care Med* 2003;29:189–95.
779. Rech TH, Vieira SR, Nagel F, Brauner JS, Scalco R. Serum neuron-specific enolase as early predictor of outcome after in-hospital cardiac arrest: a cohort study. *Crit Care* 2006;10:R133.
780. Reisinger J, Hollinger K, Lang W, et al. Prediction of neurological outcome after cardiopulmonary resuscitation by serial determination of serum neuron-specific enolase. *Eur Heart J* 2007;28:52–8.
781. Schoerhuber W, Kittler H, Sterz F, et al. Time course of serum neuron-specific enolase. A predictor of neurological outcome in patients resuscitated from cardiac arrest. *Stroke* 1999;30:1598–603.
782. Bottiger BW, Mobes S, Glatzer R, et al. Astroglial protein S100 is an early and sensitive marker of hypoxic brain damage and outcome after cardiac arrest in humans. *Circulation* 2001;103:2694–8.
783. Fogel W, Krieger D, Veith M, et al. Serum neuron-specific enolase as early predictor of outcome after cardiac arrest. *Crit Care Med* 1997;25:1133–8.
784. Martens P, Raabe A, Johnsson P. Serum S100 and neuron-specific enolase for prediction of regaining consciousness after global cerebral ischemia. *Stroke* 1998;29:2363–6.
785. Prohl J, Rother J, Kluge S, et al. Prediction of short-term and long-term outcomes after cardiac arrest: a prospective multivariate approach combining biochemical, clinical, electrophysiological, and neuropsychological investigations. *Crit Care Med* 2007;35:1230–7.

786. Stelzl T, von Bose MJ, Hög B, Fuchs HH, Flugel KA. A comparison of the prognostic value of neuron-specific enolase serum levels and somatosensory evoked potentials in 13 reanimated patients. *Eur J Emerg Med* 1995;2:24–7.
787. Tiainen M, Roine RO, Pettilä V, Takkunen O. Serum neuron-specific enolase and S100B protein in cardiac arrest patients treated with hypothermia. *Stroke* 2003;34:2881–6.
788. Pfeifer R, Borner A, Krack A, Sigusch HH, Surber R, Figulla HR. Outcome after cardiac arrest: predictive values and limitations of the neuroproteins neuron-specific enolase and protein S100 and the Glasgow Coma Scale. *Resuscitation* 2005;65:49–55.
789. Roine RO, Somer H, Kaste M, Viinikka L, Karonen SL. Neurological outcome after out-of-hospital cardiac arrest. Prediction by cerebrospinal fluid enzyme analysis. *Arch Neurol* 1989;46:753–6.
790. Zingler VC, Krumm B, Bertsch T, Fassbender K, Pohlmann-Eden B. Early prediction of neurological outcome after cardiopulmonary resuscitation: a multimodal approach combining neurobiochemical and electrophysiological investigations may provide high prognostic certainty in patients after cardiac arrest. *Eur Neurol* 2003;49:79–84.
791. Rosen H, Sunnerhagen KS, Herlitz J, Blomstrand C, Rosengren L. Serum levels of the brain-derived proteins S100 and NSE predict long-term outcome after cardiac arrest. *Resuscitation* 2001;49:183–91.
792. Dauberschmidt R, Zinsmeyer J, Mrochen H, Meyer M. Changes of neuron-specific enolase concentration in plasma after cardiac arrest and resuscitation. *Mol Chem Neuropathol* 1991;14:237–45.
793. Mussack T, Biberthaler P, Kanz KG, et al. Serum S100B and interleukin-8 as predictive markers for comparative neurologic outcome analysis of patients after cardiac arrest and severe traumatic brain injury. *Crit Care Med* 2002;30:2669–74.
794. Fries M, Kunz D, Gressner AM, Rossaint R, Kuhlen R. Procalcitonin serum levels after out-of-hospital cardiac arrest. *Resuscitation* 2003;59:105–9.
795. Hachimi-Idrissi S, Van der Auwera M, Schiettecatte J, Ebinger G, Michotte Y, Huyghens L. S100 protein as early predictor of regaining consciousness after out-of-hospital cardiac arrest. *Resuscitation* 2002;53:251–7.
796. Piazza O, Cotena S, Esposito G, De Robertis E, Tufano R. S100B is sensitive but not specific prognostic index in comatose patients after cardiac arrest. *Minerva Chir* 2005;60:477–80.
797. Rosen H, Rosengren L, Herlitz J, Blomstrand C. Increased serum levels of the S100 protein are associated with hypoxic brain damage after cardiac arrest. *Stroke* 1998;29:473–7.
798. Mussack T, Biberthaler P, Kanz KG, Wiedemann E, Gippner-Steppert C, Jochum M. S100b, sE-selectin, and sP-selectin for evaluation of hypoxic brain damage in patients after cardiopulmonary resuscitation: pilot study. *World J Surg* 2001;25:539–43 [discussion 44].
799. Sodeck GH, Domanovits H, Sterz F, et al. Can brain natriuretic peptide predict outcome after cardiac arrest? An observational study. *Resuscitation* 2007;74:439–45.
800. Geppert A, Zorn G, Delle-Karth G, et al. Plasma concentrations of von Willebrand factor and intracellular adhesion molecule-1 for prediction of outcome after successful cardiopulmonary resuscitation. *Crit Care Med* 2003;31:805–11.
801. Adib-Conquy M, Monchi M, Goulenok C, et al. Increased plasma levels of soluble triggering receptor expressed on myeloid cells-1 and procalcitonin after cardiac surgery and cardiac arrest without infection. *Shock* 2007;28:406–10.
802. Longstreth Jr WT, Clayson KJ, Chandler WL, Sumi SM. Cerebrospinal fluid creatine kinase activity and neurologic recovery after cardiac arrest. *Neurology* 1984;34:834–7.
803. Karkela J, Pasanen M, Kaukinen S, Morsky P, Harmoinen A. Evaluation of hypoxic brain injury with spinal fluid enzymes, lactate, and pyruvate. *Crit Care Med* 1992;20:378–86.
804. Rothstein T, Thomas E, Sumi S. Predicting outcome in hypoxic-ischemic coma. A prospective clinical and electrophysiological study. *Electroencephalogr Clin Neurophysiol* 1991;79:101–7.
805. Sherman AL, Tirschwell DL, Mickleson PJ, Longstreth Jr WT, Robinson LR. Somatosensory potentials, CSF creatine kinase BB activity, and awakening after cardiac arrest. *Neurology* 2000;54:889–94.
806. Longstreth Jr WT, Clayson KJ, Sumi SM. Cerebrospinal fluid and serum creatine kinase BB activity after out-of-hospital cardiac arrest. *Neurology* 1981;31:455–8.
807. Tirschwell DL, Longstreth Jr WT, Rauch-Matthews ME, et al. Cerebrospinal fluid creatine kinase BB isoenzyme activity and neurologic prognosis after cardiac arrest. *Neurology* 1997;48:352–7.
808. Clemmensen P, Strandgaard S, Rasmussen S, Grande P. Cerebrospinal fluid creatine kinase isoenzyme BB levels do not predict the clinical outcome in patients unconscious following cardiac resuscitation. *Clin Cardiol* 1987;10: 235–6.
809. Rosen H, Karlsson JE, Rosengren L. CSF levels of neurofilament is a valuable predictor of long-term outcome after cardiac arrest. *J Neurol Sci* 2004;221: 19–24.

810. Tiainen M, Kovala TT, Takkunen OS, Roine RO. Somatosensory and brainstem auditory evoked potentials in cardiac arrest patients treated with hypothermia. *Crit Care Med* 2005;33:1736–40.
811. Rossetti AO, Oddo M, Liaudet L, Kaplan PW. Predictors of awakening from postanoxic status epilepticus after therapeutic hypothermia. *Neurology* 2009;72:744–9.
812. Rossetti AO, Logroscino G, Liaudet L, et al. Status epilepticus: an independent outcome predictor after cerebral anoxia. *Neurology* 2007;69:255–60.
813. Rossetti AO, Oddo M, Logroscino G, Kaplan PW. Prognostication after cardiac arrest and hypothermia: a prospective study. *Ann Neurol* 2010;67:301–7.
814. Oksanen T, Tiainen M, Skrifvars MB, et al. Predictive power of serum NSE and OHCA score regarding 6-month neurologic outcome after out-of-hospital ventricular fibrillation and therapeutic hypothermia. *Resuscitation* 2009;80:165–70. C.D. Deakin et al./*Resuscitation* 81 (2010) 1305–1352
815. Rundgren M, Karlsson T, Nielsen N, Cronberg T, Johnsson P, Friberg H. Neuron specific enolase and S100B as predictors of outcome after cardiac arrest and induced hypothermia. *Resuscitation* 2009;80:784–9.
816. Fieux F, Losser MR, Bourgeois E, et al. Kidney retrieval after sudden out of hospital refractory cardiac arrest: a cohort of uncontrolled non heart beating donors. *Crit Care* 2009;13:R141.
817. Kootstra G. Statement on nonheartbeating donor programs. *Transplant Proc* 1995;27:2965.
818. Fondevila C, Hessheimer AJ, Ruiz A, et al. Liver transplant using donors after unexpected cardiac death: novel preservation protocol and acceptance criteria. *Am J Transplant* 2007;7:1849–55.
819. Morozumi J, Sakurai E, Matsuno N, et al. Successful kidney transplantation from donation after cardiac death using a load-distributing band chest compression device during long warm ischemic time. *Resuscitation* 2009;80:278–80.
820. Perkins GD, Brace S, Gates S. Mechanical chest compression devices: current and future roles. *Curr Opin Crit Care* 2010;16:203–10.
821. Engdahl J, Abrahamsson P, Bang A, Lindqvist J, Karlsson T, Herlitz J. Is hospital care of major importance for outcome after out-of-hospital cardiac arrest? Experience acquired from patients with out-of-hospital cardiac arrest resuscitated by the same Emergency Medical Service and admitted to one of two hospitals over a 16-year period in the municipality of Goteborg. *Resuscitation* 2000;43:201–11.
822. Liu JM, Yang Q, Pirralo RG, Klein JP, Aufderheide TP. Hospital variability of out-of-hospital cardiac arrest survival. *Prehosp Emerg Care* 2008;12:339–46.
823. Herlitz J, Engdahl J, Svensson L, Angquist KA, Silfverstolpe J, Holmberg S. Major differences in 1-month survival between hospitals in Sweden among initial survivors of out-of-hospital cardiac arrest. *Resuscitation* 2006;70:404–9.
824. Callaway CW, Schmicker R, Kampmeyer M, et al. Receiving hospital characteristics associated with survival after out-of-hospital cardiac arrest. *Resuscitation* 2010.
825. Davis DP, Fisher R, Aguilar S, et al. The feasibility of a regional cardiac arrest receiving system. *Resuscitation* 2007;74:44–51.
826. Spaite DW, Bobrow BJ, Vadeboncoeur TF, et al. The impact of prehospital transport interval on survival in out-of-hospital cardiac arrest: implications for regionalization of postresuscitation care. *Resuscitation* 2008;79:61–6.
827. Spaite DW, Stiell IG, Bobrow BJ, et al. Effect of transport interval on out-of-hospital cardiac arrest survival in the OPALS Study: implications for triaging patients to specialized cardiac arrest centers. *Ann Emerg Med* 2009.
828. Vermeer F, Oude Ophuis AJ, vd Berg EJ, et al. Prospective randomised comparison between thrombolysis, rescue PTCA, and primary PTCA in patients with extensive myocardial infarction admitted to a hospital without PTCA facilities: a safety and feasibility study. *Heart* 1999;82:426–31.
829. Widimsky P, Groch L, Zelizko M, Aschermann M, Bednar F, Suryapranata H. Multicentre randomized trial comparing transport to primary angioplasty vs immediate thrombolysis vs combined strategy for patients with acute myocardial infarction presenting to a community hospital without a catheterization laboratory The PRAGUE study. *Eur Heart J* 2000;21:823–31.
830. Widimsky P, Budesinsky T, Vorac D, et al. Long distance transport for primary angioplasty vs immediate thrombolysis in acute myocardial infarction. Final results of the randomized national multicentre trial—PRAGUE2. *Eur Heart J* 2003;24:94–104.
831. Le May MR, So DY, Dionne R, et al. A citywide protocol for primary PCI in ST-segment elevation myocardial infarction. *N Engl J Med* 2008;358:231–40.
832. Abernathy 3rd JH, McGwin Jr G, Acker 3rd JE, Rue 3rd LW. Impact of a voluntary trauma system on mortality, length of stay, and cost at a level II trauma center. *Am Surg* 2002;68:182–92.
833. Clemmer TP, Orme Jr JF, Thomas FO, Brooks KA. Outcome of critically injured patients treated at Level I trauma centers versus full-service community hospitals. *Crit Care Med* 1985;13:861–3.



834. Culica D, Aday LA, Rohrer JE. Regionalized trauma care system in Texas: implications for redesigning trauma systems. *Med Sci Monit* 2007;13:SR9–18.
835. Hannan EL, Farrell LS, Cooper A, Henry M, Simon B, Simon R. Physiologic trauma triage criteria in adult trauma patients: are they effective in saving lives by transporting patients to trauma centers? *J Am Coll Surg* 2005;200:584–92.
836. Harrington DT, Connolly M, Biff WL, Majercik SD, Cioffi WG. Transfer time to definitive care facilities are too long: a consequence of an immature trauma system. *Ann Surg* 2005;241:961–6 [discussion 6–8].
837. Liberman M, Mulder DS, Lavoie A, Sampalis JS. Implementation of a trauma care system: evolution through evaluation. *J Trauma* 2004;56:1330–5.
838. MacKenzie EJ, Rivara FP, Jurkovich GJ, et al. A national evaluation of the effect of trauma center care on mortality. *N Engl J Med* 2006;354:366–78.
839. Mann NC, Cahn RM, Mullins RJ, Brand DM, Jurkovich GJ. Survival among injured geriatric patients during construction of a statewide trauma system. *J Trauma* 2001;50:1111–6.
840. Mullins RJ, Veum Stone J, Hedges JR, et al. Influence of a statewide trauma system on location of hospitalization and outcome of injured patients. *J Trauma* 1996;40:536–45 [discussion 45–6].
841. Mullins RJ, Mann NC, Hedges JR, Worrall W, Jurkovich GJ. Preferential benefit of implementation of a statewide trauma system in one of two adjacent states. *J Trauma* 1998;44:609–16 [discussion 17].
842. Mullins RJ, Veum Stone J, Helfand M, et al. Outcome of hospitalized injured patients after institution of a trauma system in an urban area. *JAMA* 1994;271:1919–24.
843. Mullner R, Goldberg J. An evaluation of the Illinois trauma system. *Med Care* 1978;16:140–51.
844. Mullner R, Goldberg J. Toward an outcome-oriented medical geography: an evaluation of the Illinois trauma/emergency medical services system. *Soc Sci Med* 1978;12:103–10.
845. Nathens AB, Jurkovich GJ, Rivara FP, Maier RV. Effectiveness of state trauma systems in reducing injury-related mortality: a national evaluation. *J Trauma* 2000;48:25–30 [discussion 1].
846. Nathens AB, Maier RV, Brundage SI, Jurkovich GJ, Grossman DC. The effect of interfacility transfer on outcome in an urban trauma system. *J Trauma* 2003;55:444–9.
847. Nicholl J, Turner J. Effectiveness of a regional trauma system in reducing mortality from major trauma: before and after study. *BMJ* 1997;315:1349–54.
848. Potoka DA, Schall LC, Gardner MJ, Stafford PW, Peitzman AB, Ford HR. Impact of pediatric trauma centers on mortality in a statewide system. *J Trauma* 2000;49:237–45.
849. Sampalis JS, Lavoie A, Boukas S, et al. Trauma center designation: initial impact on trauma-related mortality. *J Trauma* 1995;39:232–7 [discussion 7–9].
850. Sampalis JS, Denis R, Frechette P, Brown R, Fleiszer D, Mulder D. Direct transport to tertiary trauma centers versus transfer from lower level facilities: impact on mortality and morbidity among patients with major trauma. *J Trauma* 1997;43:28895 [discussion 95–6].
851. Nichol G, Aufderheide TP, Eigel B, et al. Regional systems of care for out-of-hospital cardiac arrest: a policy statement from the American Heart Association. *Circulation* 2010;121:709–29.
852. Nichol G, Soar J. Regional cardiac resuscitation systems of care. *Curr Opin Crit Care* 2010;16:223–30.
853. Soar J, Packham S. Cardiac arrest centres make sense. *Resuscitation* 2010;81:507–8.