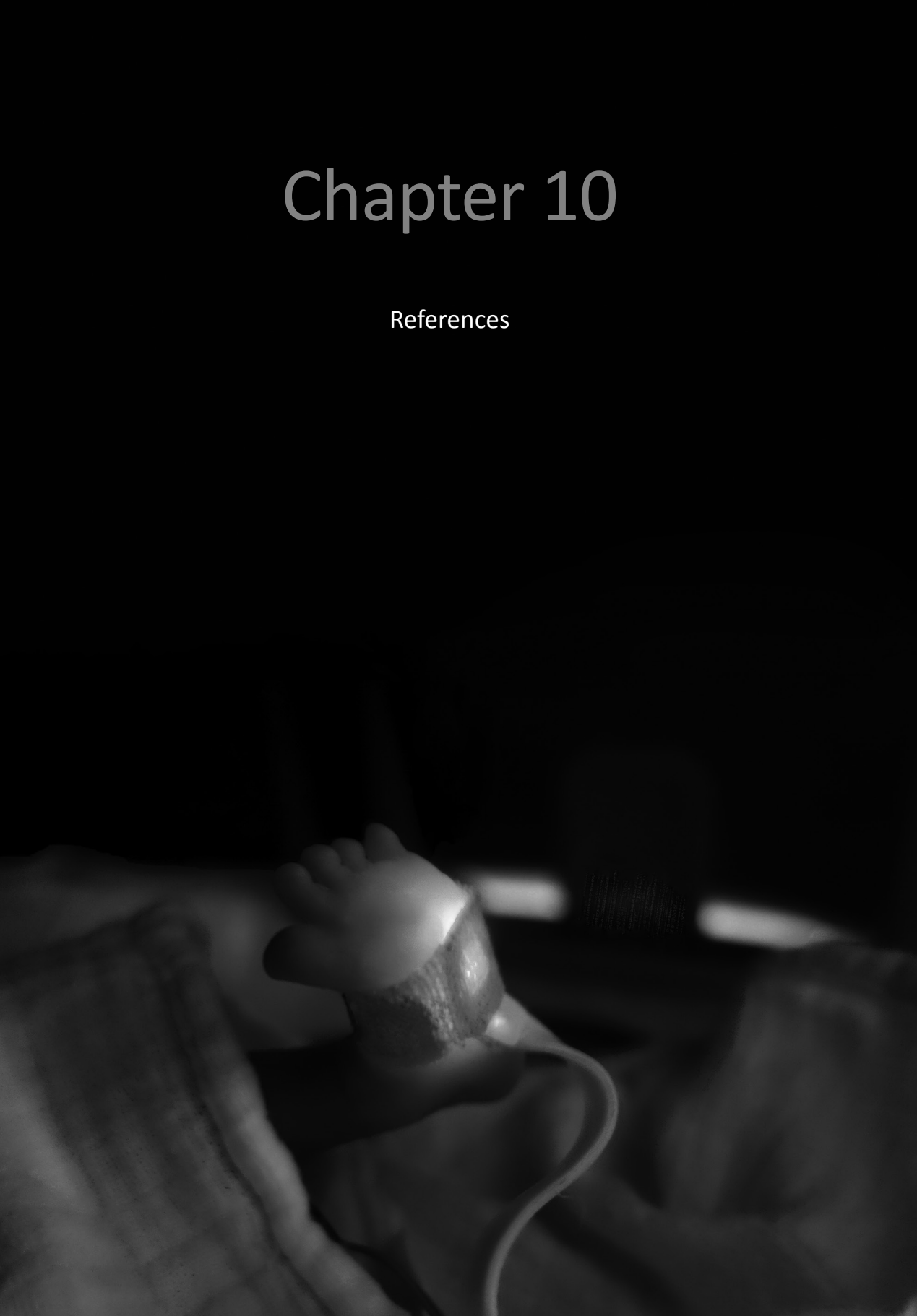
Oxygen titration and compliance with targeting oxygen saturation in preterm infants

Zanten, H.A. van

Chapter 10

References



REFERENCES

1. Beck S, Wojdyla D, Say L, et al. The worldwide incidence of preterm birth: a systematic review of maternal mortality and morbidity. *Bulletin of the World Health Organization* 2010;88(1):31-8. doi: 10.2471/blt.08.062554 [published Online First: 2010/04/30]
2. Nederland. SPR. Grote Lijnen 1999-2012. *Utrecht; Stichting Perinatale Registratie Nederland 2013*
3. Howson CP, Kinney MV, McDougall L, et al. Born too soon: preterm birth matters. *Reprod Health* 2013;10 Suppl 1:S1. doi: 10.1186/1742-4755-10-s1-s1 [published Online First: 2013/01/01]
4. Ramji S, Saugstad OD, Jain A. Current concepts of oxygen therapy in neonates. *Indian J Pediatr* 2015;82(1):46-52. doi: 10.1007/s12098-014-1571-8 [published Online First: 2014/10/19]
5. Tin W, Wariyar U. Giving small babies oxygen: 50 years of uncertainty. *Seminars in Neonatology: SN* 2002;7(5):361-7. [published Online First: 2002/12/05]
6. Vento M. Oxygen supplementation in the neonatal period: changing the paradigm. *Neonatology* 2014;105(4):323-31. doi: 10.1159/000360646 [published Online First: 2014/06/17]
7. Tin W. Optimal oxygen saturation for preterm babies. Do we really know? *Biol Neonate* 2004;85(4):319-25. doi: 10.1159/000078173 [published Online First: 2004/06/26]
8. Finer N, Leone T. Oxygen saturation monitoring for the preterm infant: the evidence basis for current practice. *Pediatric Research* 2009;65(4):375-80. doi: 10.1203/PDR.0b013e318199386a [published Online First: 2009/01/08]
9. Askie LM, Brocklehurst P, Darlow BA, et al. NeOProM: Neonatal Oxygenation Prospective Meta-analysis Collaboration study protocol. *BMC Pediatrics* 2011;11:6. doi: 10.1186/1471-2431-11-6 [published Online First: 2011/01/18]
10. Bancalari E, Claure N. Control of Oxygenation During Mechanical Ventilation in the Premature Infant. *Clinics in Perinatology* 2012;39(3):563-+.
11. Claure N, Bancalari E. Automated closed loop control of inspired oxygen concentration. *RespirCare* 2013;58(1):151-61.
12. Di Fiore JM, Bloom JN, Orge F, et al. A Higher Incidence of Intermittent Hypoxemic Episodes Is Associated with Severe Retinopathy of Prematurity. *Journal of Pediatrics* 2010;157(1):69-73.
13. Kaufman DA, Zanelli SA, Gurka MJ, et al. Time outside targeted oxygen saturation range and retinopathy of prematurity. *Early Hum Dev* 2014;90 Suppl 2:S35-40. doi: 10.1016/s0378-3782(14)50010-2 [published Online First: 2014/09/16]
14. Poets CF, Roberts RS, Schmidt B, et al. Association Between Intermittent Hypoxemia or Bradycardia and Late Death or Disability in Extremely Preterm Infants. *JAMA* 2015;314(6):595-603. doi: 10.1001/jama.2015.8841 [published Online First: 2015/08/12]
15. Saugstad OD, Aune D. In search of the optimal oxygen saturation for extremely low birth weight infants: a systematic review and meta-analysis. *Neonatology* 2011;100(1):1-8. doi: 10.1159/000322001 [published Online First: 2010/12/15]
16. Martin RJ, Wang K, Koroglu O, et al. Intermittent Hypoxic Episodes in Preterm Infants: Do They Matter? *Neonatology* 2011;100(3):303-10.
17. Dracup KA, Meleis AI. Compliance: an interactionist approach. *Nursing Research* 1982;31(1):31-6. [published Online First: 1982/01/01]
18. Clucas L, Doyle LW, Dawson J, et al. Compliance with alarm limits for pulse oximetry in very preterm infants. *Pediatrics* 2007;119(6):1056-60. doi: 10.1542/peds.2006-3099 [published Online First: 2007/06/05]
19. Hagadorn JI, Furey AM, Nghiem TH, et al. Achieved versus intended pulse oximeter saturation in infants born less than 28 weeks' gestation: the AVIOx study. *Pediatrics* 2006;118(4):1574-82. doi: 10.1542/peds.2005-0413 [published Online First: 2006/10/04]

20. Lim K, Wheeler KI, Gale TJ, et al. Oxygen saturation targeting in preterm infants receiving continuous positive airway pressure. *The Journal of Pediatrics* 2014;164(4):730-36.e1. doi: 10.1016/j.jpeds.2013.11.072 [published Online First: 2014/01/18]

21. Ivers NM, Grimshaw JM, Jamtvedt G, et al. Growing literature, stagnant science? Systematic review, meta-regression and cumulative analysis of audit and feedback interventions in health care. *J Gen Intern Med* 2014;29(11):1534-41. doi: 10.1007/s11606-014-2913-y [published Online First: 2014/06/27]

22. Ivers N, Jamtvedt G, Flottorp S, et al. Audit and feedback: effects on professional practice and healthcare outcomes. *Cochrane Database of Systematic Reviews (Online)* 2012(6):Cd000259. doi: 10.1002/14651858.CD000259.pub3 [published Online First: 2012/06/15]

23. Johnston G, Crombie IK, Davies HT, et al. Reviewing audit: barriers and facilitating factors for effective clinical audit. *Quality in Health Care: QHC* 2000;9(1):23-36. [published Online First: 2000/06/10]

24. van Zanten HA, Tan RN, Thio M, et al. The risk for hyperoxaemia after apnoea, bradycardia and hypoxaemia in preterm infants. *Archives of Disease in Childhood Fetal and Neonatal edition* 2014 doi: 10.1136/archdischild-2013-305745 [published Online First: 2014/03/29]

25. Stenson BJ, Tarnow-Mordi WO, Darlow BA, et al. Oxygen saturation and outcomes in preterm infants. *The New England Journal of Medicine* 2013;368(22):2094-104. doi: 10.1056/NEJMoa1302298 [published Online First: 2013/05/07]

26. Hummler H, Fuchs H, Schmid M. Automated adjustments of inspired fraction of oxygen to avoid hypoxemia and hyperoxemia in neonates - a systematic review on clinical studies. *Klin Padiatr* 2014;226(4):204-10. doi: 10.1055/s-0034-1375617 [published Online First: 2014/07/11]

27. Moher D, Liberati A, Tetzlaff J, et al. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Journal of Clinical Epidemiology* 2009;62(10):1006-12. doi: 10.1016/j.jclinepi.2009.06.005 [published Online First: 2009/07/28]

28. Kmet LM. Standard quality assessment criteria for evaluating primary research papers from a variety of fields. In: Lee RCC, L.S., ed. Edmonton: Alberta Heritage Foundation for Medical Research (AHFMR), 2004.

29. Laptook AR, Salhab W, Allen J, et al. Pulse oximetry in very low birth weight infants: can oxygen saturation be maintained in the desired range? *Journal of perinatology: official journal of the California Perinatal Association* 2006;26(6):337-41. doi: 10.1038/sj.jp.7211500 [published Online First: 2006/04/07]

30. Mills BA, Davis PG, Donath SM, et al. Improving compliance with pulse oximetry alarm limits for very preterm infants? *Journal of Paediatrics and Child Health* 2010;46(5):255-8. doi: 10.1111/j.1440-1754.2009.01680.x [published Online First: 2010/03/27]

31. Sink DW, Hope SA, Hagadorn JI. Nurse:patient ratio and achievement of oxygen saturation goals in premature infants. *Archives of Disease in Childhood Fetal and Neonatal edition* 2011;96(2):F93-8. doi: 10.1136/adc.2009.178616 [published Online First: 2010/11/03]

32. van der Eijk AC, Dankelman J, Schutte S, et al. An observational study to quantify manual adjustments of the inspired oxygen fraction in extremely low birth weight infants. *Acta Paediatrica (Oslo, Norway: 1992)* 2012;101(3):e97-e104. doi: 10.1111/j.1651-2227.2011.02506.x [published Online First: 2011/11/02]

33. Claure N, Gerhardt T, Everett R, et al. Closed-loop controlled inspired oxygen concentration for mechanically ventilated very low birth weight infants with frequent episodes of hypoxemia. *Pediatrics* 2001;107(5):1120-4. [published Online First: 2001/05/23]

34. Claure N, D'Ugard C, Bancalari E. Automated adjustment of inspired oxygen in preterm infants with frequent fluctuations in oxygenation: a pilot clinical trial. *The Journal of Pediatrics* 2009;155(5):640-5 e1-2. doi: 10.1016/j.jpeds.2009.04.057 [published Online First: 2009/07/15]

35. Claure N, Bancalari E, D'Ugard C, et al. Multicenter Crossover Study of Automated Control of Inspired Oxygen in Ventilated Preterm Infants. *Pediatrics* 2011;127(1):E76-E83.

36. Urschitz MS, Horn W, Seyfang A, et al. Automatic control of the inspired oxygen fraction in preterm infants: a randomized crossover trial. *Am J Respir Crit Care Med* 2004;170(10):1095-100. doi: 10.1164/rccm.200407-929OC [published Online First: 2004/09/07]

37. Arawiran J, Curry J, Welde L, et al. Sojourn in excessively high oxygen saturation ranges in individual, very low-birthweight neonates. *Acta Paediatrica (Oslo, Norway: 1992)* 2014 doi: 10.1111/apa.12827 [published Online First: 2014/10/17]

38. Hallenberger A, Poets CF, Horn W, et al. Closed-loop automatic oxygen control (CLAC) in preterm infants: a randomized controlled trial. *Pediatrics* 2014;133(2):e379-85. doi: 10.1542/peds.2013-1834 [published Online First: 2014/01/29]

39. Zapata J, Gomez JJ, Araque Campo R, et al. A randomised controlled trial of an automated oxygen delivery algorithm for preterm neonates receiving supplemental oxygen without mechanical ventilation. *Acta Paediatrica (Oslo, Norway: 1992)* 2014;103(9):928-33. doi: 10.1111/apa.12684 [published Online First: 2014/05/13]

40. Armbruster J, Schmidt B, Poets CF, et al. Nurses compliance with alarm limits for pulse oximetry: Qualitative study. *Journal of Perinatology* 2010;30(8):531-34. doi: 10.1038/jp.2009.189

41. Nghiem TH, Hagadorn JI, Terrin N, et al. Nurse opinions and pulse oximeter saturation target limits for preterm infants. *Pediatrics* 2008;121(5):e1039-46. doi: 10.1542/peds.2007-2257 [published Online First: 2008/05/03]

42. Claure N, Bancalari E. Automated respiratory support in newborn infants. *Seminars in Fetal and Neonatal Medicine* 2009;14(1):35-41.

43. Schmidt B, Whyte RK, Asztalos EV, et al. Effects of targeting higher vs lower arterial oxygen saturations on death or disability in extremely preterm infants: a randomized clinical trial. *JAMA* 2013;309(20):2111-20.

44. Carlo WA, Finer NN, Walsh MC, et al. Target ranges of oxygen saturation in extremely preterm infants. *The New England Journal of Medicine* 2010;362(21):1959-69. doi: 10.1056/NEJMoa0911781 [published Online First: 2010/05/18]

45. Laptook AR, Salhab W, Allen J, et al. Pulse oximetry in very low birth weight infants: can oxygen saturation be maintained in the desired range? *JPerinatol* 2006;26(6):337-41.

46. Solberg MT, Hansen TW, Bjork IT. Nursing assessment during oxygen administration in ventilated preterm infants. *Acta Paediatrica (Oslo, Norway: 1992)* 2011;100(2):193-7. doi: 10.1111/j.1651-2227.2010.02094.x [published Online First: 2010/11/26]

47. Claure N. Automated regulation of inspired oxygen in preterm infants: oxygenation stability and clinician workload. *Anesthesia and Analgesia* 2007;105(6 Suppl):S37-41. doi: 10.1213/01.ane.0000268714.51303.a5 [published Online First: 2007/12/06]

48. Lau YY, Tay YY, Shah VA, et al. Maintaining optimal oxygen saturation in premature infants. *The Permanente Journal* 2011;15(1):e108-13. [published Online First: 2011/09/06]

49. Deuber C, Abbasi S, Schwoebel A, et al. The toxigen initiative: targeting oxygen saturation to avoid sequelae in very preterm infants. *Advances in Neonatal Care* 2013;13(2):139-45. doi: 10.1097/ANC.0b013e31828913cc [published Online First: 2013/03/28]

50. Ford SP, Leick-Rude MK, Meinert KA, et al. Overcoming barriers to oxygen saturation targeting. *Pediatrics* 2006;118 Suppl 2:S177-86. doi: 10.1542/peds.2006-0913P [published Online First: 2006/11/03]

51. Sun SC, Stefen E, Vangvanichyakorn K. Validation of prescribed target SpO(2) range in ELBW infants: A reality check of nurses' practice. *Pediatric Research* 2004;55(4):528A-28A.

52. Edworthy J, Meredith C, Hellier E, et al. Learning medical alarms whilst performing other tasks. *Ergonomics* 2013;56(9):1400-17. doi: 10.1080/00140139.2013.819448 [published Online First: 2013/08/01]

53. Siebig S, Kuhls S, Imhoff M, et al. Intensive care unit alarms--how many do we need? *Crit Care Med* 2010;38(2):451-6. doi: 10.1097/CCM.0b013e3181cb0888 [published Online First: 2009/12/18]

54. American Academy of Pediatrics. Task Force on Prolonged Apnea. Prolonged apnea. *Pediatrics* 1978;61(4):651-2. [published Online First: 1978/04/01]

55. Martin RJ, Abu-Shaweesh JM, Baird TM. Apnoea of prematurity. *Paediatric Respiratory Reviews* 2004;5 Suppl A:S377-82. [published Online First: 2004/02/26]

56. Saugstad OD, Aune D. In search of the optimal oxygen saturation for extremely low birth weight infants: a systematic review and meta-analysis. *Neonatology* 2011;100(1):1-8.

57. Bancalari E, Claure N. Definitions and diagnostic criteria for bronchopulmonary dysplasia. *Seminars in Perinatology* 2006;30(4):164-70. doi: 10.1053/j.semperi.2006.05.002 [published Online First: 2006/07/25]

58. The International Classification of Retinopathy of Prematurity revisited. *Archives of Ophthalmology* 2005;123(7):991-9. doi: 10.1001/archopht.123.7.991 [published Online First: 2005/07/13]

59. Bell MJ. Neonatal necrotizing enterocolitis. *The New England Journal of Medicine* 1978;298(5):281-2. [published Online First: 1978/02/02]

60. Papile LA, Burstein J, Burstein R, et al. Incidence and evolution of subependymal and intraventricular hemorrhage: a study of infants with birth weights less than 1,500 gm. *The Journal of Pediatrics* 1978;92(4):529-34. [published Online First: 1978/04/01]

61. Sink DW, Hope SA, Hagadorn JI. Nurse:patient ratio and achievement of oxygen saturation goals in premature infants. *Archives of Disease in Childhood Fetal and Neonatal edition* 2011;96(2):F93-F98.

62. Bhutani VK, Taube JC, Antunes MJ, et al. Adaptive control of inspired oxygen delivery to the neonate. *Pediatric Pulmonology* 1992;14(2):110-7. [published Online First: 1992/10/01]

63. Morozoff EP, Smyth JA. Evaluation of three automatic oxygen therapy control algorithms on ventilated low birth weight neonates. *Conference Proceedings: Annual International Conference of the IEEE Engineering in Medicine and Biology Society IEEE Engineering in Medicine and Biology Society Conference* 2009;2009:3079-82. doi: 10.1109/iembs.2009.5332532 [published Online First: 2009/12/08]

64. Tin W, Gupta S. Optimum oxygen therapy in preterm babies. *Archives of Disease in Childhood Fetal and Neonatal edition* 2007;92(2):F143-7. doi: 10.1136/adc.2005.092726 [published Online First: 2007/03/06]

65. Eichenwald EC. Apnea of Prematurity. *Pediatrics* 2016;137(1) doi: 10.1542/peds.2015-3757 [published Online First: 2015/12/03]

66. Ellsbury DL, Ursprung R. Comprehensive Oxygen Management for the Prevention of Retinopathy of Prematurity: the pediatrix experience. *Clin Perinatol* 2010;37(1):203-15. doi: 10.1016/j.clp.2010.01.012 [published Online First: 2010/04/07]

67. van Kaam AH, Hummler HD, Wilinska M, et al. Automated versus Manual Oxygen Control with Different Saturation Targets and Modes of Respiratory Support in Preterm Infants. *The Journal of Pediatrics* 2015;167(3):545-50.e1-2. doi: 10.1016/j.jpeds.2015.06.012 [published Online First: 2015/07/07]

68. Chow LC, Wright KW, Sola A. Can changes in clinical practice decrease the incidence of severe retinopathy of prematurity in very low birth weight infants? *Pediatrics* 2003;111(2):339-45.

69. Deuber C, Terhaar M. Hyperoxia in very preterm infants: a systematic review of the literature. *The Journal of Perinatal & Neonatal Nursing* 2011;25(3):268-74. doi: 10.1097/JPN.0b013e318226ee2c [published Online First: 2011/08/10]

70. Clarke A, Yeomans E, Elsayed K, et al. A Randomised Crossover Trial of Clinical Algorithm for Oxygen Saturation Targeting in Preterm Infants with Frequent Desaturation Episodes. *Neonatology* 2014;107(2):130-36. doi: 10.1159/000368295 [published Online First: 2014/12/23]

71. Alanen S, Valimaki M, Kaila M. Nurses' experiences of guideline implementation: a focus group study. *Journal of Clinical Nursing* 2009;18(18):2613-21. doi: 10.1111/j.1365-2702.2008.02754.x [published Online First: 2009/06/23]

72. Tarnow-Mordi W, Stenson B, Kirby A, et al. Outcomes of Two Trials of Oxygen-Saturation Targets in Preterm Infants. *The New England Journal of Medicine* 2016;374(8):749-60. doi: 10.1056/NEJMoa1514212 [published Online First: 2016/02/11]

73. Stenson BJ. Oxygen Saturation Targets for Extremely Preterm Infants after the NeOProM Trials. *Neonatology* 2016;109(4):352-8. doi: 10.1159/000444913 [published Online First: 2016/06/03]

74. Jones JG, Lockwood GG, Fung N, et al. Influence of pulmonary factors on pulse oximeter saturation in preterm infants. *Archives of Disease in Childhood Fetal and Neonatal edition* 2016;101(4):F319-22. doi: 10.1136/archdischild-2015-308675 [published Online First: 2015/11/26]

75. Johnston ED, Boyle B, Juszczak E, et al. Oxygen targeting in preterm infants using the Masimo SET Radical pulse oximeter. *Archives of Disease in Childhood Fetal and Neonatal edition* 2011;96(6):F429-33. doi: 10.1136/adc.2010.206011 [published Online First: 2011/03/08]

76. Sweet DG, Carnielli V, Greisen G, et al. European consensus guidelines on the management of neonatal respiratory distress syndrome in preterm infants--2013 update. *Neonatology* 2013;103(4):353-68. doi: 10.1159/000349928 [published Online First: 2013/06/06]

77. van Zanten HA, Pauws S.C, Beks E.C., Stenson, B.J., Lopriore E., te Pas A.B. Selected Abstracts of the 1st Congress of joint European Neonatal Societies (jENS 2015); Budapest (Hungary); September 16-20, 2015; Session "Pulmonology". *Journal of Pediatric and Neonatal Individualized Medicine* 2015;4(2):e040213-e13. doi: 10.7363/040213

78. Greenspan JS, Goldsmith JP. Oxygen therapy in preterm infants: hitting the target. *Pediatrics* 2006;118(4):1740-1. doi: 10.1542/peds.2006-1834 [published Online First: 2006/10/04]

79. Di Fiore JM, Walsh M, Wrage L, et al. Low oxygen saturation target range is associated with increased incidence of intermittent hypoxemia. *The Journal of Pediatrics* 2012;161(6):1047-52. doi: 10.1016/j.jpeds.2012.05.046 [published Online First: 2012/06/29]

80. Ketko AK, Martin CM, Nemshak MA, et al. Balancing the Tension Between Hyperoxia Prevention and Alarm Fatigue in the NICU. *Pediatrics* 2015;136(2):e496-504. doi: 10.1542/peds.2014-1550

81. Sola A, Golombek SG, Montes Bueno MT, et al. Safe oxygen saturation targeting and monitoring in preterm infants: can we avoid hypoxia and hyperoxia? *Acta Paediatrica (Oslo, Norway: 1992)* 2014;103(10):1009-18. doi: 10.1111/apa.12692 [published Online First: 2014/05/20]

82. Bitan Y, Meyer J, Shinar D, et al. Nurses' reactions to alarms in a neonatal intensive care unit. *Cogn Tech Work* 2004;6(4):239-46. doi: 10.1007/s10111-004-0162-2

83. Cvach M. Monitor alarm fatigue: an integrative review. *Biomed Instrum Technol* 2012;46(4):268-77. doi: 10.2345/0899-8205-46.4.268

84. Wilinska M, Bachman T, Swietlinski J, et al. Automated FiO2-SpO2 control system in neonates requiring respiratory support: a comparison of a standard to a narrow SpO2 control range. *BMC Pediatrics* 2014;14:130. doi: 10.1186/1471-2431-14-130 [published Online First: 2014/06/03]

85. Waitz M, Schmid MB, Fuchs H, et al. Effects of automated adjustment of the inspired oxygen on fluctuations of arterial and regional cerebral tissue oxygenation in preterm infants with frequent desaturations. *The Journal of Pediatrics* 2015;166(2):240-4 e1. doi: 10.1016/j.jpeds.2014.10.007

86. Claure N, Bancalari E. Closed-loop control of inspired oxygen in premature infants. *Seminars in Fetal and Neonatal Medicine* 2015;20(3):198-204. doi: http://dx.doi.org/10.1016/j.siny.2015.02.003

87. Fathabadi OS, Gale TJ, Olivier JC, et al. Automated control of inspired oxygen for preterm infants: What we have and what we need. *Biomedical Signal Processing and Control* 2016;28:9-18. doi: http://dx.doi.org/10.1016/j.bspc.2016.03.002

88. Claure N, Bancalari E. Role of automation in neonatal respiratory support. *Journal of Perinatal Medicine* 2013;41(1):115-8. doi: 10.1515/jpm-2012-0031 [published Online First: 2012/10/25]

89. Wilinska M, Bachman T, Swietlinskli J. Time required for effective FiO2-titration in preterm infants: a comparison. *Neonatal Intensive Care* 2012;25(5):44-46.

90. Lal M, Tin W, Sinha S. Automated control of inspired oxygen in ventilated preterm infants: crossover physiological study. *Acta Paediatrica (Oslo, Norway: 1992)* 2015;104(11):1084-9. doi: 10.1111/apa.13137 [published Online First: 2015/07/22]

91. Dargaville PA, Sadeghi Fathabadi O, Plottier GK, et al. Development and preclinical testing of an adaptive algorithm for automated control of inspired oxygen in the preterm infant. *Archives of Disease*

in Childhood Fetal and Neonatal edition 2016 doi: 10.1136/archdischild-2016-310650 [published Online First: 2016/09/17]

92. Vagedes J, Poets CF, Dietz K. Averaging time, desaturation level, duration and extent. *Archives of Disease in Childhood Fetal and Neonatal edition* 2013;98(3):F265-6. doi: 10.1136/archdischild-2012-302543 [published Online First: 2012/09/11]
93. Poets CF, Franz AR. Automated FiO2 control: nice to have, or an essential addition to neonatal intensive care? *Archives of Disease in Childhood Fetal and Neonatal edition* 2016 doi: 10.1136/archdischild-2016-311647 [published Online First: 2016/10/05]
94. Zahari M, Lee DS, Darlow BA. Algorithms that eliminate the effects of calibration artefact and trial-imposed offsets of Masimo oximeter in BOOST-NZ trial. *J Clin Monit Comput* 2016;30(5):669-78. doi: 10.1007/s10877-015-9752-1 [published Online First: 2015/08/19]