

Decision support approaches and toolkits for identifying midwifery staff requirements

Draft evidence review

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Evidence Review: determining midwifery staff requirement and skill mix

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The National Institute for Health and Care Excellence (NICE) was asked by the Department of Health and NHS England to develop an evidence based guideline on safe staffing of maternity settings.

A [scope](#) was developed which defines what the guideline will and will not consider. It also outlines the 7 review questions that will be addressed to inform the development of the guideline.

This report is one of a series of evidence reviews that cover the review questions outlined in the scope. This report focuses on the following review questions:

What approaches for identifying midwifery staff requirements and skill mix at a local level, including tool kits, are effective and how frequently should they be used?

- *What evidence is available on the reliability and/or validity of any identified toolkits?*

39 1.1 Introduction

40 Determining midwifery staff requirement can be challenging. This is because the number and
41 skill mix of midwives required to provide care to women and neonates is influenced by a
42 multitude of factors. These can include: the number of women and neonates requiring care,
43 the type of care needed, and the amount of time taken to provide the required care; the
44 knowledge and experience of the midwife; the setting in which care is taking place (e.g. in
45 hospital settings or home settings), as well as a host of other factors.

46 The challenge facing providers of midwifery care is ensuring that the right staff, with the right
47 skill mix are available in the right place and at the right time¹. The use of systematic
48 approaches, frameworks, toolkits or models (collectively referred to as 'approaches and
49 toolkits' throughout this document) have been recommended^{2,3} to support staffing decision
50 making. However, currently there are uncertainties about their use, including which
51 approaches or toolkit leads to optimal outcomes, whether their effectiveness varies
52 depending on when and where they are used and who is using them, and how often they
53 should be used for optimal results. Therefore it is currently unclear whether the use of some
54 approaches or toolkits are preferable to others.

55 1.2 Review question

56 What approaches for identifying midwifery staff requirements and skill mix at a local level,
57 including tool kits, are effective and how frequently should they be used?

58 - What evidence is available on the reliability and/or validity of any identified toolkits?

59 1.3 Aims

60 The aim of this systematic review was to establish whether different approaches and toolkits
61 for identifying midwifery staff requirements and skill mix at a local level are effective. That is,
62 does the use of a particular approach or toolkit to support decision making about number and
63 mix of midwives lead to changes in the estimated number and skill mix of midwives required,
64 and does that lead to changes in outcomes for women, neonates and staff?

65 The review question did not aim to simply identify and describe the ways in which midwifery
66 staff requirement and skill mix can be determined on a local level, since this would not
67 provide evidence about whether the use of a particular approach or toolkit is effective or not.

68 1.4 Methods

69 This systematic review was conducted in accordance with the draft *Developing NICE*
70 *guidelines* manual.

71 A search strategy and review protocol were developed to identify primary studies comparing
72 the use of a particular approach to another approach or to standard methods for estimating
73 midwifery staff and skill mix (see appendix A and B).

74 A date restriction was imposed on all the systematic reviews that were conducted for the
75 midwifery staff guideline, including this review, as it was deemed inappropriate to include all
76 evidence. This is because midwifery practices have advanced over the years, making older
77 studies of limited relevance to midwifery practice today. A cut-off date of 1998 was chosen
78 following advice from a topic expert, and studies published before this date or which used
79 data from before this date were excluded.

80 The systematic search identified 1799 references. An additional 37 references were
81 identified through screening the searches for other review questions included in the related
82 evidence reviews.

83 As an additional check, topic experts appointed to the NICE Safe Staffing Advisory
84 Committee for Maternity Services and the NICE Accreditation team were also contacted and
85 asked if they were aware of any other evidence which should be considered in the review.
86 The developers of known toolkits for midwifery staff decision making were also contacted
87 and asked if they had any unpublished research or data that could be used in this review. No
88 additional evidence was identified using these checks.

89 A screening checklist was developed with the purpose of enabling non-relevant references to
90 be excluded rapidly (see appendix C). One reviewer applied the screening checklist to all
91 identified references. A second reviewer performed a consistency check by screening the
92 title and abstracts of 10% of the references which were selected at random against the same
93 checklist. Any disagreements between the two reviewers were discussed and resolved.
94 Overall there was 100% agreement between the two reviewers.

95 Overall, 31 references were selected and retrieved for full text appraisal. All full texts were
96 independently reviewed against the review protocol by two reviewers, and the reviewers had
97 100% agreement. The reference lists and full text of these 31 studies were also screened to
98 identify potentially relevant additional studies. An additional reference⁴ was identified from
99 screening of the reference list and full text bringing the total number of studies that were
100 considered to 32.

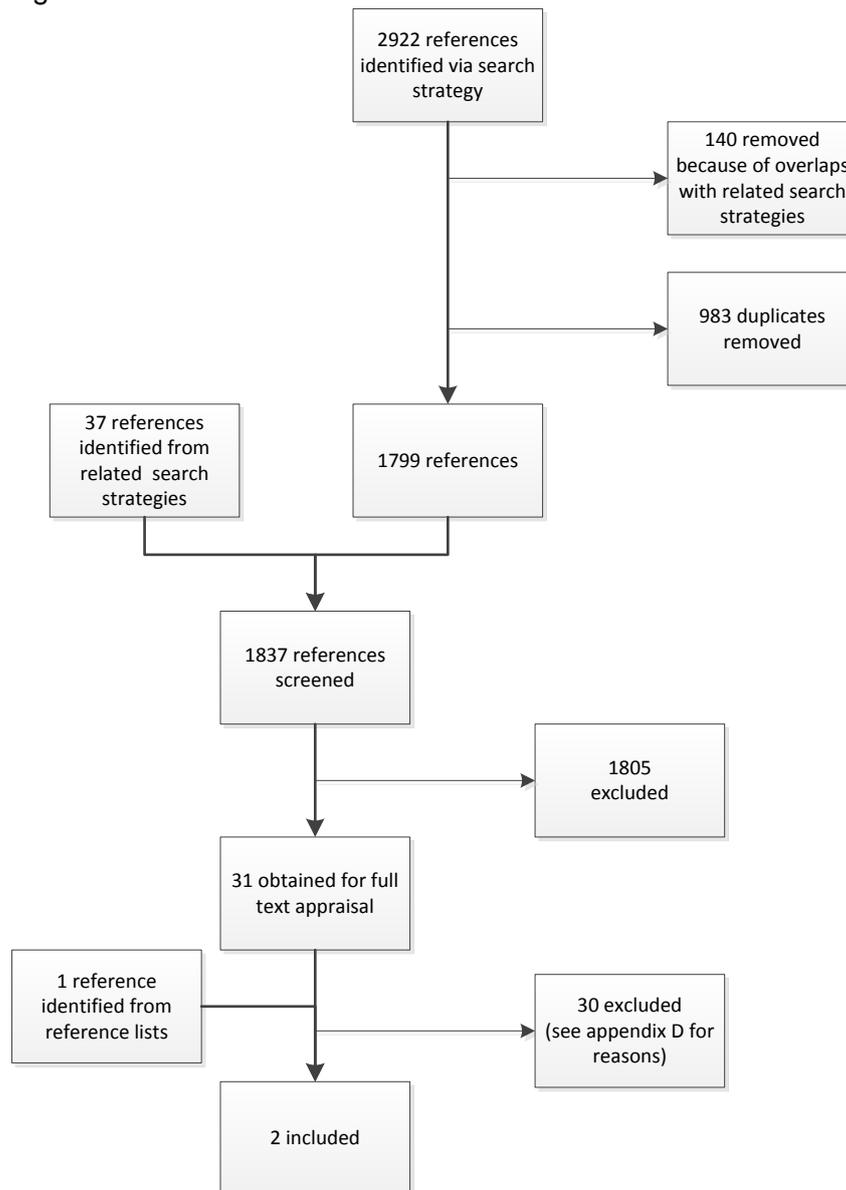
101 All 32 studies were appraised and two articles (Allios et al 2014⁴; Allen and Thornton 2013⁵)
102 met the criteria for inclusion in this review (**Figure 1**).

103 Most of the retrieved full text references related to studies that were purely descriptive in
104 nature which described the evidence base for the development of toolkits (e.g. Ball et al
105 series of papers on Birthrate Plus^{6,7,8,9,10,11}). However, these studies did not provide evidence
106 about whether the use of a particular approach or toolkit resulted in changes to midwifery
107 staff requirement, or to changes in outcomes. Thus these studies were excluded from the
108 evidence review.

109 Other references related to policy documents or guidance provided by other organisations
110 (e.g. National Audit Office¹²; National Quality Board¹; Royal Colleges Report¹³; Kings Fund
111 Reports^{14,15}; Scottish Government Report¹⁶). Whilst these documents recommend the use of
112 various toolkits to support staffing decision making, the documents do not provide evidence
113 about whether the use of a particular toolkit resulted in changes to midwifery staff
114 requirement, or to changes in outcomes. Thus these references were also excluded from the
115 evidence review. A full list of excluded studies and reasons for exclusion is provided in
116 appendix D.

117

Figure 1: Review flow chart



118 1.4.1 Results

119 Two simulation studies conducted in the UK (Allen and Thornton, 2013; Allios et al, 2014)
 120 were identified that examined the extent to which one-to-one midwifery midwife care can be
 121 provided.

122 1.4.1.1 Allen and Thornton (2013): quality score [-]

123 This study used a simulation model that was developed on routinely collected data from a UK
 124 hospital maternity unit which had approximately 6,000 deliveries per annum. The model was
 125 used it to replicate different clinical scenarios and different sized maternity units.

126 The main focus of the study was to compare actual trust midwifery staff levels determined
 127 using Birthrate Plus calculations to different simulated scenarios. The main study outcomes
 128 were the percentage of time where there were more women on the labour ward than
 129 midwives available (i.e. the ward was “overloaded”), and when ‘Workload Index’ (a

130 calculation of the total time women spend on the labour ward multiplied by each of five
131 categories relating to the level of intervention the woman received during labour) exceeded
132 the number of midwives present.

133 There were clear patterns of activity on the labour ward; peak activity was on Monday to
134 Friday when 20% more deliveries occurred than on the weekend, and between 09:00 and
135 12:00 when the number of deliveries were 60% higher than the average for the rest of the
136 day (weekdays only). This was attributed to activity related to caesarean sections.

137 For this particular trust Birthrate Plus staffing calculations suggested a staffing ratio of 1.4
138 midwives to every woman. This ratio left the maternity unit with more women than midwives
139 for 65% of the time between 09:00 and 13:00, but on nights and weekends this 'overloading'
140 only occurred 5-10% of the time.

141 Using model simulations the study found that the ratio of midwives to women needed to be
142 increased to 1.8 to 1 in order to ensure that there were enough midwives to provide one to
143 one care for 95% of the time or more. If the estimate of 'Workload Index', rather than the
144 number of women was used the simulation model further increased this ratio to 2.2 midwives
145 per woman.

146 Using model simulations the study found that the Birthrate plus calculations would lead to
147 more women than midwives on the unit 15% of the time for small units (2000 births per year),
148 13% of the time for medium units (6000 births per year) and 10% of the time for large units
149 (8000 births per year).

150 1.4.1.2 Allios et al (2014): quality score [-]

151 This study also developed a simulation model based on routinely collected data from a UK
152 hospital maternity service which had approximately 6,000 deliveries per annum. The model
153 was used to evaluate the resource implications of changes in maternity care provision and
154 demand.

155 The study tested various scenarios, one of which was the trusts ability to provide one-to-one
156 midwifery care throughout the process of giving birth.

157 It was unclear how the trust's actual midwifery staff requirement had been determined, but
158 the modelling work revealed that for about 25% of the time there were more women in labour
159 and in theatre than midwives available. For this particular trust, the modelling indicated that
160 an additional 3 midwives would be required to allow one-to-one care for 95% of the time.

161 Results for the Alongside Midwifery Unit (AMU) revealed that there was a greater ability to
162 provide one-to-one care at all times, not just during labour. During the day there were more
163 women than midwives for 4% of the time. During the night there was one fewer midwife
164 which resulted in more women than midwives 11.8% of the time. Thus if the target of one-to
165 one-care during labour only is considered, the AMU probably meets this objective most of the
166 time.

167

168 **Table 1: Summary of included evidence**

Reference	Country	Design	Approach to determining midwifery staff requirement	Comparison	Outcome	Quality
(Allen and Thornton 2013)	UK	Simulation study	Birthrate Plus	Simulated model	<ul style="list-style-type: none"> • % time more women than midwives • % time workload index exceeded number of midwives 	[-]

Reference	Country	Design	Approach to determining midwifery staff requirement	Comparison	Outcome	Quality
Allios et al (2014)	UK	Simulation study	Unclear	Simulated model	<ul style="list-style-type: none"> % time more women than midwives 	[-]

169 1.4.2 Evidence Statements

170 Two studies^{4,5} (quality score [-]) conducted in the UK found that methods for determining
 171 midwifery staff requirement (including Birthrate Plus) underestimate the number of midwives
 172 required to provide one-to-one care to all women in labour in comparison to predictions made
 173 by computer simulation models. Methods for determining midwifery staff requirement
 174 (including Birthrate Plus) had less of a short fall in the predicted number of midwives required
 175 in Alongside Midwifery Units⁴ and maternity services serving larger populations (over 8,000
 176 births per annum)⁵ than for other maternity settings⁴ and for services serving smaller
 177 populations (less than 8,000 births per annum)⁵.

178 No evidence was found about determining staffing requirement for other midwifery activities.

2 Gaps in the evidence

179

180 Currently, Birthrate Plus is widely used throughout maternity services as a decision support
 181 tool for determining midwifery staff requirement, and is endorsed for use by the Royal
 182 College of Anaesthetists, Royal College of Midwives and Royal College of Obstetricians and
 183 Gynaecologists³, and by the Department of Health². However, there is no evidence to
 184 validate the methodology that Birthrate Plus uses, or to demonstrate that the tool has an
 185 effect on outcomes.^{14,17,18} In 2011 the Kings Fund called for more research on Birthrate Plus
 186 to be done to evaluate its effectiveness.

187 This evidence review identified a single study⁵ that addressed the King's Fund call for
 188 research that specifically focused on Birthrate Plus. This limited amount of evidence is
 189 insufficient to determine whether the effectiveness of Birthrate Plus varies depending on
 190 when and where it is used and by whom, and how often it should be used.

191 A small amount of evidence was found demonstrating that computer simulated models^{4,5}
 192 could be used to monitor and predict the number of midwives required to provide one-to-one
 193 care to women in labour, but it is unclear if some simulation models are more effective than
 194 others.

195 No evidence was found for other decision support approaches, frameworks, methods or
 196 toolkits, and no evidence was found about outcomes other than providing one-to-one care
 197 during labour.

198 Further research is therefore needed to establish what method should be used for
 199 determining midwifery staff requirement in a variety of maternity settings in the UK. An
 200 example review protocol for future research is provided in table 2.

201

Table 2: Review protocol for future research

Question	What method(s) should be used for determining midwifery staff requirement in maternity settings in the UK?
Objectives	To investigate whether there is an accurate method for determining midwifery staff requirement, To determine whether the most accurate method varies by setting (such as alongside midwifery units, free standing midwifery units, obstetric units, community settings).
Study design	Comparative evidence, ideally cluster randomised controlled trials but prospective cohort studies are acceptable.
Population	Women and neonates accessing maternity services for pre natal, antenatal or postnatal care
Method	Any method that aims to predict staffing requirement <ul style="list-style-type: none"> • Birthrate Plus • Computer simulation models • Clinical judgement • Etc.
Comparator	Any other method that aims to predict staffing requirement <ul style="list-style-type: none"> • Birthrate Plus • Computer simulation models • Clinical judgement • Etc.
Outcomes	<ul style="list-style-type: none"> • Number of midwives predicted • Resource use and costs • Woman, neonatal, or midwife outcomes such as (but not limited to): <ul style="list-style-type: none"> ○ Serious preventable events/never events (e.g. death, haemorrhage, perineal tears) ○ Delivery of midwifery care (e.g. one-to-one midwife support during labour, completion of observations and paperwork, drug errors, readmission) ○ Completion and maintenance of staff training

	<ul style="list-style-type: none">○ Staff retention and sickness rates○ Closure to admission due to staffing capacity
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204
205

3 References

N.B. Excluded studies, and reasons for exclusion are in appendix D

- ¹ National Quality Board (2013) How to ensure the right people, with the right skills, are in the right place at the right time: a guide to nursing, midwifery and care staffing capacity and capability
- ² Maternity Matters (Department of Health, 2007)
- ³ Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Health RCoPaC (2007) Safer childbirth: minimum standards for the organisation and delivery of care in labour. London: RCOG Press.
- ⁴ Allios M, Cozzi E, McBride T, Palmer W (2014) Modelling of maternity services in England. London. National Audit Office
- ⁵ Allen M, Thornton S (2013) Providing one-to-one care in labour. Analysis of 'Birthrate Plus' labour ward staffing in real and simulated labour ward environments BJOG: An International Journal of Obstetrics & Gynaecology 120 (1) 100-107
- ⁶ Ball J, Bennett B, Washbrook M (2003) Birthrate Plus programme: a basis for staffing standards? British Journal of Midwifery 11 (5) 264-
- ⁷ Ball J, Bennett B, Washbrook M (2003) Further issues in deciding staffing needs British Journal of Midwifery 11 (7) 416-
- ⁸ Ball J, Bennett B, Washbrook M et al. (2003) Birthrate Plus Programme. Factors affecting staffing ratios British Journal of Midwifery 11 (6) 357-360
- ⁹ Ball J, Washbrook M (2010) Birthrate Plus: using ratios for maternity workforce planning British Journal of Midwifery 18 (11) 724-
- ¹⁰ Ball J, Washbrook M (2010) Developing a real-time assessment of staffing needs in delivery suites British Journal of Midwifery 18 (12) 780-
- ¹¹ Ball J, Washbrook M (2010) Workforce planning in midwifery: an overview of 8 years British Journal of Midwifery 18 (8) 527-
- ¹² National Audit Office (2013) Maternity services in England.
- ¹³ Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians and Gynaecologists, Health RCoPaC (2007) Safer childbirth: minimum standards for the organisation and delivery of care in labour. London: RCOG Press.
- ¹⁴ Sandall J, Homer C, Sadler E et al. (2011) Staffing in maternity units: getting the right people in the right place at the right time. London: The King's Fund
- ¹⁵ Thomas V, Dixon A (2012) Improving safety in maternity services: introduction to The King's Fund's maternity toolkit. London: The King's Fund
- ¹⁶ Scottish Government (2004) Nursing & Midwifery: Workload & Workforce: Planning Project. Edinburgh: Scottish Executive
- ¹⁷ National Institute for Clinical Excellence (NICE) (2007) Intrapartum Care: Care of healthy women and their babies during childbirth. London: National Institute for Clinical Excellence
- ¹⁸ Yelland A, Winter C, Draycott T et al. (2013) Midwifery staffing: Variation and mismatch in demand and capacity British Journal of Midwifery 21 (8) 579-589

206 4 Appendices

207 4.1 Appendix A Search strategy

208

209 This appendix outlines the searches carried out for this review in order to inform
210 NICE's safe staffing guidance for Midwifery staff services. It should be read in
211 conjunction with the protocol for this review, and with the appendices for the
212 associated reviews.

213 References which were identified during each of the associated reviews were shared
214 with the other (midwifery staff) review groups if they were thought to be relevant to
215 their review questions. No additional citation searching or website searching was
216 carried out specifically for this review.

217 4.1.1 Database search strategies

218 4.1.1.1 Medline and Medline-in process

219

220 **Platform:** Ovid

221

221 **Search date:** 17/6/2014

222

223

224

1 Midwifery/

225

2 midwi*.tw.

226

3 Nurse Midwife/

227

4 maternity.tw.

228

5 (intrapartum or postnatal or antenatal or prenatal or perinatal).tw.

229

6 (birth* or childbirth*).tw.

230

7 ((delivery or labour or labor) adj (ward* or suite* or room* or unit*)).tw.

231

8 *Delivery Rooms/ or *birthing centers/

232

9 exp *Perinatal Care/ or *Prenatal Care/

233

10 (msw* not "municipal solid").tw.

234

11 or/1-10

235

12 (care adj3 pathway*).tw.

236

13 "score card".tw.

237

14 scorecard*.tw.

238

15 (acuity adj3 (tool* or score* or system*)).tw.

239

16 "bench mark".tw.

240

17 benchmark*.tw.

241

18 "tool kit".tw.

242

19 toolkit*.tw.

243

20 "dash board".tw.

244

21 dashboard.tw.

245 22 ((planning or staffing or acuity or severity or need*) adj3 (approach* or model*
 246 or system* or tool*).tw.
 247 23 "Personnel Staffing and Scheduling Information Systems"/
 248 24 "Safer Nursing Care Tool".tw.
 249 25 snct.tw.
 250 26 (shelford adj3 tool*).tw.
 251 27 aukuh.tw.
 252 28 "association of UK university hospitals".tw.
 253 29 "patient care portfolio".tw.
 254 30 or/12-29
 255 31 11 and 30
 256 32 birthrate plus.tw.
 257 33 "birth rate plus".tw.
 258 34 (birthrate adj3 tool).tw.
 259 35 or/32-34
 260 36 31 or 35
 261 37 limit 36 to (english language and yr="1998 -Current")
 262 38 limit 37 to (comment or editorial or news or letter)
 263 39 37 not 38
 264 40 Animals/
 265 41 Humans/
 266 42 40 not 41
 267 43 39 not 42

268 **4.1.1.2 Embase**

269
 270 **Platform:** Ovid
 271 **Search date:** 17/6/2014

272
 273 1 exp midwife/
 274 2 midwi*.tw.
 275 3 maternity.tw.
 276 4 (intrapartum or postnatal or antenatal or prenatal or perinatal).tw.
 277 5 *intrapartum care/ or *postnatal care/ or *prenatal care/ or *perinatal care/
 278 6 (birth* or childbirth*).tw.
 279 7 ((delivery or labour or labor) adj (ward* or suite* or room* or unit*).tw.
 280 8 *delivery room/
 281 9 *maternity ward/
 282 10 (msw* not "municipal solid").tw.
 283 11 or/1-10
 284 12 (care adj3 pathway*).tw.
 285 13 "score card*".tw.
 286 14 scorecard*.tw.
 287 15 (acuity adj3 (tool* or score* or system*).tw.
 288 16 "bench mark*".tw.

289 17 benchmark*.tw.
 290 18 "tool kit".tw.
 291 19 toolkit*.tw.
 292 20 "dash board".tw.
 293 21 dashboard.tw.
 294 22 ((planning or staffing or acuity or severity or need*) adj3 (approach* or model*
 295 or system* or tool*)).tw.
 296 23 clinical pathway/
 297 24 "Safer Nursing Care Tool".tw.
 298 25 snct.tw.
 299 26 (shelford adj3 tool*).tw.
 300 27 aukuh.tw.
 301 28 "association of UK university hospitals".tw.
 302 29 "patient care portfolio".tw.
 303 30 or/12-29
 304 31 11 and 30
 305 32 birthrate plus.tw.
 306 33 "birth rate plus".tw.
 307 34 (birthrate adj3 tool).tw.
 308 35 or/32-34
 309 36 31 or 35
 310 37 limit 36 to (english language and yr="1998 -Current")
 311 38 human/
 312 39 nonhuman/
 313 40 39 not 38
 314 41 37 not 40
 315 42 limit 41 to (editorial or letter or note)
 316 43 41 not 42
 317 44 limit 43 to embase
 318

319 **4.1.1.3 Health Management Information Consortium**

320

321 **Platform:** Ovid

322 **Search date:** 19/6/2014

323

324 1 Midwifery/ or exp Midwives/ or maternity support workers/
 325 2 midwi*.tw.
 326 3 Midwifery services/
 327 4 maternity.tw.
 328 5 (intrapartum or postnatal or antenatal or prenatal or perinatal).tw.
 329 6 (birth* or childbirth*).tw.
 330 7 ((delivery or labour or labor) adj (ward* or suite* or room* or unit*)).tw.
 331 8 exp maternity units/ or delivery rooms/
 332 9 maternity care/ or antenatal care/ or postnatal care/ or perinatal care/

333 10 (msw* not "municipal solid").tw.
 334 11 or/1-10
 335 12 (care adj3 pathway*).tw.
 336 13 "score card".tw.
 337 14 scorecard*.tw.
 338 15 (acuity adj3 (tool* or score* or system*)).tw.
 339 16 "bench mark".tw.
 340 17 benchmark*.tw.
 341 18 "tool kit".tw.
 342 19 toolkit*.tw.
 343 20 "dash board".tw.
 344 21 dashboard.tw.
 345 22 ((planning or staffing or acuity or severity or need*) adj3 (approach* or model*
 346 or system* or tool*)).tw.
 347 23 care pathways/ or benchmarking/ or exp Dependency scoring/
 348 24 "Safer Nursing Care Tool".tw.
 349 25 snct.tw.
 350 26 (shelford adj3 tool*).tw.
 351 27 aukuh.tw.
 352 28 "association of UK university hospitals".tw.
 353 29 "patient care portfolio".tw.
 354 30 or/12-29
 355 31 11 and 30
 356 32 birthrate plus.tw.
 357 33 "birth rate plus".tw.
 358 34 (birthrate adj3 tool).tw.
 359 35 or/32-34
 360 36 31 or 35
 361 37 limit 36 to yr="1998 -Current"
 362

363 **4.1.1.4 Cochrane Database of Systematic Reviews; Database of Abstracts of Reviews of**
 364 **Effects; Cochrane Central Register of Controlled Trials; Health Technology**
 365 **Assessment Database**
 366

367 Platform: Wiley

368 Search date: 19/6/2014

369

370 ID Search

371 #1 MeSH descriptor: [Midwifery] this term only

372 #2 midwi*:ti,ab

373 #3 MeSH descriptor: [Nurse Midwives] this term only

374 #4 maternity:ti,ab

375 #5 (intrapartum or postnatal or antenatal or prenatal or perinatal):ti,ab

376 #6 (birth* or childbirth*):ti,ab

- 377 #7 ((delivery or labour or labor) near/2 (ward* or suite* or room* or unit*)):ti,ab
378 #8 MeSH descriptor: [Delivery Rooms] explode all trees
379 #9 MeSH descriptor: [Birthing Centers] this term only
380 #10 MeSH descriptor: [Perinatal Care] explode all trees
381 #11 MeSH descriptor: [Prenatal Care] this term only
382 #12 (msw* not "municipal solid"):ti,ab
383 #13 #1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10 or #11 or #12
384 #14 (care near/4 pathway*):ti,ab
385 #15 "score card":ti,ab
386 #16 scorecard*:ti,ab
387 #17 (acuity near/4 (tool* or score* or system*)):ti,ab
388 #18 "bench mark":ti,ab
389 #19 benchmark*:ti,ab
390 #20 "tool kit":ti,ab
391 #21 toolkit*:ti,ab
392 #22 "dash board":ti,ab
393 #23 dashboard:ti,ab
394 #24 ((planning or staffing or acuity or severity or need*) near/4 (approach* or
395 model* or system* or tool*)):ti,ab
396 #25 MeSH descriptor: [Personnel Staffing and Scheduling Information Systems]
397 this term only
398 #26 "Safer Nursing Care Tool":ti,ab
399 #27 snct:ti,ab
400 #28 (shelford adj3 tool*):ti,ab
401 #29 aukuh:ti,ab
402 #30 "association of UK university hospitals":ti,ab
403 #31 "patient care portfolio":ti,ab
404 #32 #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or
405 #25 or #26 or #27 or #28 or #29 or #30 or #31
406 #33 #13 and #32
407 #34 birthrate plus:ti,ab
408 #35 "birth rate plus":ti,ab
409 #36 (birthrate near/4 tool):ti,ab
410 #37 #34 or #35 or #36
411 #38 #33 or #37 Publication Year from 1998
412

413 4.1.1.5 Cumulative Index to Nursing and Allied Health (CINAHL)

414

415 Platform: Ebsco

416 Search date: 19/6/2014

417

Search Terms	Search Options	Actions
--------------	----------------	---------

S38	S33 OR S34 OR S35 OR S36	Limiters - Published Date: 19980101-20141231 Search modes - Boolean/Phrase
S37	S33 OR S34 OR S35 OR S36	Search modes - Boolean/Phrase
S36	TI (birthrate N3 tool) OR AB (birthrate N3 tool)	Search modes - Boolean/Phrase
S35	TI "birth rate plus" OR AB "birth rate plus"	Search modes - Boolean/Phrase
S34	TI birthrate plus OR AB birthrate plus	Search modes - Boolean/Phrase
S33	S10 AND S32	Search modes - Boolean/Phrase
S32	S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27 OR S28 OR S29 OR S30 OR S31	Search modes - Boolean/Phrase
S31	(MH "Personnel Staffing and Scheduling Information Systems")	Search modes - Boolean/Phrase
S30	(MH "Benchmarking")	Search modes - Boolean/Phrase
S29	(MH "Patient Classification/MT")	Search modes - Boolean/Phrase
S28	(MH "Critical Path")	Search modes - Boolean/Phrase
S27	TI "patient care portfolio" OR AB "patient care portfolio"	Search modes - Boolean/Phrase
S26	TI "association of UK university hospitals" OR AB "association of UK university hospitals"	Search modes - Boolean/Phrase
S25	TI aukuh OR AB aukuh	Search modes - Boolean/Phrase
S24	TI (shelford N3 tool*) OR AB (shelford N3 tool*)	Search modes - Boolean/Phrase
S23	TI snct OR AB snct	Search modes - Boolean/Phrase
S22	TI "Safer Nursing Care Tool" OR AB "Safer Nursing Care Tool"	Search modes - Boolean/Phrase
S21	TI (((planning or staffing or acuity or severity or need*) N3 (approach* or model* or system* or tool*))) OR AB (((planning or staffing or acuity or severity or need*) N3 (approach* or model* or	Search modes - Boolean/Phrase

	system* or tool*)))	
S20	TI dashboard OR AB dashboard	Search modes - Boolean/Phrase
S19	TI "dash board*" OR AB "dash board**"	Search modes - Boolean/Phrase
S18	TI toolkit* OR AB toolkit*	Search modes - Boolean/Phrase
S17	TI "tool kit*" OR AB "tool kit**"	Search modes - Boolean/Phrase
S16	TI benchmark* OR AB benchmark*	Search modes - Boolean/Phrase
S15	TI "bench mark*" OR AB "bench mark**"	Search modes - Boolean/Phrase
S14	TI ((acuity N3 (tool* or score* or system*))) OR AB ((acuity N3 (tool* or score* or system*)))	Search modes - Boolean/Phrase
S13	TI scorecard* OR AB scorecard*	Search modes - Boolean/Phrase
S12	TI "score card*" OR AB "score card**"	Search modes - Boolean/Phrase
S11	TI (care N3 pathway*) OR AB (care N3 pathway*)	Search modes - Boolean/Phrase
S10	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7 OR S8 OR S9	Search modes - Boolean/Phrase
S9	TI ((msw* not "municipal solid")) OR AB ((msw* not "municipal solid"))	Search modes - Boolean/Phrase
S8	TI (((delivery or labour or labor) N1 (ward* or suite* or room* or unit*))) OR AB (((delivery or labour or labor) N1 (ward* or suite* or room* or unit*)))	Search modes - Boolean/Phrase
S7	TI ((birth* or childbirth*)) OR AB ((birth* or childbirth*))	Search modes - Boolean/Phrase
S6	TI ((intrapartum or postnatal or antenatal or prenatal or perinatal)) OR AB ((intrapartum or postnatal or antenatal or prenatal or perinatal))	Search modes - Boolean/Phrase
S5	TI midwi* OR AB midwi*	Search modes - Boolean/Phrase
S4	(MH "Delivery Rooms+")	Search modes - Boolean/Phrase
S3	(MH "Perinatal Care") OR (MH "Postnatal Care+") OR (MH "Intrapartum Care+") OR (MH	Search modes - Boolean/Phrase

	"Prenatal Care")	
S2	(MH "Midwifery+")	Search modes - Boolean/Phrase
S1	(MH "Midwives+")	Search modes - Boolean/Phrase

418 **4.1.1.6 British Nursing Index (BNI)**

419

420 Platform: HDAS

421 Search date: 19/6/2014

422

423 1. BNI; MIDWIFERY/

424 2. BNI; (perinatal AND care).ti,ab

425 3. BNI; prenatal.ti,ab

426 4. BNI; exp ANTENATAL CARE/

427 5. BNI; exp POSTNATAL CARE/

428 6. BNI; midwi*.ti,ab

429 7. BNI; MATERNITY SERVICES/

430 8. BNI; (intrapartum OR postnatal OR antenatal OR prenatal OR perinatal).ti,ab

431 9. BNI; (birth* OR childbirth*).ti,ab

432 10. BNI; (((delivery OR labour OR labor) ADJ (ward* OR suite* OR room* OR
433 unit*))).ti,ab

434 11. BNI; ((msw* NOT "municipal solid")).ti,ab

435 12. BNI; 1 OR 4 OR 5 OR 6 OR 7 OR 8 OR 9 OR 10 OR 11

436 13. BNI; ((care adj3 pathway*).ti,ab

437 14. BNI; "score card".ti,ab

438 15. BNI; scorecard*.ti,ab

439 16. BNI; ((acuity adj3 (tool* OR score* OR system*))).ti,ab

440 17. BNI; "bench mark".ti,ab

441 18. BNI; benchmark*.ti,ab

442 19. BNI; "tool kit".ti,ab

443 20. BNI; toolkit*.ti,ab

444 21. BNI; "dash board"

445 22. BNI; dashboard.ti,ab

446 23. BNI; (((planning OR staffing OR acuity OR severity OR need*) adj3 (approach*
447 OR model* OR system* OR tool*))).ti,ab

448 24. BNI; "Safer Nursing Care Tool".ti,ab

449 25. BNI; snct.ti,ab

450 26. BNI; ((shelford adj3 tool*).ti,ab

451 27. BNI; aukuh.ti,ab

452 28. BNI; "association of UK university hospitals".ti,ab

453 29. BNI; "patient care portfolio".ti,ab

454 30. BNI; 13 OR 14 OR 15 OR 16 OR 17 OR 18 OR 19 OR 20 OR 21 OR 22 OR 23
455 OR 24 OR 25 OR 26 OR 27 OR 28 OR 29

- 456 31. BNI; 12 AND 30
- 457 32. BNI; (birthrate AND plus).ti,ab
- 458 33. BNI; "birth rate plus".ti,ab
- 459 34. BNI; ((birthrate adj3 tool)).ti,ab
- 460 35. BNI; 32 OR 33 OR 34
- 461 37. BNI; 31 OR 35
- 462 38. BNI; 37 [Limit to: Publication Year 1998-2014]

463

464

465

466 **4.2 Appendix B Review protocol**

467

	Details
Review question	<p>What approaches for identifying midwifery staff requirements and skill mix at a local level, including tool kits, are effective and how frequently should they be used?</p> <p>What evidence is available on the reliability and/or validity of any identified toolkits?</p>
Objectives	To identify evidence on approaches used to identify staffing requirements and skill mix, and establish how effective, reliable and valid the approaches are.
Language	English
Study design	Any study with a comparator group e.g. Controlled trials (randomized, quasi randomized, cluster randomized), cross sectional, cohort, before and after
Status	Published papers (full papers only)
Setting	Maternity settings
Perspective	NA
Intervention	Any approach/method/process/toolkit for identifying midwifery staff requirements such as birth rate plus, Scottish tool, professional judgement
Comparator	<ul style="list-style-type: none"> Professional judgement Any approach/method/toolkit used for determining staffing requirement
Evaluation/ outcome	<p>Any midwifery sensitive outcome, such as:</p> <ul style="list-style-type: none"> Serious preventable events (maternal death, stillbirth, neonatal death etc.) Delivery of midwifery care (Women offered minimum set of antenatal tests etc.) Reported feedback (experience/satisfaction of woman, partner or staff) Any other outcome (costs, litigation, training, sickness etc.)
Other criteria for inclusion/ exclusion of studies	<p>Include:</p> <ul style="list-style-type: none"> English language, primary research in full text Case-control <p>Exclude:</p> <ul style="list-style-type: none"> Non-comparative evidence (e.g. case report) Conference abstracts Studies published before 1998 Toolkits/processes evaluated in non-maternity settings
Review strategies	<ul style="list-style-type: none"> The appropriate NICE methodology checklist will be used as a guide to appraise the quality of individual studies Data on all included studies will be extracted into evidence tables Where statistically possible, a meta-analytical approach will be used to give an overall summary effect

468

469 **4.3 Appendix C Title and Abstract Screening checklist**

470

471 Studies not addressing midwife staffing

472 Studies not addressing an approach/framework/model/toolkit for determining staffing
473 requirement

474 Non-English language studies

475 Non-primary study publications e.g. editorials

476 Studies not performed in OECD countries

477

478

479 **4.4 Appendix D Excluded studies**

480

481 Ball J, Bennett B, Washbrook M (2003) Birthrate Plus programme: a basis for staffing
482 standards? British Journal of Midwifery 11 (5) 264-

483 EXCLUDE: not primary research, description only

484

485 Ball J, Bennett B, Washbrook M (2003) Further issues in deciding staffing needs British
486 Journal of Midwifery 11 (7) 416-

487 EXCLUDE: not primary research, description only

488

489 Ball J, Bennett B, Washbrook M et al. (2003) Birthrate Plus Programme. Factors affecting
490 staffing ratios British Journal of Midwifery 11 (6) 357-360

491 EXCLUDE: not primary research, description only

492

493 Ball J, Washbrook M (2010) Birthrate Plus: using ratios for maternity workforce planning
494 British Journal of Midwifery 18 (11) 724-

495 EXCLUDE: not primary research, description only

496

497 Ball J, Washbrook M (2010) Developing a real-time assessment of staffing needs in delivery
498 suites British Journal of Midwifery 18 (12) 780-

499 EXCLUDE: not primary research, description only

500

501 Ball J, Washbrook M (2010) Workforce planning in midwifery: an overview of 8 years British
502 Journal of Midwifery 18 (8) 527-

503 EXCLUDE: not primary research, description only

504

505 Byrne G, Macgregor C, Brady A et al. (2004) Effective tool for managing workload Nursing in
506 the Community 5 (1) 7-8

507 EXCLUDE: Not primary research, narrative summary only

508

509 The Kings Fund (2012) Improving safety in maternity services: introduction to The King's
510 Fund's maternity toolkit

511 EXCLUDE- not primary research, description only

512

513 Flynn B, Kellagher M, Simpson J (2010) Workload and workforce planning: tools, education
514 and training... second of five articles Nursing Management - UK 16 (10) 32-35

515 EXCLUDE: not primary research, description only

516

517 Hamid R, Mahadevan N, Khoo C (2013) Developing clinical care pathways in response to
518 the new maternity pathway payment system: Our experience at Ealing Hospital BJOG: An
519 International Journal of Obstetrics and Gynaecology 120 461-

520 EXCLUDE: Doesn't assess midwifery staff on patient outcomes

521

522 Hurley J, Dickson K (1998) Clinical. Assessing midwifery workload on a labour ward British
523 Journal of Midwifery 6 (7) 444-449

524 EXCLUDE: doesn't separate midwives from auxiliary staff

525

526 Jenkin-Cappiello E (2000) Oh baby!... a labor and delivery staffing system measures patient
527 census and acuity Nursing Management 31 (2) 35-37

528 EXCLUDE: not primary research, description only

529

530 Kellagher M, Simpson J, Flynn B (2010) Workload and workforce planning: developing a
531 learning toolkit Nursing Management 17 (1) 32-

- 532 EXCLUDE: not primary research, description only
533
534 Koblinsky M, Matthews Z, Hussein J et al. (2006) Maternal Survival 3 - Going to scale with
535 professional skilled care Lancet 368 (9544) 1377-1386
536 EXCLUDE: not primary research and paper focusses on non-OECD countries.
537
538 Ksykiewicz-Dorota A, Adamska-Kuzmicka I (2001) Method of Patient Classification System
539 in obstetric staff scheduling. II. Demand for direct nursing in the delivery room among
540 mothers who deliver by natural birth Annales Universitatis Mariae Curie-Sklodowska - Sectio
541 d - Medicina 56 301-306
542 UNAVAILABLE FROM ALL SOURCES
543
544 Lankford D (2013) The Art of Staffing in Labor and Delivery: A Tool to Quantify Staffing
545 Demands JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing 42 S64-S64
546 EXCLUDE: conference abstract only
547
548 Lockhart K, Simpson J, Kellagher M et al. (2010) Workload and workforce planning:
549 devolving the programme Nursing Management (Harrow) 17 (3) 24-27
550 EXCLUDE: not primary research, descriptive only
551
552 Loper D, Hom E (2000) Creating a patient classification system: one birth center's
553 experience in the triage process Journal of Perinatal & Neonatal Nursing 13 (4) 31-49
554 EXCLUDE: Description only, no data on outcomes provided
555
556 Mathew D, Dougall A, Konfortion J et al. (2011) The Intrapartum Scorecard: Enhancing
557 safety on the labour ward British Journal of Midwifery 19 (9) 578-586
558 EXCLUDE: pilot of scorecard and its useability, no data on outcomes provided
559
560 McIntosh B, Cookson G, Sandall J (2012) A call to arms: the efficient use of the maternity
561 workforce British Journal of Midwifery 20 (2) 122-127
562 EXCLUDE: not related to toolkits
563
564 Mejia A (1998) Planning midwifery services to deliver continuity of care Journal of the
565 Operational Research Society 49 (1)
566 EXCLUDE: does not describe number of midwifery staff
567
568 National Audit Office (2013) Maternity services in England - National Audit Office (NAO).
569 EXCLUDE- not primary research, description only
570
571 National Quality Board (2013) How to ensure the right people, with the right skills, are in the
572 right place at the right time: a guide to nursing, midwifery and care staffing capacity and
573 capability. S.I. National Quality Board, 2013.
574 EXCLUDE- not primary research, description only
575
576 NHS Education for Scotland (1-1-2013) Nursing and midwifery workload and workforce
577 planning: learning toolkit - second edition. Scottish Government.
578 EXCLUDE- not primary research, description only
579
580 O'Sullivan S (1999) Working to plan: workforce planning in midwifery... Birthrate Plus...
581 workforce planning tool RCM Midwives Journal 2 (7) 216-217
582 EXCLUDE- not primary research- narrative summary
583
584 Royal College of Anaesthetists, Royal College of Midwives, Royal College of Obstetricians
585 and Gynaecologists, Health RCoPaC (2007) Safer childbirth: minimum standards for the
586 organisation and delivery of care in labour. London - 27 Sussex Place, Regent's Park,
587 London NW1 4RG: RCOG Press

588 EXCLUDE- not primary research, description only
589
590 Scottish Government (2004) Nursing & Midwifery: Workload & Workforce: Planning Project.
591 EXCLUDE- not primary research, description only
592
593 Tolofari M (2014) Counting midwives Midwives 17 (1) 60-61
594 EXCLUDE: not primary research
595
596 Wallis AB, Chereches R, Oprescu F et al. (2007) An international model for staffing maternal
597 and child health research: The use of undergraduate students Breastfeeding Medicine 2 (3)
598 139-144.
599 EXCLUDE- not primary research, description only
600
601 Yelland A, Winter C, Draycott T et al. (2013) Midwifery staffing: Variation and mismatch in
602 demand and capacity British Journal of Midwifery 21 (8) 579-589
603 EXCLUDE- not primary research, description only
604
605

606 **4.5 Appendix E Evidence tables**

607

608

Allen (2013)

Reference	<p>Reference: Allen & Thornton (2013) Providing one-to-one care in labour. Analysis of 'Birthrate plus' labour ward staffing in real and simulated labour ward environments.</p> <p>Aim: to establish how well birth rate plus supports the provision of 1-1 midwifery care during labour</p> <p>Design: Computer simulation</p> <p>Funding: NIHR and CLAHRC</p> <p>Study dates: Not stated</p> <p>Country: UK</p> <p>Quality assessment: [-]</p>
Population	<p>Setting: A labour ward in a city hospital</p> <p>Sample size: Not stated, hospital provides support for approximately 6,000 births per year.</p> <p>Stage of care: Labour</p> <p>Characteristics: Not stated</p>
Approach used to determine midwifery staffing requirement	<p>Birthrate plus</p> <p>Birthrate Plus is a retrospective midwife workforce planning tool. It is applied when the mother and baby are ready to leave the delivery suite.</p> <p>It is based upon a classification system which uses clinical indicators to place mother and baby in one of five outcome categories. The time spent in the delivery suite is recorded.</p> <p>Staffing need is determined by calculating a mean time per category. Extra allowances of midwife time are given to women in higher need categories, thus allowing for the fact that woman and infant may need the attention of more than one midwife at times.</p> <p>The tool is based on the principle of midwives providing one-to one care during labour</p> <p>The tool focuses on the intrapartum period but all aspects of midwives' roles are considered from outpatient clinics and ante-natal services to birthing units and post-natal services.</p>
Comparison	Simulated scenarios
Methods	<p>A simulation model was developed based on the hospitals birth data collected over a 1 year period:</p> <ul style="list-style-type: none"> • Women are categorised as either spontaneous birth or elective caesarean and adjustments are made for day of the week (since birth data revealed that deliveries were 20% higher during the week than the weekend, due to caesarean sections) • Time of arrival for caesarean section can be set (since elective caesareans are performed tended to occur between 9am and 12pm on weekdays, and number of births were 60% higher than the average of the rest of the day) • Women are then be assigned to a BR+ category. The length of stay in the model depends only on the BR+ category and whether they were undergoing elective

	<p>section; no other data were used.</p> <ul style="list-style-type: none"> The model runs an audit of the virtual labour ward every hour; total number of women on the ward are counted and the current workload index calculated using BR+ formula. <p>The simulation model was validated against 3 months worth of actual data collected previously for the calculation of staffing levels using BR+ formula.</p> <p>The model was used to investigate the potential of alternative staffing schedules, and how a changing number of births per year affects the ability to provide one to one care during labour. The main outcome measure was labour ward overloading (when either the number of women or the BR+ Workload Index exceeded the scheduled midwife availability).</p>																																					
Results	<p>Birthrate Plus data compared to ideal simulation for the hospital</p> <table border="1" data-bbox="496 763 1481 1137"> <thead> <tr> <th></th> <th>Actual BR+ calculations</th> <th>Simulation</th> </tr> </thead> <tbody> <tr> <td>Midwife to woman ratio</td> <td>1.4 to 1</td> <td>1.8 to 1</td> </tr> <tr> <td>Percentage of time number of women exceeded number of midwives :</td> <td></td> <td></td> </tr> <tr> <td> <ul style="list-style-type: none"> Nights/Weekends </td> <td>5-10%</td> <td>5% or less</td> </tr> <tr> <td> <ul style="list-style-type: none"> Day during weekdays </td> <td>25-30%</td> <td>5% or less</td> </tr> <tr> <td> <ul style="list-style-type: none"> 09:00 to 13:00 weekdays </td> <td>65%</td> <td>5% or less</td> </tr> <tr> <td>Midwife to workload index ratio</td> <td>n/a</td> <td>2.2 to 1</td> </tr> </tbody> </table> <p>Birthrate Plus data for alternative sized labour wards (simulated)</p> <table border="1" data-bbox="496 1205 1481 1503"> <thead> <tr> <th>Size of unit (number of births)</th> <th>% time more women than midwives</th> <th>% time workload index exceeded number of midwives available</th> <th>Probability of workload index rising to twice the number of allocated midwives</th> </tr> </thead> <tbody> <tr> <td>Small (2000)</td> <td>16%</td> <td>45%</td> <td>6%</td> </tr> <tr> <td>Med (6000)</td> <td>13%</td> <td>36%</td> <td>na</td> </tr> <tr> <td>Large (8000)</td> <td>10%</td> <td>30%</td> <td>0.1%</td> </tr> </tbody> </table> <p>Probability of labour ward overload is higher during the day on weekdays As the number of midwives increase, the probability of overload decreases</p>		Actual BR+ calculations	Simulation	Midwife to woman ratio	1.4 to 1	1.8 to 1	Percentage of time number of women exceeded number of midwives :			<ul style="list-style-type: none"> Nights/Weekends 	5-10%	5% or less	<ul style="list-style-type: none"> Day during weekdays 	25-30%	5% or less	<ul style="list-style-type: none"> 09:00 to 13:00 weekdays 	65%	5% or less	Midwife to workload index ratio	n/a	2.2 to 1	Size of unit (number of births)	% time more women than midwives	% time workload index exceeded number of midwives available	Probability of workload index rising to twice the number of allocated midwives	Small (2000)	16%	45%	6%	Med (6000)	13%	36%	na	Large (8000)	10%	30%	0.1%
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Small (2000)	16%	45%	6%																																			
Med (6000)	13%	36%	na																																			
Large (8000)	10%	30%	0.1%																																			
Authors conclusions	<p>BR+ formula allows for 15% extra resource for coping with fluctuations in workload. We found that in practice workload index exceeded planned resource 35% of the time, and the number of women exceeded the number of midwives 13% of the time.</p> <p>BR+ recommends the number of midwives should remain constant throughout the day and week, but we identified a clear pattern of increased workload on weekdays which was associated with the scheduling of caesarean sections on weekdays.</p>																																					
Limitations	<p>Analysis was focused on one hospital (although the model was used to simulate other labour wards)</p> <p>Midwife staffing for other work is not considered</p> <p>Model is not adequately described</p>																																					

609

610

Allios et al (2014)

Reference	<p>Reference: Allios M, Cozzi E, McBride T, Palmer W (2014) Modelling of maternity services in England. London. National Audit Office</p> <p>Aim: to evaluate the trusts ability to provide one-to-one midwifery care throughout the process of giving birth.</p> <p>Design: Computer simulation</p> <p>Funding:</p> <p>Study dates: 2011-12 and 2012-13</p> <p>Country: UK</p> <p>Quality assessment: [-]</p>
Population	<p>Setting: A hospital with a maternity service comprising an obstetric led maternity unit, an alongside midwifery led unit, and a free standing midwifery unit</p> <p>Sample size: Not stated, hospital provides support for approximately 6,000 births per year (less than 1% of births are home births).</p> <p>Stage of care: Labour</p> <p>Characteristics: 11 midwives cover the labour ward and theatre, 4 cover the alongside midwifery unit in the day (3 at night). Number of midwives in the freestanding unit not stated.</p>
Approach to determining midwifery staffing requirement	<p>Unclear</p> <p>Plausible that Birthrate plus was used since this is widely used throughout maternity units in the UK</p>
Comparison	<p>Simulated scenarios</p>
Methods	<p>A simulation model was developed based on the hospitals Patient Administration System, Evolution IT system, and the hospitals theatre dataset.</p> <p>A discrete event simulation was used to model the provision of services by replicating the current care pathway. This was based on clinical guidance and consultation with staff at the trust.</p> <p>The model was used to evaluate the resource implications for changes in maternity care provision and demand. Several assumptions were made which were discussed and agreed with healthcare and modelling experts:</p> <ul style="list-style-type: none"> • Birth and non-birth were treated as two separate cases (therefore the model can account for the same woman more than once) • Cases with 6 or more episodes were removed from the analysis • Non-maternity wards with low usage were removed from the analysis • Antenatal and postnatal rooms were considered as a single ward pooling both resources and the demand for these resources • Rare methods of delivery were removed from the analysis (e.g. breech) <p>Clinical specialists reviewed the model during its development.</p>
Results	

		Setting		
		In labour or theatre	In AMU during day *	In AMU during night *
	Percentage of time number of women exceeded number of midwives:	23.5%	4%	11.8%
	Planned number of midwives	11	4	3
	Simulated number of midwives needed to provide 1-1 care for 95% of time	14 (3 extra midwives required)	Target is currently met	Target is likely to be met if post labour care is removed from calculations
<i>*Calculations were based on one to one midwifery care being delivered during labour and for post labour care in the Alongside Midwifery Unit (AMU)</i>				
Authors conclusions	In the labour ward, one-to-one care was achievable for around three quarters of the time, which is broadly in line with the national average. Three extra midwives on the ward (an increase of a third) would be required to provide one to one care for 95% of the time.			
Limitations	Analysis was focused on one hospital Midwife staffing for other work is not considered			
Comments	<p>This study was referenced by the National Audit Office report on Maternity Services in England as providing evidence that Birthrate Plus is insufficient for one-to-one midwifery care to be provided for every woman during established labour.</p> <p>This study does not state that Birthrate plus was used in the trust providing the data, and so the statement made in the NAO report is based on an assumption that BR+ was used</p>			

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