

Appendix 3: The detailed calculations

1 For simplicity's sake we have rounded off figures to approximate values, but have always erred on the side of conservatism.

2 *Medical staff* in England will be predictably absent on:¹

- annual leave
 - i 27 days annually on first appointment to the NHS
 - ii 32 days annually after 5 years' completed NHS service
- public holidays: 8 days annually
- study leave
 - i up to 15 days annually for foundation year 1 (F1) trainees²
 - ii up to 30 days annually for all other trainees
 - iii up to 10 days annually for career grade hospital doctors.

Medical staff working in the other nations of the UK will enjoy similar rights of leave.

Note: The vast majority of trainees working at Tier 1 will have been working in the NHS for less than 5 years, and will have a right to 27 days of annual leave, whereas those working at Tier 2 are likely to have been working in the NHS for more than 5 years and will have a right to 32 days of annual leave.

3 Staff will be unpredictably absent on sick leave, maternity and paternity leave. Review of records of previous staff leave of this sort may give some indication of the amount of leave to be expected.

4 Although we have recognised the additional time spent by all Tiers of medical staff in dealing with the issues that interrupt their day-to-day working, we have acknowledged that staff will have, in addition to their ward work, commitments to:

- outpatient clinics
- investigational and therapeutic sessions
- organisational and administrative responsibilities
- educational duties as trainers and clinical supervisors, or trainees and supervisees
- obligations to quality assurance and clinical governance, including clinical audit and mortality and morbidity reviews
- statutory and mandatory training
- covering the duties of unfilled places in the team – filling rota gaps and covering planned leave.

In our attempts to define the workforce needed to provide the daily clinical presence that we have recommended, we have not attempted to account for these additional activities for Tier 1 clinicians because of the heterogeneity of the group.

Neither have we taken account of these activities for Tier 3 consultants, as there is great variability of such activities in this group.

We have, however, accepted that Tier 2 doctors, who are mainly medical specialty registrars in higher training, will have, on average, commitments to 3 half-days each week either in outpatient clinics or investigational and therapeutic sessions. This means that an individual Tier 2 doctor will only be available for the duties that we have described for 70% of the time. We have accordingly made allowance for this when deriving the workforce that we recommend for Tier 2.

5 *Nursing staff*

- Will be predictably absent on annual leave for 28 days per year.³
- Enjoy no automatic statutory entitlement to bank and public holidays.
- Do not have guaranteed study leave.
- All registered nurses are required to have undertaken 35 hours of continuing professional development (CPD) relevant to their scope of practice over a 3-year period in order to revalidate.⁴
- Of those 35 hours of CPD, at least 20 hours must have included participatory learning.

We recommend that for nursing staff of all grades, a minimum of 5 weeks annually is recognised as leave, giving a leave-adjusted working year of 47 weeks (2,256 hours @ 48 hours/week).

6 *Physician associates*

- Annual leave will depend on length of service in the NHS, but tends to be in the region of 28 days.⁵
- They enjoy no automatic statutory entitlement to bank and public holidays.
- They do not have guaranteed study leave.
- Physician associates are required to complete 50 hours of CPD per year, of which at least 25 hours must be 'external' CPD in order to revalidate.⁶

We recommend that for physician associates, a minimum of 5 weeks annually is recognised as leave, giving a leave-adjusted working year of 47 weeks (2,256 hrs @ 48 hours/week).

Calculations

The leave-adjusted working year

- For Tier 1 medical trainees, a minimum of 13 weeks (65 days) annually is recognised as leave. They are therefore available for work on 39 weeks of the year.
 - Working a 48-hour week, they are available for work 39 x 48 hours each year – 1,872 hours each year.
 - This is the leave adjusted working year for Tier 1 F2 and core medical trainee (CMT) doctors.
 - F1 trainees have less study leave and a working year of 42 weeks.
- For Tier 2 trainees, a minimum of 14 weeks (70 days) annually is recognised as leave. They are therefore available for work on 38 weeks of the year.
 - Working a 48-hour week, they are available for work 38 x 48 hours each year – 1,824 hours each year.
 - This is the leave adjusted working year for Tier 2 specialty registrars.
- For career grade hospital doctors, a minimum of 10 weeks (50 days) annually is recognised as leave. They are therefore available for work on 42 weeks of the year.
 - Working a 48-hour week, they are available for work 42 x 48 hours each year – 2,016 hours each year.
 - This is the leave adjusted working year for Tier 3 consultants and for other career grade hospital doctors.
 - It is also the working year for F1 trainees.
- For nursing staff and physician associates, we recommend that they are considered to have 5 weeks annually recognised as leave, giving a working year of 47 weeks.
 - Working a 48-hour week, they are available for work 47 x 48 hours each year – 2,256 hours each year.
 - This is the leave adjusted working year for nursing staff and physician associates.
- We recognise that Tiers 1 and 2 may comprise a mixture of different clinicians with a variety of leave-adjusted working years.
 - Tier 1 may include F1 medical trainees (2,016 hrs), F2 and CMT trainees (1,872 hours) nurses and physician associates (2,256 hours).
 - Tier 2 may include specialty registrars (1,824 hours) and career grade hospital doctors (2,016 hours).

- For the sake of simplicity we have taken the leave-adjusted year of what we consider to be the majority of the workforce in each Tier as being typical of that Tier.
 - Thus we have taken the leave-adjusted year for:
 - **Tier 1 to be 1,872 hours**
 - **Tier 2 to be 1,824 hours**
 - **Tier 3 to be 2,016 hours.**
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The number of staff needed and the size of the workforce

We have shown the number of staff that we consider are needed in each of the situations that we have described in two different ways:

- 1 the numbers of staff needed daily
- 2 the workforce needed to enable that daily presence.

We have derived the numbers of staff needed daily by calculating the hours of work each day, at each Tier, and indicating the number of staff working shifts of permitted duration that would be needed to deliver that work.

We have derived the workforce needed to enable the appropriate numbers of staff at each Tier to be present daily by calculating the numbers of hours of work in total for the whole year (hours daily × 365) and dividing that by the hours of the leave adjusted working year for that Tier.

Thus for Tier 1 in the assessment and admission team in a hospital, which has on average 45 patients presenting to the team daily:

- we have estimated that the time it takes Tier 1 staff to see 10 patients is 15 hours
- thus to see 45 patients will take $15 \times 45/10 = 67.5$ hours
- this work could be undertaken by:
 - five clinicians working 12-hour shifts and one working a 7.5 hour shift – **six Tier 1 staff**, or
 - seven clinicians working 8-hour shifts and one working an 11.5 hour shift – **eight Tier 1 staff**
- similarly, the total yearly Tier 1 time in this situation is $67.5 \times 365 = 24,637.50$ hours
 - with a Tier 1 leave-adjusted working year of 1,872 hours, the Tier 1 workforce needed to provide a daily presence of six to eight Tier 1 staff is $24,637.5/1,872 = 13.1$ – **13 Tier 1 posts.**

The assessment and admission team

<i>45 admissions daily</i>	<i>Time needed for 10 patients daily</i>	<i>Time needed for 45 patients daily</i>	<i>Number of staff needed daily, depending on length of shift</i>	<i>Workforce needed to provide this presence daily</i>
Partly consultant-delivered care	Tier 1 = 15 hrs	Tier 1 = 67.5 hrs	6 to 8	13
	Tier 2 = 7 hrs	Tier 2 = 31.5 hrs	3 to 4	6
	Tier 3 = 6.5 hrs	Tier 3 = 29.25 hrs	3 to 4	5
Consultant-led care	Tier 1 = 15 hrs	Tier 1 = 67.5 hrs	6 to 8	13
	Tier 2 = 9.5 hrs	Tier 2 = 42.75 hrs	4 to 5	8
	Tier 3 = 4.25 hrs	Tier 3 = 19.1 hrs	2 to 3	3

Staffing the medical wards: weekdays and weekends – the calculations

Three Tier 3 ward rounds weekly

Three Tier 3 ward rounds weekly		Time needed daily (hours) per ward	Number of staff needed daily per ward
Monday	- Tier 1	14	2
Ward round	Tier 2	7	1
	Tier 3	6.5	1
	Tuesday	- Tier 1	14.5
Board round	Tier 2	4.5	0.5
	Tier 3	2.5	0.25
	Wednesday	- Tier 1	14
Ward round	Tier 2	7	1
	Tier 3	6.5	1
	Thursday	- Tier 1	14.5
Board round	Tier 2	4.5	0.5
	Tier 3	2.5	0.25
	Friday	- Tier 1	14
Ward round	Tier 2	7	1
	Tier 3	6.5	1
	Saturday	- Tier 1	8
Board round	Tier 2	2	0.25
	Tier 3	2	0.25
	Sunday	- Tier 1	8
Board round	Tier 2	2	0.25
	Tier 3	2	0.25

Tier 1 hours weekly per ward	87.0
Tier 2 hours weekly per ward	34.0
Tier 3 hours weekly per ward	29
Tier 1 hours annually per ward	$87 \times 52 = 4,524$
Tier 2 hours annually per ward	$34 \times 52 = 1,768$
Tier 3 hours annually per ward	$29 \times 52 = 1,508$
Tier 1 posts needed for a six-ward hospital	$(4,524 / 1,872) = 2.4 \times 6 \approx \mathbf{14.5}$
Tier 2 posts needed for a six-ward hospital	$(1,768 / 1,824) = 1 \times 6 \approx \mathbf{6}$
Tier 3 posts needed for a six-ward hospital	$(1,508 / 2,016) = 0.75 \times 6 \approx \mathbf{4.5}$

The medical team on-call

Tier 1

Work done by the WayWard Project of the University of Nottingham and the Aneurin Bevan University Health Board (ABUHB) has provided us with evidence of the current activity of a Hospital at Night (H@N) team.

The actual time spent by a multidisciplinary team on-call responding to urgent requests, for a cohort of 100 hospital inpatients of all specialties, including some estimate of the time it takes to move from task to task, over a 16-hour on-call period, is in the region of 4.25 hours of continuous work.

Respondents to the RCP Medical Registrar Survey reported that, in their opinion, over half the tasks that they undertook could have been undertaken by Tier 1 clinicians. As they also reported that their workload was excessive, it would appear that the levels of Tier 1 staffing on-call described by the WayWard Project and ABUHB studies are an under-provision and that Tier 2 medical registrars are having to 'act down' to make good the shortfall. This information from the RCP Medical Registrar Survey suggests therefore that the measurements made for current levels of Tier 1 staffing out-of-hours are documenting levels of staffing that are essentially inadequate. A further reality check suggested that the Tier 1 time needed to safely provide 16 hours of out-of-hours care is in the order of 14 hours for every 100 hospital beds covered by the team. This equates with there being one medical Tier 1 clinician available to provide emergency care for each 100 hospital inpatients throughout each 16-hour period of time on-call.

14 hours of Tier 1 activity is need for every 100 beds supported by the on-call team.

Annual hours of Tier 1 activity per 100 beds = $14 \times 365 = 5,110$ hours.

The overall multidisciplinary workforce needed to provide that level of Tier 1 activity = $5,110 / 1,872 = 2.7$ clinicians posts per 100 beds.

As most out-of-hours teams follow the multidisciplinary H@N model, some of the team may not be members of the department of medicine. However the majority – we estimate two-thirds – are likely to be so. We estimate that: *the medical contribution to the H@N workforce will be 1.8 Tier 1 clinician posts per 100 beds.*

Tier 2

A survey of the work of Tier 2 medical registrars that was carried out in relation to this report has shown that 80% of the doctors surveyed were responsible for leading both the assessment and admissions team and the medical team on-call for the wards. 60% felt that their workload was heavy, with 15% feeling that it was so onerous as to be a hazard to patient safety.

Clearly, a single Tier 2 medical registrar cannot be safely responsible for both the medical cover of the wards and for leading the medical intake in even a medium-sized hospital. This dual role might only be practicable during the period at night when both the levels of admission activity and emergency calls are low.

We recommend that:

- in a small hospital it may be practicable for the Tier 2 doctor leading the assessment and admission team to also lead the medical team on-call for the wards
- for medium-sized hospitals there should be a Tier 2 medical registrar dedicated to providing on-call cover for 12 hours at times of peak activity on every day of the week; the workforce needed to provide this presence daily would be $(12 \times 365) / 1,824 = 2.4$ Tier 2 doctors
- for a large hospital there should be a Tier 2 doctor present to lead the medical on-call team 24 hours a day; this would require a workforce of 5 Tier 2 doctors.

References

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- 2 British Medical Association. *Junior doctors' handbook on the 2016 contract*. London: BMA, 2016. www.bma.org.uk/-/media/files/pdfs/employment%20advice/contracts/junior%20doctor%20contract/junior-doctors-handbook-2016-tcs-sept2016-amended.pdf?la=en [Accessed June 2018].
- 3 Royal College of Nursing. *Annual leave and holiday: advice guides*. London: RCN, 2016. www.rcn.org.uk/get-help/rcn-advice/annual-leave-and-holiday-pay [Accessed June 2018].
- 4 Nursing and Midwifery Council. *Continuing professional development*, 2017;4:1-4. <http://revalidation.nmc.org.uk/what-you-need-to-do/continuing-professional-development/> [Accessed June 2018].
- 5 Faculty of Physician Associates. *Who are physician associates?* London: FPA, 2016. [www.swansea.ac.uk/media/Physician Associates Leaflet.pdf](http://www.swansea.ac.uk/media/Physician%20Associates%20Leaflet.pdf) [Accessed June 2018].
- 6 Faculty of Physician Associates. *Continuing professional development: guidance for physician associates*. London: FPA, 2012. www.fparcp.co.uk/your-career/cpd [Accessed June 2018].