ARTP Workforce & Workload Survey

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1. Introduction and Survey Demographics

This survey was carried out on behalf of the ARTP Workforce Committee. The aim of the survey was to gain an insight into the workload, waiting times and staffing levels in respiratory and sleep physiology departments in the UK, and to make recommendations. A question regularly asked on the ARTP email forum by members is whether there is a recommended ratio for the number of clinical physiologists required to support the number of respiratory/sleep consultants employed within Trusts. This is a complex question, and depends on many variables, but this paper will aim to provide some guidance on staffing ratios, however this is ultimately a local decision.

An electronic survey tool was developed and piloted and this was sent out to all heads of respiratory/sleep services listed on the ARTP Heads of Department database. The survey tool (shown in Appendix 1) was also available to complete directly via the ARTP website (www.artp.org.uk). Regular reminders to encourage completion were posted on the ARTP email forum and included in monthly ARTP newsletters.

Data was collected between August 2015 and May 2016 and was received from 70 NHS respiratory/sleep services. According to the ARTP 2012 Survey there were 251 practising laboratories in the UK giving an estimated response rate of 28%. Comments received during the consultation period suggest that some diagnostic services do not routinely collect or analyse workload or waiting time data and were therefore unable to complete the survey. The ARTP Survey 2012 (1) highlighted that 74% of departments were using electronic diaries/booking systems.

The majority of hospitals responding to the survey were District General or Teaching hospitals (42.9% each - Table 1). All responding hospitals were National Health Service (NHS) organisations.

60% of responding services offered both respiratory and sleep diagnostics. 23% of services were respiratory only services and 17% were joint cardiorespiratory departments. No dedicated sleep only services responded (Table 2).

Two thirds of responding services tested adult patients only and 4% of the sample were specialist paediatric centres. 30% of services tested both adult and paediatric patients (Table 3).

56 (80%) of the responding services were from England. 11 services were from Wales (16%) and 3 services were from Scotland (4%). No responses were received from Northern Ireland or Eire. Table 4 and Figure 1 show the regional response rate. The majority of responding services were from South-East England and Wales (15.7% each).

Table 1: Hospital Type

Hospital Type	n (%)
District General Hospital	30 (42.9%)
Teaching Hospital	30 (42.9%)
Specialist Centre	6 (8.6%)
Community Hospital	4 (5.7%)

(A list of all hospital's supplying data for this survey is shown in Appendix 2.)

Table 2: Service Speciality

Speciality of Services	n (%)
Respiratory and Sleep	42 (60%)
Respiratory only	16 (23%)
Cardio-Respiratory	12 (17%)
Sleep	0 (0%)

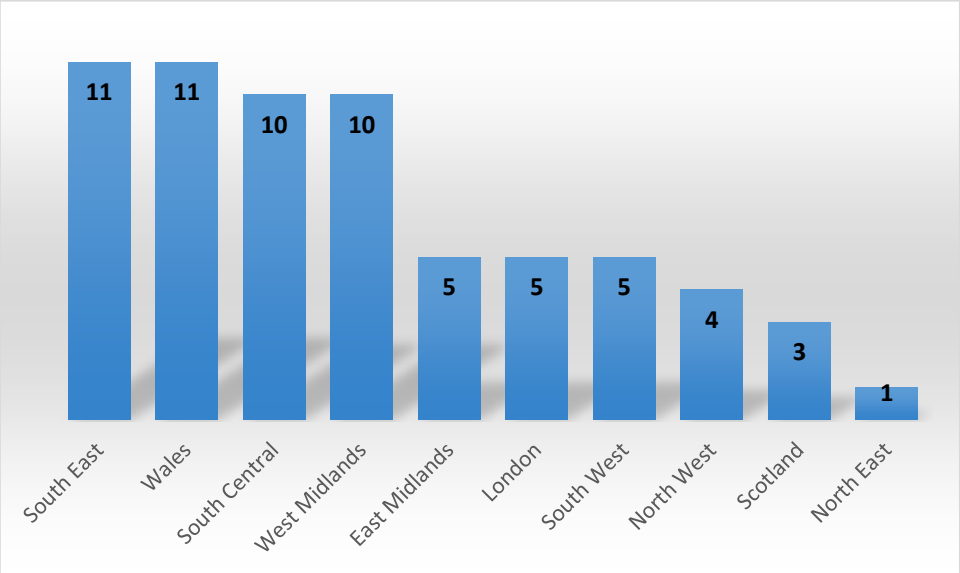
Table 3: Patient Groups Tested

Patient Group	n (%)
Adults only	46 (66%)
Both Adult and Paediatric	21 (30%)
Paediatric only	3 (4%)

Table 4: Hospital Region of Survey Respondents

Hospital Region	n (%)
South-East	11 (15.7%)
Wales	11 (15.7%)
South Central	10 (14.3%)
West Midlands	10 (14.3%)
East Midlands	5 (7.1%)
East of England	5 (7.1%)
London	5 (7.1%)
South West	5 (7.1%)
North West	4 (5.7%)
Scotland	3 (4.3%)
North East	1 (1.4%)

Figure 1: Number of Responding Departments per Region



Key Point

- Many services may not be collecting important information on their departmental workload and waiting times for procedures.

Recommendation

- All services should have access to electronic booking systems. This will allow services to accurately monitor patient throughput and waiting times. This information is essential for service business planning and recruitment of additional staffing. Accurate counting of workload is essential for payment of tariffs for procedures, where applicable.

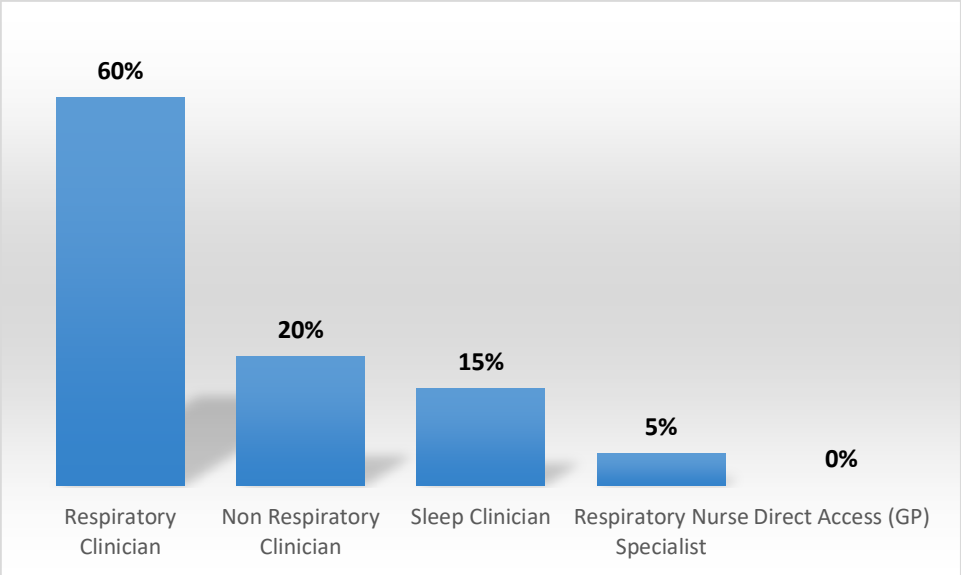
2. Sources of Referral

Services were asked to record what percentage of their workload/referrals were from respiratory consultants, sleep consultants, respiratory nurse specialists, non-respiratory consultants or received as direct access referrals from primary care. The referral data is shown in Table 5 and Figure 2.

Table 5: Source of Referral to Respiratory and Sleep Services

Source of Referral	Median percentage of referrals received (%)	IQR (%)	Range (%)
Respiratory Consultants *(n=69)*	60	45 - 70	4 - 95
Non Respiratory Consultants *(n=68)*	20	15 - 30	1 - 70
Sleep Consultants *(n=46)*	15	5 - 30	0 - 50
Respiratory Nurse Specialists *(n=62)*	5	1 - 5	0 - 18
Direct Access referrals *(n=46)*	0	0 - 1.75	0 - 30

Figure 2: Median Source of Referrals to Respiratory and Sleep Services



The data shows that the majority of referrals to services (median = 60%) are generated by respiratory consultants, but there is wide variability across services for all referrals. A significant proportion (median = 20%) of workload is generated by non-respiratory consultants. The survey did not collect information on the various specialities within this category, but this is likely to include cardiology, elderly medicine, rheumatology, ENT, haematology, pre-operative assessment and

oncology referrals. Referrals from respiratory nurse specialists (median = 5%) and direct access routes made up a smaller proportion of referrals.

The majority of services did not receive direct referrals from primary care. Out of the 46 services who responded to this question, 30 (65%) did not offer direct access routes of referral into the service. This may suggest that many diagnostic tests may be being performed within primary/community care locations or that referrals for investigations may be made via referral through consultants.

Key Points

- There is variability in the source of referrals to respiratory and sleep services. The majority (median = 60%) of referrals are generated via respiratory consultants. Just under a quarter of referrals are generated from non-respiratory consultants.
- Approximately two thirds of services did not offer direct access referrals from primary care for diagnostics.

Recommendation

- Respiratory and Sleep services need to be aware of, and included in, discussions of service developments within both respiratory and non-respiratory specialities as this has potential to impact significantly on the workload of many respiratory/sleep services.

3. Staffing Levels

There is variation in the number of employed consultants and nurse specialists between Trusts. The median number of respiratory consultants, respiratory nurse specialists and sleep consultants were 5, 4 and 1 WTE respectively (Table 6).

Table 6: Clinical Staffing Levels (WTE)

Clinical Group		Median WTE	IQR	WTE (range)
Respiratory Consultants	*(n=68)*	5	4 – 8.25	2 – 35
Respiratory Nurse Specialists	*(n=62)*	4	3 – 6	0 – 20
Sleep Consultants	*(n=51)*	1	0.45 – 2	0 – 5

Table 7 shows the breakdown of physiologist staffing levels by AfC bandings. The data is also grouped to show differences in qualified and unqualified staff. Our sample showed (Figure 3) that approximately 80% of the physiology workforce is qualified and 20% unqualified. Unqualified staff have an important and essential role in the work of a physiology department which may include performance of basic investigations and quality assurance. Unqualified staff may be working towards professional qualifications or registration. (Details of ARTP professional training courses and examinations can be found at www.artp.org.uk.). Recently healthcare science apprenticeship programmes have been developed and it is likely that apprentices will form an important part of the healthcare science workforce.

There was a wide range in the number of qualified staff - between 0.2 to 19.6 WTE per service. The median WTE was 3.0 (IQR 1.98 to 4.4 WTE). There were no services relying solely on unqualified staff.

Table 7: Respiratory/Sleep Physiology Staffing Levels (WTE)

Unqualified	Qualified	Total	Mean	Median	Range
Band 2		15.3	0.85	0.25	0 – 4.6
Band 3		35.1	1.6	1.0	0 – 6.0
Band 4		15.6	1.3	1.0	0 – 4.0
	Band 4	14.0	1.1	1.0	0 – 2.0
Band 5		6.0	1.0	1.0	0 – 2.0
	Band 5	57.9	2.1	1.5	0 – 7.0
	Band 6	109.8	2.1	1.6	0 – 7.0
	Band 7	65.9	1.2	1.0	0 – 5.6
	Band 8	36.1	1.1	1.0	0 – 3.0

Figure 3: Percentage Split between Qualified and Unqualified Staff

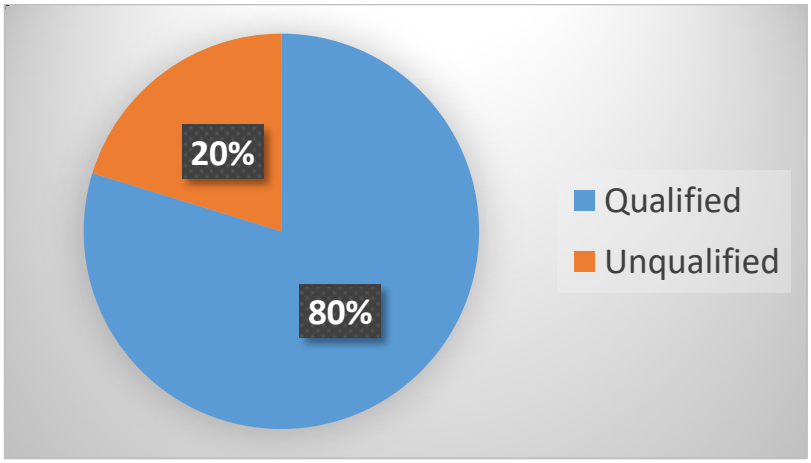


Table 8 shows the breakdown of AfC banding and also compare the findings with the ARTP 2012 Survey (1). The data again showed that the greater proportion of staff working in respiratory/sleep services are employed at Band 6 (31%). It is difficult to make firm conclusions due to the relatively small sample size, but the data may suggest that there is a possible shift to increasing numbers of physiology staff working at lower bandings (Band 3/4) and reduced numbers at higher bands (Band 7/8) – see Table 8. This may be a consequence of reductions in staffing budgets for physiology services and staff at lower grades performing routine diagnostics.

Table 8: Percentage of Staff Employed at Different AfC Bandings in 2012 and 2015

AfC Banding	ARTP 2012 Survey *(n=156 services)* (% of total WTE)	2015 Workforce Survey *(n=70 services)* (% of total WTE)
2	4%	4% (—)
3	8%	10% (↑)
4	5%	8% (↑)
5	20%	18% (↓)
6	27%	31% (↑)
7	25%	19% (↓)
8	12%	10% (↓)

Figure 4: Department Sizes (Staffing in WTE)

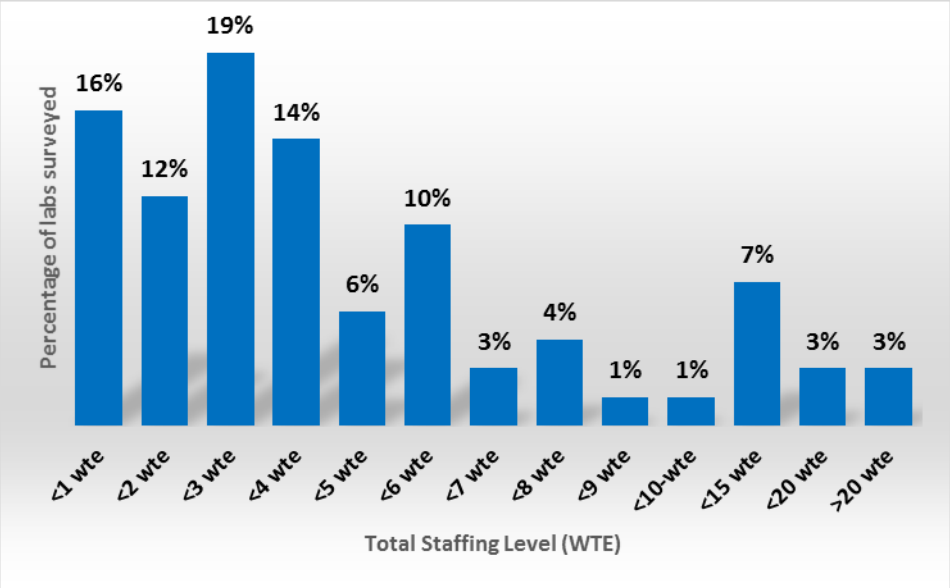


Figure 4 shows that there are many services operating with small staffing levels. 16% of services employed less than 1 WTE staff and 61% of services had less than 4 WTE. The ARTP Survey 2012 (1) showed that 69% of services were run with less than 4 qualified staff members.

The potential impacts of small staffing levels may result in lack of clinical cover for periods of sickness, annual leave and CPD, and over-reliance on agency staffing.

4. Workload and Waiting Times

The tests performed in clinical physiology departments are important for the diagnosis, monitoring and exclusion of diseases. It is therefore essential that diagnostic tests are performed in a timely manner.

The NHS Constitution (2) is that patients are diagnosed and treatment is initiated as soon as possible. It is a legal duty to start non-emergency NHS consultant-led treatment within a maximum of 18 weeks from the point of referral. Diagnostic tests therefore form a very important part of this 18-

week pathway and any delays in diagnostics can adversely affect this pathway impacting on the quality and service offered to patients.

Information - Waiting Time Data Collection

- Diagnostic tests should be performed as soon as possible and within 6 weeks of referral. In addition to the 18-week pathway, patients with suspected cancer should be seen by a specialist within 2 weeks of referral.
- Further details of waiting time data collections are available at www.england.nhs.uk. In Wales, the maximum wait for access to diagnostics is set at 8 weeks (www.wales.nhs.uk). Waiting time guidance for Scotland can be found at www.isdscotland.org.

Two thirds of departmental service managers felt that they had inadequate staffing levels within their service and 31% of services reported regular breaches of 6 week waiting list targets (Table 9).

Table 9: Perception of Staffing Levels and Breach of Waiting Time Targets

Adequate Staffing Levels?	n (%)	Regularly Breach 6 week waiting times?	n (%)
Yes	24 (34%)	Yes	5 (21%)
		No	19 (79%)
No	46 (66%)	Yes	17 (37%)
		No	29 (63%)

There were several comments received relating to the use of agency staffing: for example, to cover staff absence or to run additional clinics and these are shown below (Comments Panel 1). Additionally comments were made relating to a lack of administrative staff, leading to physiology staff undertaking administrative roles including booking and scheduling of patient appointments (Comments Panel 2).

A short survey carried out in 2012 showed that 28% of respiratory and sleep departments had no dedicated administrative support (3). It is essential that physiology services have administrative support and it is not efficient use of skilled staff time to be diverted from clinical duties.

Comments Panel 1: Comments Relating to Locum/Agency Usage

- *'Trust does not allow locum except for medical staff, trust received criticism for this in recent CQC inspection.'*
- *'We have 3 Locums at Band 6/7.'*
- *'Often have no choice but to use agency staff due to difficulties recruiting experienced staff (who are working for agencies).'*
- *'We continually book extra patients on a list or extra lists using locum staff to prevent breaches.'*
- *'Agency staff to cover maternity leave.'*
- *'We are very dependent on locum cover. Our biggest limiting factor is a lack of rooms; we have to borrow space from Outpatients when there is space available.'*
- *'Agency cover for sick leave.'*
- *'We have used locum prior to recruitment for sleep waiting list.'*

Comments Panel 2: Comments Relating to Administrative Support

- *'We suffer from lack of administration support. As clinicians we have to make our own appointments, type clinic letters and code/attend our clinics.'*
- *'Have no administration, a large amount of work alongside clinical commitments.'*

Waiting Times for Non-Urgent Investigations

Table 10 shows a wide variation in waiting times for all non-urgent diagnostic procedures and interventions. The shortest (median) waiting times reported were for spirometry testing (3 weeks) and all median wait times were less than 6 weeks. Figure 5 and Table 10 show the median waiting times for respiratory and sleep procedures.

However a significant percentage of services were reporting wait times over 6 weeks (Figure 6 and Table 10), suggesting that some services may be under-resourced with regard to staffing levels and/or equipment availability. For respiratory investigations; full lung function, challenge and cardiopulmonary exercise testing, 23.5%, 22% and 19% of services respectively were breaching 6 week waiting time targets for non-urgent investigations. This will impact on timely diagnosis and management of patients, including having the potential to postpone or delay surgical procedures.

For sleep investigations/treatments; multi-channel sleep studies, overnight oximetry, polysomnography and CPAP/NIV issue showed 24%, 18.5%, 20% and 17% of services were breaching 6 week waiting time targets. One service reported 100 week waits for sleep investigations (this was verbally verified as accurate).

Table 10: Waiting Times for Respiratory and Sleep Procedures

Procedure		Median Wait (weeks)	Range (weeks)	IQR (weeks)	% services reporting >6 week wait
Full Lung Function	*(n = 68)*	5	0 – 25	3 – 6	23.5%
Spirometry	*(n = 65)*	3	0 – 12	2 – 5	6%
Cardiopulmonary Exercise Testing	*(n = 31)*	4	1 – 24	2 – 6	19%
Walk Tests	*(n = 54)*	4	0 – 12	3 – 6	9%
Sleep Study – Multichannel	*(n = 45)*	5	0 – 100	3 – 6	24%
Sleep Study – Overnight Oximetry	*(n = 53)*	4	0 – 20	2 – 6	18.5%
Sleep Study – Polysomnography	*(n = 10)*	4	1 – 10	3.25 – 5.75	20%
Allergy Testing	*(n = 34)*	4	0 – 22	3 – 5	11%
Challenge Testing	*(n = 50)*	4	2 – 24	3 – 6	22%
Oxygen Assessment	*(n = 25)*	4	0 – 7	2 – 5	4%
CPAP / NIV issue	*(n = 36)*	4	0 – 20	2 – 6	17%
Respiratory muscle assessment	*(n = 52)*	4	0 – 15	3 – 6	13%
Other tests > 30 minutes*	*(n = 34)*	4	0 – 30	3 – 6	29%
Other tests < 30 minutes**	*(n = 45)*	4	0 – 12	2 – 6	13%

**includes bronchodilator assessments* ***excludes spot pulse oximetry*

Figure 5: Median Waiting Times (in Weeks) for Respiratory and Sleep Investigations

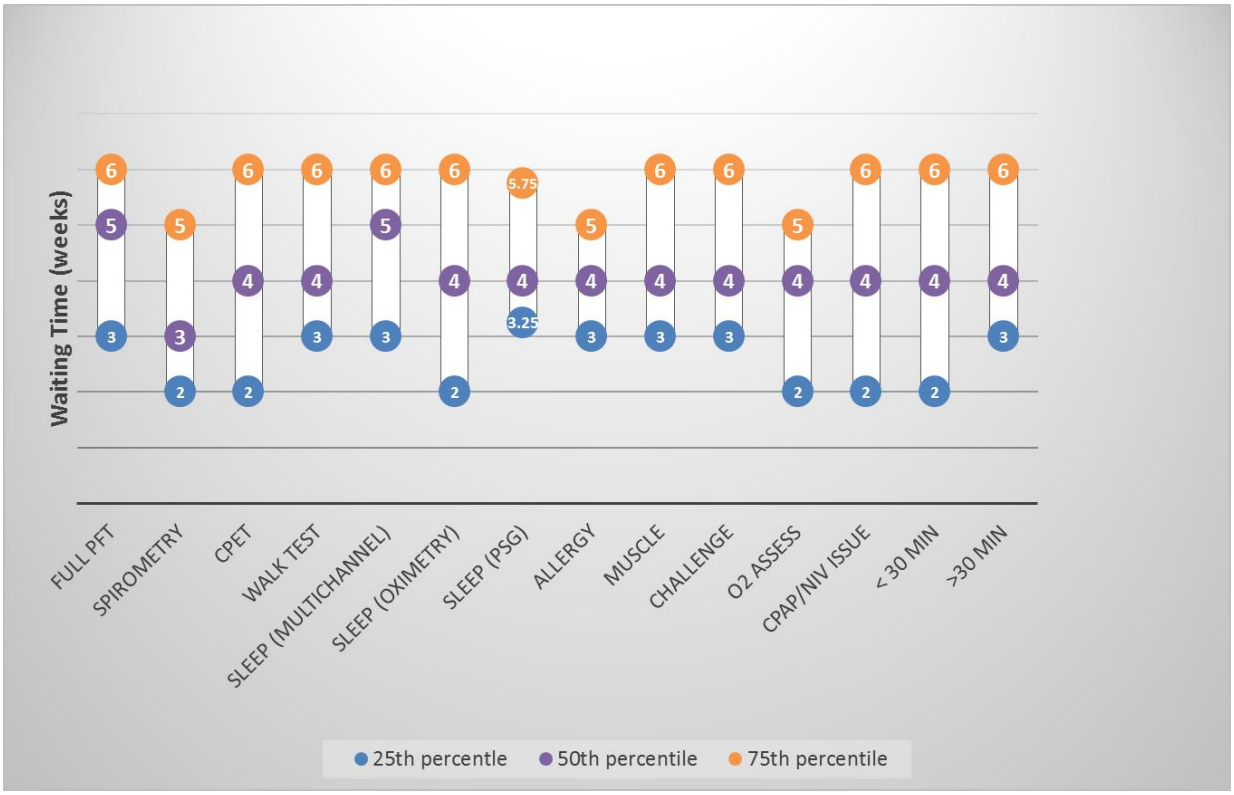
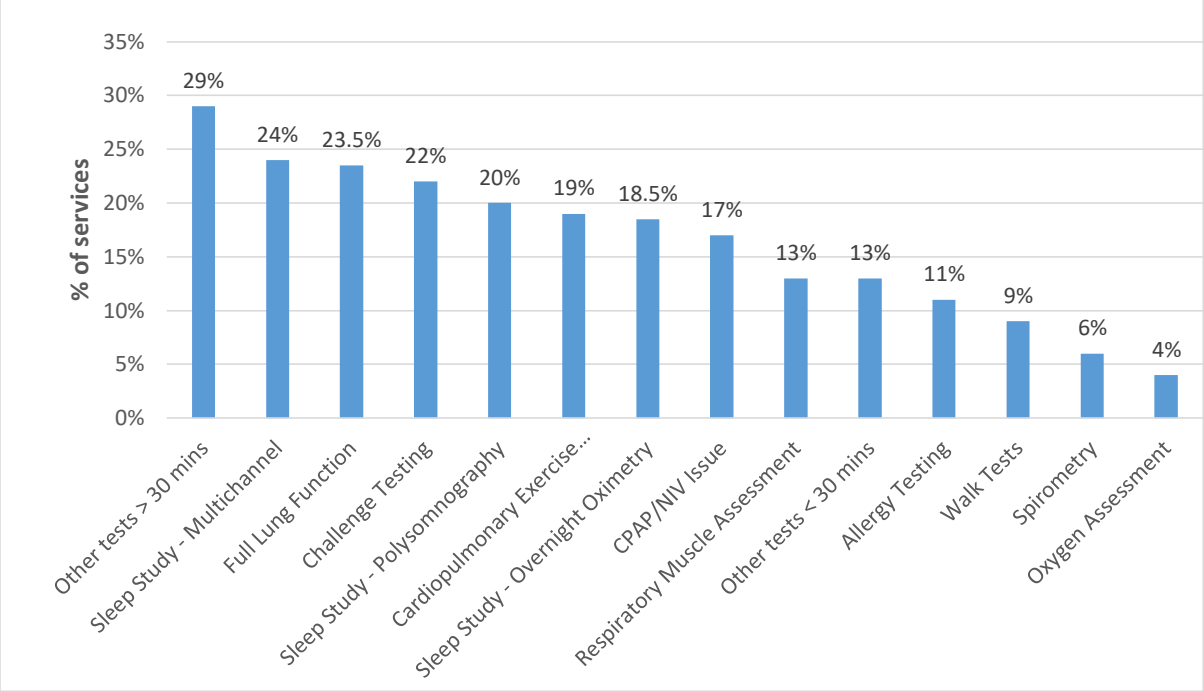


Figure 6: Services Reporting Wait Times >6 Weeks for Non-Urgent Investigations



In 2005 the ARTP Survey (4) looked at waiting time data for respiratory and sleep diagnostics. This survey had a good response rate (91%), and concluded that, at the time, waiting times did 'not seem too bad in the current climate' but recomended a need to improve these to meet waiting list targets. This report also noted concern over waiting times for sleep investigations.

Table 11 summarises the data from the ARTP 2005 and the data collected from this survey (2015).

Table 11: Comparison of Median (and IQR) Waiting Times (in weeks)

	2005		2015		
Procedure	**Median**	**IQR**	**Median**	**IQR**	**Trend**
Full Lung Function	3.5	2 - 5	5	3 - 6	↑
Spirometry	2	1 - 4	3	2 - 5	↑
Challenge Testing	4	2 - 6	4	3 - 6	↔
CPET	4	2 - 6	4	2 - 6	↔
Walk Tests	2.5*	0 - 4*	4	3 - 6	↑
Overnight Oximetry	2	0 - 4	4	2 - 6	↑
Multi-Channel Sleep	6	3 - 11	5	3 - 6	↓
Polysomnography	10	5 - 22	4	3 - 5.5	↓
CPAP	6	3 - 12	4	2 - 6	↓

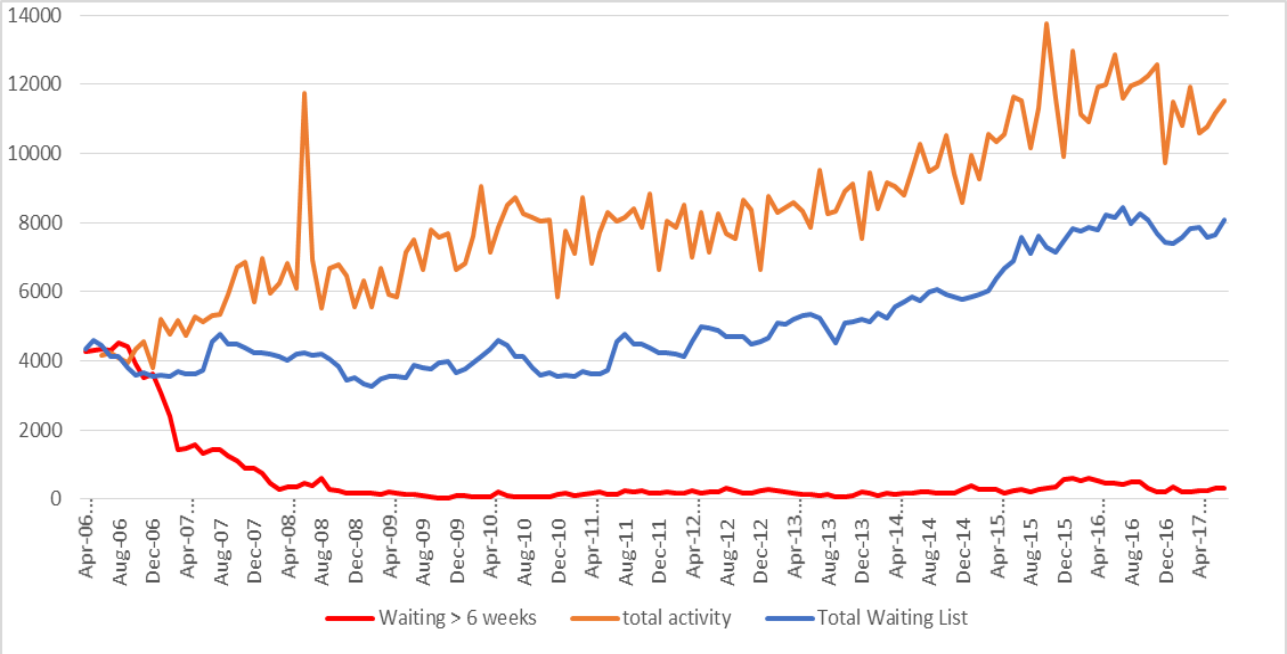
**Relates to 6MWT*

The data indicate that there has been an increase in waiting times for lung function testing, spirometry and walk tests from 2005. There is an increase in waiting times for overnight oximetry sleep studies and a reduction in wait times for polysomnography. Data for reported workloads in Table 13 indicates that services are moving away from hospital-based studies to performing more cost-effective domicillary multi-channel sleep studies to meet increasing demand and manage waiting lists. The waiting time for multi-channel studies has also reduced. (However it has to be

noted that no pure sleep services responded to the 2015 survey which will skew the data on polysomnography.)

Data from NHS England monthly data collections (5) confirm an increase in sleep study workload between 2006 and 2017. Interestingly, despite the increase in diagnostic activity, the number of patients waiting has steadily increased.

Figure 7: Monthly Diagnostic Waits Census – Sleep Studies



Data from NHS England monthly waiting time submissions are shown in Figure 7. This shows that the number of sleep studies undertaken from 2006 to 2017 has continued to increase and at the same time there has been an increase in demand for sleep diagnostics. The increase in demand and activity over this time period is greater than 70%. There are several possible reasons for this increase, including:

- Increased awareness of obstructive sleep apnoea syndrome (OSAS) in primary and secondary care resulting in more studies being undertaken.
- Response to waiting list targets to reduce wait times for sleep studies to less than 6 weeks. (Sleep study activity and waiting times are the only respiratory procedures reported to the Dept. of Health on a monthly basis hence are monitored by Trust management.)
- More patients on treatments/interventions for OSAS and therefore requiring further studies to assess effectiveness.
- Increasing numbers of respiratory consultants. Additionally sleep studies are commonly being requested by other specialities, including ENT, cardiology, neurology, bariatric medicine etc.
- A move from polysomnography studies to less complex and more cost effective screening tests.
- Increases in obesity in children and adults.

Interestingly, the waiting time comparison data (Table 11) shows a fall in waiting times for CPAP issue, which may be a response to the NICE technology appraisal guidance recommending CPAP treatment for moderate to severe OSAS, published in March 2008 (6).

Key Points

- Waiting times for lung function testing, spirometry and walk tests have increased compared to data collected in 2005. Wait times for overnight oximetry have increased, but polysomnography wait times have decreased.
- Two thirds of service managers felt they had inadequate staffing levels.
- 31% of services reported regular breaches of 6 week waiting time targets.
- Services are using locum/agency staff to manage workload, run additional clinics and to cover periods of absence.
- A large percentage of services are breaching 6 week waiting time targets for non-urgent respiratory and sleep investigations. This includes 24% of services undertaking multi-channel sleep investigations or full lung function testing.
- In 2012, 28% of respiratory and sleep physiology services report no dedicated administrative support to support their clinical services. Services therefore rely on skilled physiology staff to schedule appointments.
- Data from NHS England shows that waiting times for respiratory physiology procedures are increasing.

Recommendations

- All services should have a process for vetting of referrals. Inappropriate referrals should be discussed further with referring clinicians/health care professionals.
- Service leads should regularly discuss waiting times with service managers and lead clinicians/directors to agree robust and long-term waiting list action plans if appropriate.
- Annual business planning should address long-term solutions to manage waiting times. This includes review of staffing levels, skill mix, equipment availability and adequate environment. Business planning should incorporate the need for administrative staff where required.
- Respiratory/Sleep services must be involved in business planning for the introduction of new services that impact on workload.
- Respiratory/Sleep services should be aware of tariffs payable for some respiratory and sleep diagnostic investigations and that activity is coded correctly. More information on tariffs is available (7,8).
- Increased waiting times should be included within departmental and Trust risk registers.
- ARTP should develop costing tools to assist services in business planning for new services.
- ARTP Sleep should provide guidance of new innovations to manage CPAP follow-up. (ARTP Sleep are currently updating CPAP Standards of Care documents to include guidance on long term CPAP treatment and Telehealth).
- ARTP should promote innovation and good practice in service delivery, design and innovation, to facilitate sharing of good practice across physiology services.

Annual Workload

Table 12 shows the annual workload for respiratory and sleep diagnostic investigations. Large variability in the number of tests is seen across different services. As expected, full lung function testing and spirometry make up the majority of workload performed within respiratory physiology services.

Table 12: Annual Workload (No. of Procedures)

Procedure		Median	Mean	IQR	Range
Full Lung Function	*(n=70)*	1716	1997	1200 - 2112.5	378 - 7500
Spirometry	*(n=67)*	985	1822	214 - 2256	5 - 11500
Cardiopulmonary Exercise Testing	*(n=31)*	100	181	65 - 264	10 - 880
Walk Tests	*(n=57)*	72	197	40 - 246	1 - 1500
Sleep Study – Multichannel	*(n=47)*	270	417	108 - 465	10 - 2124
Sleep Study – Overnight Oximetry	*(n=57)*	480	588	150 - 800	15 - 2500
Sleep Study – Polysomnography	*(n=10)*	98.5	141	21.25 - 164.5	6 - 520
Allergy Testing	*(n=36)*	56.5	83	28 - 100	3 - 400
Respiratory Muscle Assessment	*(n=61)*	48	84	25 - 100	2 - 588
Challenge Testing	*(n=55)*	46	70	22.5 - 90	6 - 314
Oxygen Assessment	*(n=26)*	275	380	50.75 - 500	2 - 1697
CPAP / NIV issue	*(n=39)*	245	318	110 - 351.5	2 - 1560
CPAP/NIV Follow-up	(n=37)	664	1445	400 - 1571	2 - 7640
Other tests > 30 minutes	*(n= 36)*	50	186	20 - 100	4 - 1782
Other tests < 30 minutes	*(n= 56)*	338	743	107 - 608	1 - 5375

Table 13: Comparison of Mean Diagnostic Workload (2005 versus 2015)

	2005	2015	Change over 10 years	Estimated Annual Increase
Full Lung Function	1250	1999	+60%	6%
Spirometry	1246	1822	+46%	5%
Cardiopulmonary Exercise Testing	100	181	+81%	8%
Walk tests	98.5	197	+100%	10%
Sleep Study - Multichannel	190	417	+119%	12%
Sleep Study – Overnight Oximetry	256	588	+130%	13%
Sleep Study - Polysomnography	130	141	+8%	1%
Bronchial Challenge Testing	38	70	+84%	8%
CPAP Issue	173	318*	+84%	8%

**includes NIV*

The data in Table 13 comparing previous ARTP surveys suggest that mean departmental workload has shown significant increases between 2005 and 2015. The largest increases in workload have been seen in sleep investigations with overnight oximetry and multichannel studies showing 130% and 119% increases respectively (i.e. more than doubled). Increases in departmental workload may be due to many factors, including meeting waiting list targets. Additionally in sleep physiology, the number of patients diagnosed and treated with sleep apnoea within services will increase annually.

Increases in workload were also observed in walk tests, cardiopulmonary exercise testing and bronchial challenge testing. This may be due to increased use of CPET as a pre-op tool, walk testing being used for oxygen assessments and pulmonary rehabilitation, and challenge testing being promoted in asthma guidelines.

Increases in departmental workload may also be due to increases in the number of respiratory consultants over the same time period (2005-2015). The Royal College of Physicians (RCP) conduct an annual census which includes data collection on consultant numbers. (9). Data shows that the number of respiratory consultants in the United Kingdom has increased by 81% from 697 in 2005 to 1265 in 2015. Over the same period data in Table 13 shows a similar increase in diagnostic workload however, according to ARTP Survey data (1), the physiologist workforce only increased by an estimated 2.2% per year; not keeping pace with the increase in consultants.

Table 5 showed that respiratory consultants, as expected, are the main source of referrals to lung function departments, so it is reasonable to assume that the large increases in workload seen are due to increasing consultant numbers. It is essential that increases in consultants are matched by increases in the physiology workforce.

Services should ensure that increases in their workload are monitored and business planning identifies the requirements for additional staffing, equipment and facilities. New services or expansions to existing services should be adequately resourced. Business planning should also consider the impact of the publication of new guidelines on the workload of the service.

Figure 8: Median Annual Workload for Main Respiratory Investigations

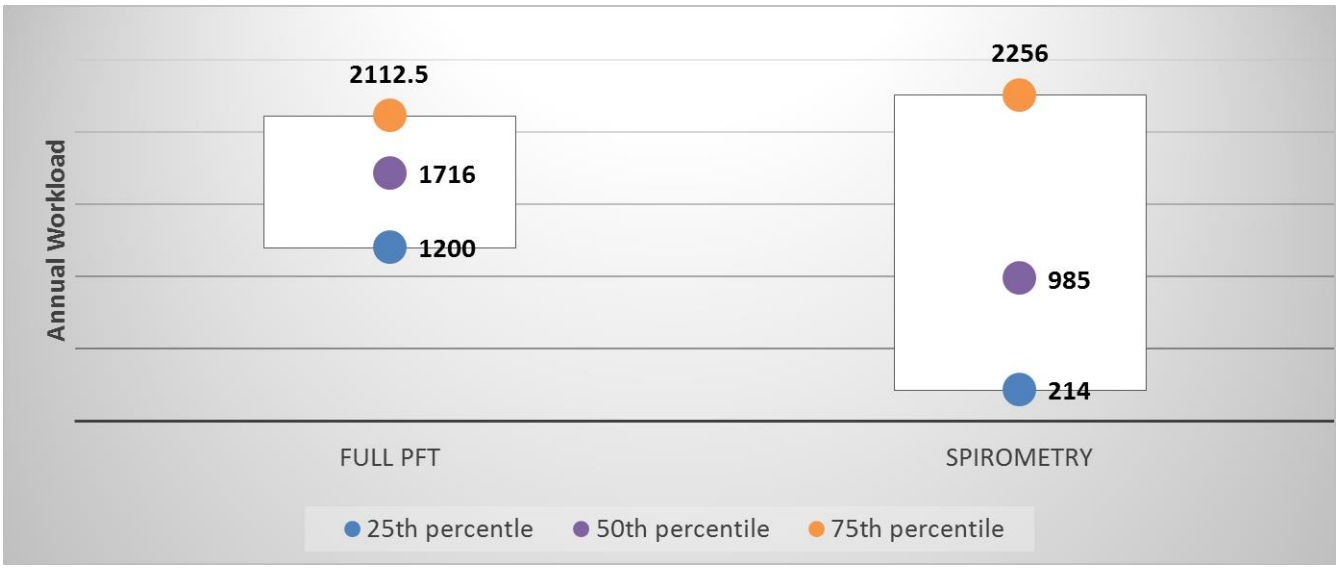


Figure 9: Median Annual Workload for Other Respiratory Investigations

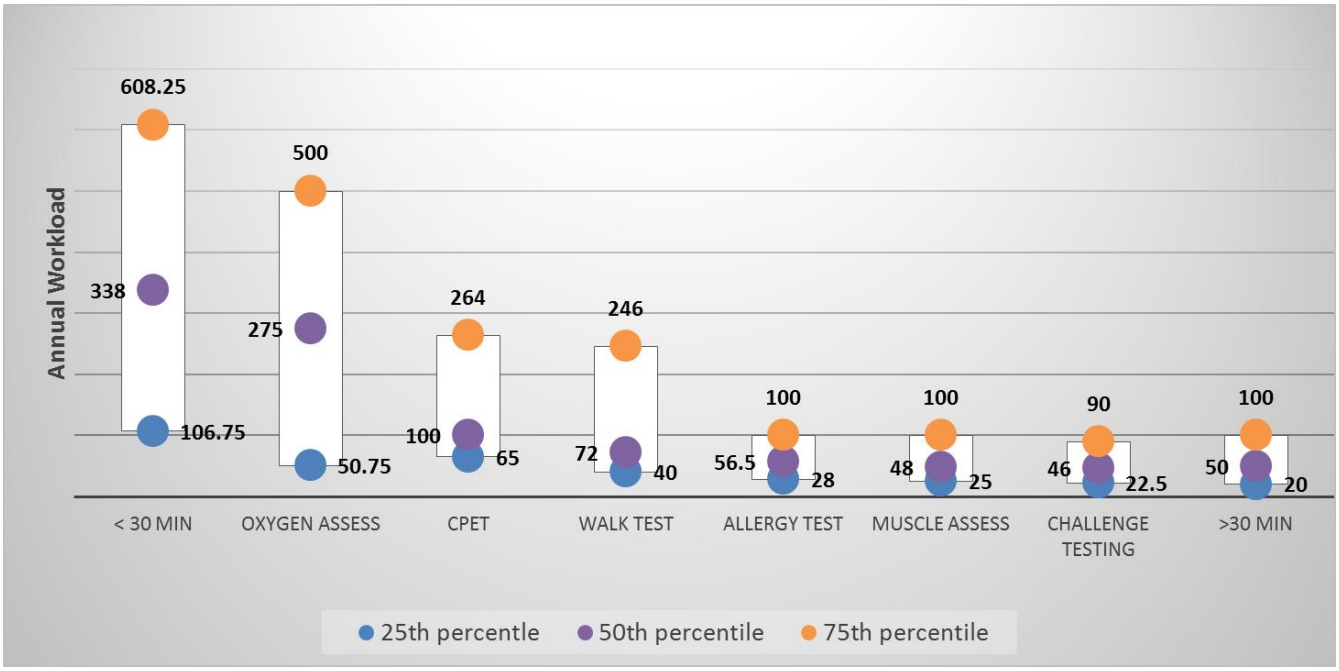
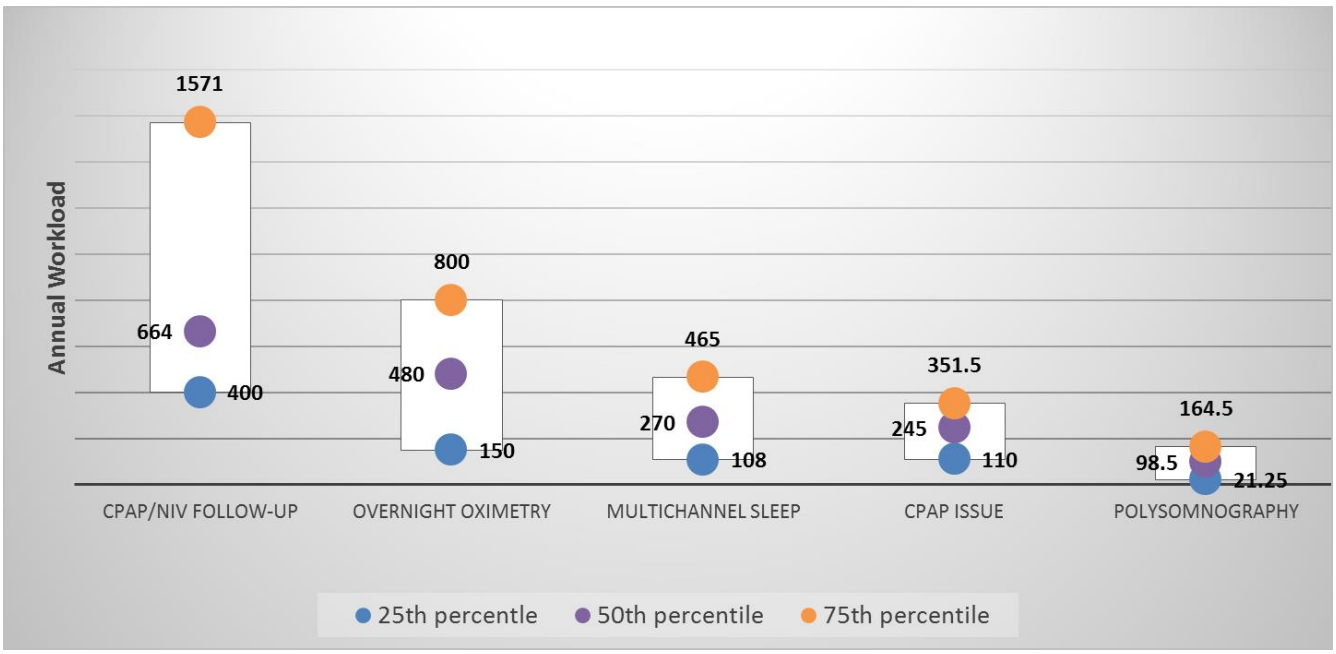


Figure 10: Median Annual Workload for Sleep Investigations



In addition to investigations and interventions being undertaken by physiologists/scientists, some services reported investigations performed by other healthcare professionals including physiotherapists, anaesthetists, cardiology services and specialist nurses hence some services may have over-reported the activity delivered by the physiology workforce. This is highlighted in Comments Panel 3.

Comments Panel 3: Performance of Diagnostics by Other Healthcare Professionals

- *'The NIV service is run by 1.6 WTE Physiotherapists.'*
- *'Oxygen assessments done by resp nurse team.'*
- *'CPET performed by Anaesthetics due to restrictions in department size/staffing. Sleep clinics, allergy tests & most walk tests performed by clinic nurses.'*
- *'Most of the sleep work in our trust is completed by CNS.'*
- *'Resp nurses cover the oxygen assessments.'*
- *'Sleep service consultant / nurse specialist also issue replacement consumables (masks, etc.) as part of daily tasks.'*
- *'Physios perform ambulatory oxygen assessments.'*
- *'CPET done by cardiology only.'*

Key Points

- There is wide variability in the annual workload between different services. However, full lung function testing and spirometry accounted for the bulk of the workload.
- Investigations may be performed by other healthcare professionals including clinical nurse specialists and physiotherapists, in addition to physiologists.
- Comparison of mean departmental workload between 2005 and 2015 shows that departmental workload has increased. Large increases in workload were seen in lung function testing, walk tests, cardiopulmonary exercise testing, bronchial challenge testing and sleep investigations (oximetry and multichannel).
- Increases in workload in respiratory/sleep services may be due to many factors, including:
    - Waiting list initiatives
    - Publication of guidelines recommending the use of diagnostic tests in the diagnosis, monitoring and treatment of disorders
    - Increased numbers of respiratory consultants. (81% between 2005 and 2015)
    - Ageing population, rising obesity, complex comorbidities
- NHS England monthly data collections for sleep studies have shown a continual increase in the number of sleep studies performed between 2006 and 2017.

Recommendations

- Services should ensure that increases in their workload are monitored and business planning identifies the requirements for additional staffing, equipment and facilities. New services should be adequately resourced.
- There are opportunities for services to engage in multidisciplinary working.

5. Prediction of Required Staffing Levels

Predicting the staffing numbers and appropriate grades needed to support a clinical service is complex and will be affected by many variables. Ultimately decisions will be affected by local circumstances and so decisions will need to be made locally about how to deliver the service; maintaining quality standards, satisfying demand and maintaining waiting times. In addition to clinical work additional time needs to be allocated to undertake other tasks including administrative duties, CPD, quality assurance, research/audit & innovation, staff meetings and infection control programmes.

Consultant/Physiologist Ratio

In the past one suggested approach was to look at the number of qualified physiology staff in each service and compare that with number of respiratory/sleep consultants. Figure 11 shows the relationship (excluding paediatric and specialist centres) of WTE between number of qualified physiologists and respiratory/sleep consultants, however the statistical correlation is not very strong ($r = 0.68$).

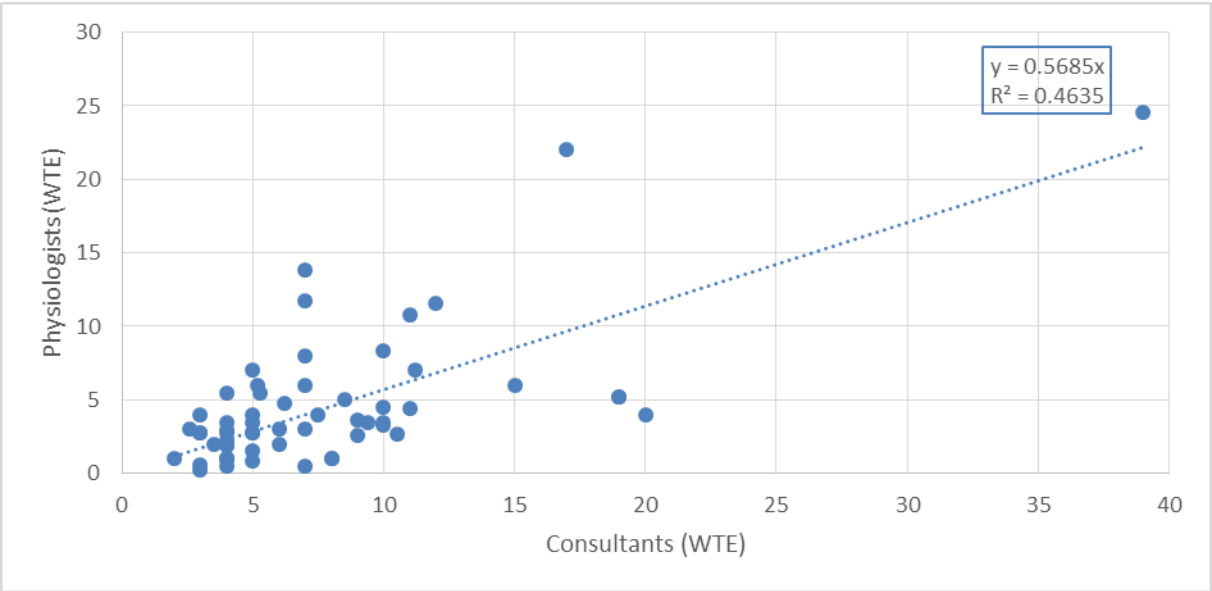
The median WTE for physiology staff (qualified & unqualified) and respiratory/sleep consultants was 3.3 and 5.65 respectively. So, according to this survey sample, the ratio of physiology staff to number of consultants is 1:1.7 which would suggest 0.59 WTE physiologists per consultant post.

Decisions around physiology staffing levels need to be made locally as many factors can affect workload, including individual clinician referral patterns (anecdotally younger consultants are more likely to order more tests) and job plans (not all consultants job plans will be 100% respiratory).

Services also need to factor in service continuity to take into account annual leave, CPD and unplanned absence (for example a small department could not run on one physiologist as the service would cease whenever the individual goes on any period of leave).

However, this ratio might be useful as a rule of thumb to aid in business planning when additional respiratory/sleep consultants are recruited, as this will inevitably be in response to increasing workload and have a consequential impact on workload and waiting times.

Figure 11: Physiology Staff compared with Respiratory/Sleep Consultants (WTE)

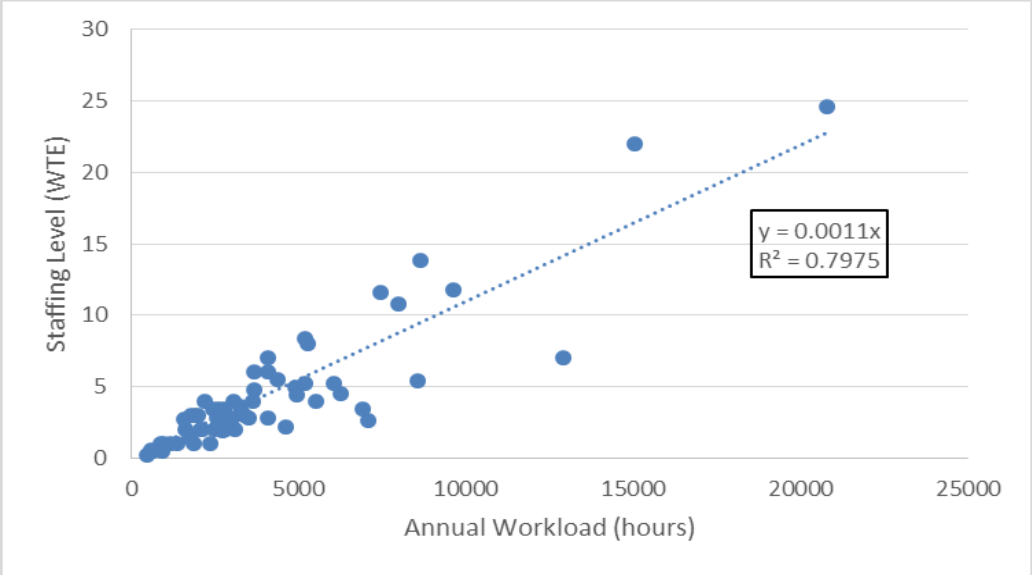


Physiologist Numbers Based on Total Annual Workload

A stronger correlation was found by looking at physiology staffing levels and comparing it to the reported departmental workloads. This was done by calculating total departmental annual workload for each service (in hours) and comparing this to the reported staffing levels.

Figure 12 shows this stronger correlation (r = 0.89) between total annual workload hours and staffing levels (WTE) when compared with using consultant numbers. The relationship between annual workload and staffing numbers appears stronger in the departments with smaller annual workloads (most likely the "typical" respiratory/sleep physiology department) whereas departments with larger staffing numbers may have staff undertaking a wider range of roles, not directly related to clinical duties, including managerial, research or academic roles. Nearly half of services responding to the survey (48%) reported total annual workloads less than 3000 hours, with 74% of services reporting less than 5000 annual workload hours.

Figure 12: Staffing Levels compared with Annual Workload



Appendix 3 shows the amount of time allocated for diagnostic/therapeutic procedures that were used in the calculation of annual workload. (Specialist services and paediatric only services were excluded which have more specific staffing requirements that may have skewed the calculation.)

By calcuating total annual hourly workload, an ***estimation*** of the number (WTE) of physiologist staff (Physiologist Staff Estimate = PSE) required can be derived from the following equation:

Physiologist Staff Estimate (in WTE) = (0.0011 * annual hourly workload)

6. The Workload & Staffing Toolkit

A manual work-through of the calculation of Physiologist Staff Estimate for a departmental workload is shown in Appendix 4. However to make it easier to compile and compare different workload & workforce models the Workload & Staffing Toolkit (an Excel workbook) has been designed incorporating these principles.

The Toolkit allows the direct comparison of 3 different scenarios so that users can enter different activity data and workforce skill mixes to explore departmental data and how it might change to adapt to proposed workload or staffing changes over time.

Appendix 5 describes the how the Toolkit can be used and Appendix 6 gives detailed guidance on how to use it.

The Workload & Staffing Toolkit can be downloaded from the ARTP website (See ARTP Reports).

Validating the Workload & Staffing Toolkit

A prototype of the Toolkit (similar to the method described in Appendix 4) was completed by a few labs and feedback gathered. Initial responses showed that, although seeming to be fairly accurate, it usually resulted in an under-estimation of the actual workforce within the department.

Because the survey only sampled the physiologist time spent performing clinical procedures the PSE can only be applied to those elements of the departmental workload. However there are many other tasks that are directly related to testing but are not part of the actual testing time (e.g. equipment cleaning, quality control and assurance, audit & research, managerial duties, administrative tasks like booking appointments, stock ordering, mandatory training and possibly many others depending on local circumstances).

It was felt that to get a more accurate picture those other elements of departmental life needed to be accomodated so a separate section was added to the toolkit to be able to reflect these 'overheads'.

The data in this 'overheads' section is entered as duration and frequency of a task: hence a task that is done weekly will occur on 52 weeks of the year, a monthly task 12 times a year and a yearly task will only occur once a year. However an individual is not available 52 weeks of the year because they will take leave. This is accounted for by applying a factor ('Working hours per person per year' on the spreadsheets) which assumes an average of 35 days absence per person for annual leave and public holidays.

The data in the example shown at Appendix 5 is real data; after adding in the 'Overheads' section the toolkit predicted 3.51 WTE for this department which has an actual establishment of 3.43 WTE.

Comments Panel 4: Validation Feedback

Version 1 – 'Prototype'

- *'Really easy to use – I think it is great.'*
- *'Very useful to compare the differences the various tests/reviews make to the overall total and skill mix type. I think I would separate the CPAP and NIV purely because it requires a higher level of expertise for NIV and more time especially those with progressive disease.'*
- *'Part of a service requires senior staff (e.g. >Band 7) to work 50% clinical and 50% managerial/admin/research and it may be worth adding this for transparency and encouragement to complete these aspects of the role.'*
- *'Is there a way of including other duties? meetings, etc.'*
- *'Have been trying to find a document with this information for some time, as I am working on a feasibility case for another physiologist.'*
- *'The time spent doing admin work and service improvement is not reflected on the worksheet. Would be good to have a space to input all the admin (referrals management, phone calls, emails, stock control).'*
- *'I don't know if it takes account of a maximum predicted workload, or just the tests that have been performed plus, for instance, leave and training times or just the tests that have been performed plus, for instance, leave and training times.'*

Updated Version

- *'I really like the option of adding our own tasks.'*
- *'Very easy to use and populate.'*
- *'It has supported our "feel" for the deficiency in our current staffing and I am keen to share this with our department manager and service lead.'*
- *'I think we forget how much time we should give to other duties and it is good to see this part worked out too.'*
- *'The toolkit makes good sense and I am surprised the model is not used currently and could be adapted for other services.'*

Interpreting the Toolkit Results

It is suggested that you use the default procedure timings for your initial analysis, the survey data was collected from working labs and the PSE was calculated from that sample. The default timings should therefore reflect general practice in respiratory & sleep physiology departments.

If your estimated vs actual WTE differs (especially if the estimated is significantly greater than actual) something may need adjusting in your model. If your estimated WTE comes out significantly lower than your actual WTE using the default timings (i.e. you should have more than enough staff to satisfy your workload yet you are still struggling with capacity) you may need to examine your local practice and benchmark how you perform tests against other labs.

Ultimately the toolkit will only be as accurate as the data that is entered and this does need to reflect your local practice. The guidance in Appendix 6 explains how you can edit the spreadsheets to do this.

Potential Inaccuracies With Procedures …

- Are you confident that your activity data is accurate (anecdotally many labs don't seem to have direct access to their activity figures which might be compiled outside the department, e.g. in coding).
- Have you been accurate & honest about the time taken to perform tests?
- The procedure times used should not be appointment time but actual physiologist time utilised. So procedure time does not just include time spent with the patient it should also include any time spent 'prepping' for the test, for example, any subsequent report generation and equipment setup/dismantling.
- You should include 'prep-time' in tests where it is done for each test. When it is done for a batch of tests you can either add an average time to the test time or perhaps include it as a separate 'overhead' time.
- Tasks performed weekly or daily, such as cleaning & quality assurance procedures would be better included in the 'overhead' section.
- Are you testing more than one patient at a time? If you test one patient for spirometry and then spirometry on a second patient while waiting for bronchodilators to take effect the overall physiologist's time may be overestimated if you are considering them to be two separate procedures (perhaps calculate an average time for the procedure taking this into account). This may also apply if, for example, group sessions are run to issue sleep equipment.

Potential Inaccuracies With Staffing …

- Make sure that the departmental workload that you are 'mapping' is performed by the workforce you are examining.
- If your department has a staffing component that is involved in other activities e.g. research or is a multi-disciplinary team e.g. cardio-respiratory you will need to work out how much of your workforce is actually dedicated to respiratory clinical testing and likewise how much of any 'overhead' factors are attributable to supporting the respiratory element of your departments work.
- Some activities may be being performed by respiratory nurse specialists or physiotherapists rather than healthcare scientists (See Comments Panel 3). Are these part of the workforce you are looking at?
- Don't forget to add in any administrative needs, and whether this function is being performed by administrative or clinical staff. (Remember if you are plotting an increase in workload it is likely that there will be a corresponding increase in appointments and other paperwork.)
- Does the WTE of your funded establishment reflect the actual WTE worked? Many individuals work over their allocated hours on a regular basis (77% of science & technical staff reported working extra hours in the 2016 NHS Staff Survey (10)).

Key Points

- The Workload & Staffing Toolkit makes it simple to apply the principles discussed in this paper and is available to download from the ARTP website.
- Feedback helped to refine the toolkit and validators found it easy to use.
- Users need to be confident that the data used is accurate.
- Make sure that the departmental workload that is being 'mapped' is performed by the workforce being examined.
- The Scenarios within the Toolkit can be used to help project staffing requirements resulting from changes in demand.

Recommendations

- The estimations of staffing levels need to be refined and ARTP Workforce Committee needs to do further work to establish the working patterns ('job planning') of different grades.

7. Involvement in Service Planning

Unfortunately, physiology departments are not commonly involved in planning discussions when Trust's recruit additional respiratory consultants. Table 14 and show that 89% of physiology services were not consulted prior to the recruitment of new respiratory and sleep consultants. This is surprising, especially as respiratory/sleep consultants have the greatest impact on departmental workload and will require support from the physiology department.

As discussed earlier, there was an 81% increase in respiratory consultant numbers (2005-2015), so it is essential that physiology services are consulted and incorporated into new consultant appointments.

Table 14: Planning for Recruitment of Additional Consultants

Is the service involved in the planning for recruitment of additional respiratory/sleep consultants?	**n (%)**
Yes	6 (8.6%)
No	62 (88.6%)
No Consultants Recruited	2 (2.8%)

Key Points

- 88% of departments **are not involved** in discussions or planning when additional respiratory and sleep consultants are recruited. This has the potential to impact on increased workload and waiting lists for physiology departments.
- Respiratory/Sleep consultants are the major source of referral to respiratory/sleep services.

Recommendations

- Respiratory service managers should be involved in business planning as part of the process for recruiting additional respiratory/sleep consultants.
- ARTP should raise this issue through its engagement with the ARTP/BTS liaison committee to promote and raise awareness of the importance of including respiratory/sleep services as part of new or additional clinician recruitment.

8. Summary

Median data (Table 10 and Figure 5) shows that most services are undertaking non-urgent diagnostic investigations within 6 weeks, however, there were many services that reported wait times over 6 weeks (Table 10 & Figure 6). Some respiratory/sleep services are under pressure to meet waiting list targets, and this may be due to reduced staffing levels, insufficient numbers of qualified staff and/or unfunded increases in workload.

Workload is only expected to continue to rise in respiratory/sleep physiology departments as people are living longer and trends in obesity are increasing. There are 550,000 new diagnoses of lung disease in the UK per annum, placing huge burdens on healthcare services. Around 200,000 people live with obstructive sleep apnoea in the UK and the prevalence is increasing. Nearly 20,000 new diagnoses are made in primary care per year, in addition to diagnosis in secondary care. It is estimated that 80% of cases remain undiagnosed (11).

It is therefore essential that all respiratory/sleep diagnostic services are involved in service delivery, design and business planning, (including demand and capacity) to be able to meet current and future pressures. Additionally, services providing therapeutics (e.g. CPAP, LTOT etc.) should have plans for staffing levels to reflect year on year increases in the number of patients receiving treatment and requiring access to follow-up clinics etc.

'Medical Care' is a web based plan launched by the Royal College of Physicians (RCP) in 2017 to assist in the planning and provision of services. The respiratory specialist information was produced in partnership with the British Thoracic Society (BTS). This states that the resources required in a respiratory unit includes a fully equipped and staffed lung function laboratory to perform both routine and highly specialised investigations. The plan also highlights the need to have secure funding for CPAP and the ongoing technical and clinical support required (12).

With rising waiting times failure to properly plan for future demand and capacity could lead to incidences of stress in its workforce which physiology services will need to monitor and manage. A GMC report (13) identified increased stress levels in doctors, related to increasing workloads, reduced trainee numbers and reduction in budgets. Similar patterns may therefore be seen in the healthcare science workforce, and may be more likely in smaller departments. In October 2014, NHS Employers issued guidance on the prevention and management of stress at work (14).

The government plans to introduce seven-day NHS services by 2020. One of the drivers for this is to ensure that patients in need of hospital care at the weekends get the same quality care as they would during the week. This would have to include providing access to important diagnostic tests that facilitate clinical decision-making and facilitate discharge. Currently, many important diagnostic tests are not available at weekends. Again, service managers should be actively involved in any planning for seven day services to ensure staffing levels are appropriate.

In 2010, changes in educational training routes for healthcare scientists were introduced under Modernising Scientific Careers (MSC). MSC was introduced as a UK wide education and training strategy for the healthcare science workforce. Key underlying principles of MSC include the standardisation of education and training programmes, to inform workforce planning and to ensure the healthcare science workforce meets the future service needs of patients. MSC programmes include the Practitioner Training Programme (PTP) at undergraduate level and the Scientist Training Programme (STP), which is at postgraduate level. The PTP and STP programmes are essential for providing the future clinical workforce in respiratory/sleep physiology and it is essential that services support the delivery of these programmes and liaise with Higher Education Institutes (HEIs) to offer clinical training placements.

Adequate and appropriate staffing in diagnostic services is essential to provide a quality service, a positive patient experience and correct outcomes directly affecting patient pathways.

Improving Quality in Physiological Services (IQIPS) is a UK system of accreditation for all physiological disciplines, including respiratory and sleep services. IQIPS accreditation assesses four domains/areas that services must meet to achieve the required standard:

- Patient Experience
- Facilities, Resource and Workforce
- Clinical
- Safety

IQIPS can also act as a service improvement tool, to highlight areas where services do not meet the required standard to facilitate internal service improvement. This includes provision of adequate staffing, planning, equipment and facilities to support and manage services, including waiting times.

More information on the IQIPS programme can be found at …
https://www.ukas.com/services/accreditation-services/physiological-services-accreditation-iqips/.

Key Points

- Education and Training programmes, including PTP and STP programmes are essential in providing the future healthcare science workforce for respiratory/sleep services.
- IQIPS allows recognition of services that meet the required standards, but also acts as a lever to facilitate service improvement, which should be a continuous cycle.

Recommendations

- Where possible, clinical services should support HEI's in the delivery of student clinical training.
- Service managers should promote, discuss and work toward IQIPS accreditation within their organisations.

9. Acknowledgements

We would like to thank the physiology departments who submitted their valuable data for the survey (see Appendix 2). Thanks also to the sites that helped with the validation of the Toolkit and Sarah Bibby at DCH for help with advanced Excel functions in the toolkit.

We are grateful to Dr. Martin Allen (Consultant Physician), Ken Hutchinson (ARTP Human Resource Non-Executive Director) for reviewing and commenting on the paper.

10. Versions & Corrections

- Version 1 – 18 Jan 2018
- Version 2 – 23 Apr 2018
  Page 11: Figure 6 re-sized.
  Page 19: Reference/Link to Appendix 3 was missing.
  Page 20: Corrected P. 20: 'actual establishment of 3.43 WTE' (not 4.43).

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12. Tables / Figures / Comments /Appendices

Tables

Figures

Comments

Appendices

Appendix 1: The Survey Data Collection Proforma

ESTABLISHMENT SECTION							
Hospital/Establishment Name							
Hospital/Establishment Classification							
Contact Name / Tel No / email							
Location							
Department Speciality							
Type							
Patient Group							
STAFFING SECTION							
AfC Bands	**2**	**3**	**4**	**5**	**6**	**7**	**8**
No. of qualified Physiologists/HCSs (WTE)							
No. of unqualified/trainee Physiologists/HCSs (WTE)							

	REFERRALS SECTION	**REFERRERS SECTION**
	Approx. % of referrals received	**WTE**
Chest/Respiratory Consultants		
Sleep Consultants		
Respiratory Nurse Specialists		
Non-Respiratory referrals		
Primary Care/Direct Access GP referrals		
	Estimate the % of referrals received. Please ensure that this adds up to 100%	
	WORKLOAD SECTION	**WAITING SECTION**
	Please enter (or estimate) approximate annual workload for the diagnostic investigations. These should be for tests performed by physiologists/healthcare scientists only	Please enter approx. waiting time (in weeks) for non-urgent referrals
Tests (performed by physiologists/scientists only)	**Approx. ANNUAL workload**	**Typical waiting list (WEEKS)**
Spirometry only		
Lung Function Tests (spiro, gas transfer, lung vols) - See Note1		
Cardiopulmonary Exercise Testing		
Walk Tests (e.g. 6 minute walk test, shuttle test)		
Sleep Studies - Multi-Channel		
Sleep Studies - Overnight Oximetry		
Sleep Studies - MWT / MSLT / PSG		

Allergy Testing		
Non-Invasive Respiratory Muscle Assessment		
Bronchial Challenge Testing (e.g. mannitol, methacholine, exercise)		
Oxygen Assessments (LTOT/Ambulatory)		
CPAP or NIV Issue (new patient)		
CPAP or NIV follow up or review		
Sleep Clinic Review		
Other Tests - lasting <= 30 minutes (patient appointment time)		
Other Tests - lasting > 30 minutes		
Do you have an adequate number of staff?	*Yes / No*	
Are you consulted when additional consultants are recruited?	*Yes / No / None Recruited*	
Does your service regularly breach 6 week diagnostic targets?	*Yes / No*	
Has your service had to use locum/agency staff over the last year?	*Yes / No*	
Any other comments		

Appendix 2: List of Hospitals Supplying Data

Aberdeen Royal Infirmary	Milton Keynes University Trust	Royal Surrey County
Addenbrookes Hospital, Cambridge	Morriston Hospital ABM	Royal United Hospital Foundation Trust
Birmingham Children's Hospital	Neath Port Talbot	Salford Royal NHS Trust
Brighton General Hospital	Nevill Hall Hospital	Sandwell & West Birmingham Hospitals NHS Trust
Broomfield Hospital	New Cross Hospital Wolverhampton	Singleton Hospital
Broomfield Hospital	Norfolk & Norwich University Hospital	Southampton General Hospital
Conquest Hospital, Hastings	Northampton General Hospital	Southend University Hospital NHS Foundation Trust
Croydon University Hospital	Nottingham University NHS trust (City Campus)	Southmead Hospital, Bristol
Derby Teaching Hospitals NHS Foundation Trust	Peterborough City Hospital	St George's Hospital, London
Derriford Hospital	Poole Hospital	St Mary's Hospital
Dorset County Hospital, Dorchester	Poole Hospital NHS Foundation Trust	St Richard's Hospital
Eastbourne District General Hospital	Portsmouth Hospitals NHS Trust	Sunderland Royal Hospital
Frimley Health	Prince Charles Hospital	The Royal Bournemouth and Christchurch Hospitals
George Elliot Hospital	Princess Royal Hospital	The Royal Free Hospital, London
Good Hope Hospital, Sutton Coldfield	Princess Royal University Hospital, Orpington	University Hospital Aintree, Liverpool
Great Ormond Street Hospital for Children, London	Queen Elizabeth Hospital, Birmingham (QEHB)	University Hospital Llandough, Cardiff and Vale UH
Hampshire Hospitals NHS Foundation Trust	Raigmore Hospital	University Hospitals Coventry and Warwickshire
Hereford County Hospital - Wye Valley NHS Trust	Royal Berkshire Hospital, Reading	University Hospitals South Manchester
Kettering General Hospital	Royal Brompton Hospital, London	University Hospitals, Bristol
Kings College Hospital, London	Royal Glamorgan	Wrexham Maelor
Maidstone and Tunbridge Wells NHS Trust	Royal Gwent Hospital	Ysbyty Gwynedd
Manchester Royal Infirmary	Royal Hospital for Children, Glasgow	
Medway Maritime Hospital, Gillingham	Royal Stoke University Hospital	

Appendix 3: Default Test Times

These default procedure times for the diagnostic investigations were used to calculate annual workload

Diagnostic Procedure	Default Time (hours)
Full PFT	0.75
Spirometry	0.3
CPET (including reporting)	1.5
Walk Test	0.5
Sleep – Multichannel (including reporting)	1.25
Sleep – Overnight Oximetry (including reporting)	0.75
Sleep – PSG (including reporting)	5.0
Allergy Testing	0.5
Muscle Study (non-invasive)	0.5
Challenge Testing	1
Oxygen Assessment	1.5
CPAP/NIV Issue	0.75
CPAP/NIV Follow Up	0.5
Sleep Clinic review	0.5
Other Tests < 30 min	0.3
Other Tests > 30 min	0.75

Appendix 4: Sample Calculations for Physiologist Staff Estimation (PSE)

Example A

A respiratory/sleep physiology department comprising of 2 staff members (2.0 WTE) is reviewing its staffing quotas as there are waiting list pressures, and its annual workload is shown in columns 1 and 2:

Column 1	Column 2 (see Step 1)	Column 3 (see Step 2)	Column 4 (see Step 3)
Procedure	Test Time	Annual Workload	Annual Hours
Full PFT	0.75	3200	2400
CPET	1.5	128	192
Allergy	0.5	200	100
Overnight Oximetry	0.75	467	350.25
CPAP Issue	0.75	56	42
CPAP Follow up	0.5	275	137.5
Reversibility Testing	0.3	150	45
Total Annual Hours (Step 4)			**3266.75**

To estimate Physiologist Staff Estimation (PSE)

Step 1 – List the procedures performed in Column 1 and enter the appropriate test times from Appendix 3 into Column 2

Step 2 – Enter the estimated or projected annual number of procedures in column 3

Step 3 – Complete column 4 (Annual Hours) by multiplying columns 2 and 3

Step 3 – Add up Column 4 to calculate 'Total Annual Hours'

Step 4 – Insert the 'Total Annual Hours' (from Step 3) into the PSE equation:

Physiologist Staff Estimation (PSE) = (0.0011 * annual hourly workload)

In this example, PSE = (0.0011 * 3266.75) = 3.59 WTE

Based on the PSE, the service could write a business case with the aim of increasing staff numbers from 2.0 to 3.60 WTE.

Example B

As part of a new clinical trial, a physiology department will be undertaking additional bronchial challenge tests. It is estimated that the number of bronchial challenge tests per annum will be 500 tests.

The PSE was used to estimate additional staffing requirement

Step 1 – Calculate additional annual hours using Appendix 3. In this case 500 additional hours are required (500 tests x 1 hour)

Step 2 – Use the PSE equation. In this case the equation predicts an additional 0.55 WTE staff would be needed as a minimum to undertake the clinical trial.

(See also Appendix 5: The PSE Toolkit)

Appendix 5: The PSE Toolkit

The PSE Toolkit is an Excel spreadsheet that uses the principles described in Appendix 4 and allows services to examine their current workload and skill mix and generate other scenarios to predict how staffing requirements might change if demand for different tests changes or what effect it might have on the required skill mix if the tests were performed by different grades of staff.

The first 'Guidance' tab contains instructions for use of the toolkit and how to customise it to suit the circumstances of your individual service.

The default configuration of the 'Scenario#' tabs of the PSE toolkit matches the way data was collected for the Survey but it can be configured by the user to reflect any differences in local services and refine the accuracy by adding more detail.

The complexity column is intended to reflect the different staff grades required to perform the related test procedure (using a generic scale of routine, specialised or highly specialised).

Other tests or grading definitions can be added to customise and refine the output of the toolkit.

ARTP Workload & Staffing Toolkit

(See notes in the 'Guidance' tab)

Scenario Title: Scenario 1

ARTP (Toolkit Version 1.1)

PROCEDURE (Tests by physiologists/scientists only)	TEST TIME (Hours)	COMPLEXITY (Grade Code)	ANNUAL WORKLOAD (Procedures per year)	ANNUAL HOURS (Hours per year)
Full PFT	0.75	R	1466	1099.5
Spirometry	0.30	R	154	46.2
CPET (inc. reporting)	1.50	H	45	67.5
Walk Test	0.50	R	39	19.5
Sleep – Multichannel (inc. reporting)	1.25	S	330	412.5
Sleep – Overnight Oximetry (inc. reporting)	0.75	S	54	40.5
Sleep – PSG (including reporting)	5.00	H		
Allergy Testing	0.50	R	5	2.5
Muscle Study (non-invasive)	0.50	R	14	7.0
Challenge Testing	1.00	S	166	166.0
Oxygen Assessment	1.50	S	93	139.5
CPAP/NIV Issue	0.75	S	5	3.8
CPAP/NIV Follow Up	0.50	R		
Sleep Clinic review	0.50	S		
Other Tests < 30 min	0.30	R	146	43.8
Other Tests > 30 min	0.75	R	256	192.0
(Your Own Procedure 1)				
(Your Own Procedure 2)				
(Your Own Procedure 3)				
(Your Own Procedure 4)				
OVERHEADS (Non-testing duties by physiologists/scientists)	**TIME (Hours per week)**	**COMPLEXITY (Grade Code)**	**FREQUENCY (How many weeks per year)**	**ANNUAL HOURS (Hours per year)**
Managerial Duties	15.00	H	52	780.0
Quality Control & Assurance	1.00	R	52	52.0
Equipment Cleaning & Maintenance	1.00	R	52	52.0
Appointment Booking	16.00	A	52	832.0
Ordering & Stock Control	0.50	S	52	26.0
Mandatory Training (H Grade)	10.00	H	1	10.0
Mandatory Training (S Grade)	10.00	S	1	10.0
Mandatory Training (R Grade)	10.00	R	1	10.0
(Your Own Overhead 1)				
(Your Own Overhead 2)				
(Your Own Overhead 3)				
(Your Own Overhead 4)				

PSE Factor is applied to Test Procedures =	0.0011
Working hours per person per year (applied to OVERHEADS)	1688

Subtotal (Tests) =	2240
Subtotal (OVERHEADS) =	1772
TOTAL HOURS =	4012
ESTIMATED WTE =	3.51

Grade Calculations

(After altering data in the table use the menu option: Data -> Refresh All to update the profiles)

Grade Code	Grade Label	PROFILE (WTE)	PROFILE (%)
H	Highly Specialist	0.54	15%
S	Specialist	0.86	24%
R	Routine	1.62	46%
A	Administrative	0.49	14%
Z	Other2		
	Estimated WTE =		3.51

The output in the ‘Comparisons’ tab gives a side by side display of the 3 different models that you map out in the Scenario tabs.

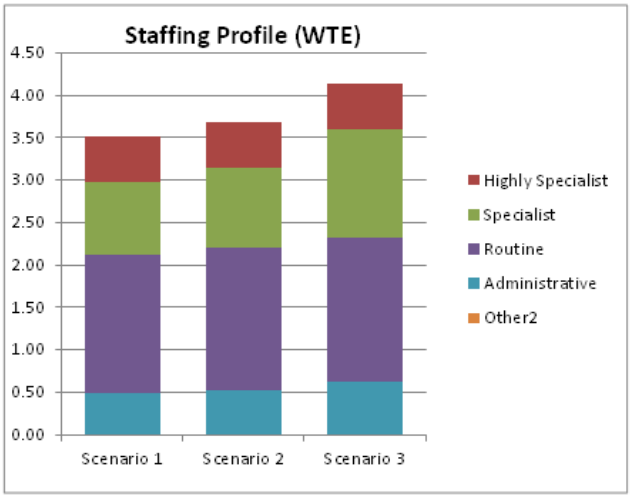
In the worked example below; Scenarios 2 & 3 built on the baseline (as above) exploring different projections of expected increases in workload and whether the procedures could be reallocated to different grades.

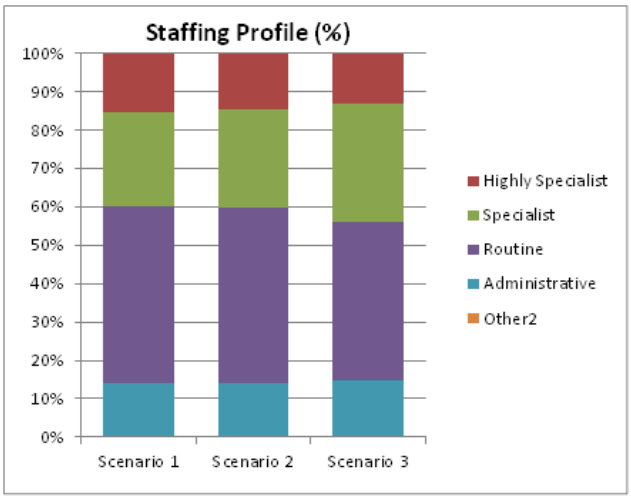
The middle scenario proposes a small increase in workload and some grading changes to the distribution of the workload to explore whether this could enable the work to be accommodated within existing resources. The last scenario shows that a proposed further increase in workload at a later time would require an extra 0.63 WTEs with most of that being tasks for a ‘Specialist’ grade and clearly would require some planning for recruitment.

ARTP Workload & Staffing Toolkit - Scenario Planning

(Toolkit Version 1.1)

Complexity	Scenario 1 PROFILE (WTE)	Scenario 1 PROFILE (%)	Scenario 2 PROFILE (WTE)	Scenario 2 PROFILE (%)	Scenario 3 PROFILE (WTE)	Scenario 3 PROFILE (%)
Highly Specialist	0.54	15%	0.54	15%	0.54	13%
Specialist	0.86	24%	0.94	26%	1.28	31%
Routine	1.62	46%	1.67	46%	1.70	41%
Administrative	0.49	14%	0.52	14%	0.62	15%
Other2						
Notes: Complexity Titles	3.51		3.68		4.14	





Appendix 6: ARTP Workload & Staffing Toolkit - Guidance

(This guidance is reproduced within the Toolkit Workbook)

This toolkit is intended to help with planning the staffing of respiratory & sleep physiology diagnostic services.

It can be used to compare your current staffing levels in terms of Whole Time Equivalent (WTE) to diagnostic workload, examine the complexities of the services workload and look at the balance of skill-mix.

It is based on data collected in the ARTP Workload & Staffing Survey - It is important that this toolkit be used in conjunction with the REPORT to understand and appreciate all the other staffing elements that are directly related to the workload but not generated by performing tests.

To use the toolkit… (SCENARIO Tabs)

There are 3 identical 'Scenario' tabs which can be used to generate 3 different versions of your data.

Enter the corresponding number of each procedure performed (or expected to be performed when future planning) per year in column D.

The default test times and complexity are already entered, however to suit local requirements it may be appropriate to amend these default values (see below).

TEST TIME: is the time (in hours) it takes to complete the test; so use patient appointment time plus any extra preparation or report time.

COMPLEXITY: this reflects the competence level or grade of staff required to perform the procedure (Routine / Specialised / Highly Specialised)

The spreadsheet then calculates the clinical time commitment for each of the procedures and the annual total.

Each Scenario has 2 sections of data. One for PROCEDURES and another for 'OVERHEADS'…

The PROCEDURES section deals with tests performed.

If you also want to use this model to factor in other (non-testing) elements of the department workload this can be done in the OVERHEADS section.

You need to consider whether the timings you use for PROCEDURES does or doesn't include the element you are thinking of adding in; for example cleaning/prepping/reporting.

The OVERHEADS section enables you to add in other regular tasks performed but not directly associated with a single procedure (e.g. weekly Quality Assurance activities).

After altering any data in the table use the menu option: **Data -> Refresh All** to update the profiles.

The PROFILE columns then describe the WTE needed to perform these tests and the supporting Skill Mix.

(Note: cross cover of duties needs to be taken into consideration when reviewing the Skill Mix information. E.g. Senior grades will still be likely to perform some routine procedures when a basic grade is not available.)

Comparing Models (COMPARISONS Tab)

The Comparisons worksheet allows the 3 different models generated on the Scenario tabs to be compared.

The profile information generated by running different scenarios is graphed to compare the overall impact on the workforce due to (for example)…

- The changes in WTE to satisfy an anticipated change in demand for a particular set of tests.
- The change in skill mix generated by reallocating responsibilities for tests (e.g. an HCA being allocated for certain tests)

Amending the default procedure values...

The spreadsheet only features the procedures collected in the survey you may want to refine the calculations to reflect your local service.

By editing the worksheet you can ...

… add in a procedure not listed

… change the time associated with a procedure because of local conditions (e.g. equipment limitations/protocols)

… change the complexity associated with a PROCEDURE/OVERHEAD

… add another complexity/grade to the model

… split a procedure into more than one component

… separate out the elements included in the < and > 30min group (especially if different complexity is involved)

NB: After making any changes to the spreadsheet it is important to update the sheet using the menu option Data->Refresh All.

Adding a procedure not listed…

Four rows have been included at the bottom of the table for you to add 'Your Own Procedure', however if that is not enough… Insert new rows anywhere in the main table (right-click on the row number) and the entries will automatically get incorporated.

You will need to replicate the formula in column E in any new rows (easily done by copy and pasting from the cell above).

Changing the time associated with a PROCEDURE/OVERHEAD...

Because of local equipment issues or protocols a procedure may take more or less time - just change the hours allocated in column B.

The PSE factor derived from the survey is used to calculate WTE from the data entered into the PROCEDURES section only - you should try to reflect the individual's time spent performing all tasks associated with a procedure from start to finish (not just patient contact time).

Items entered in the OVERHEAD section are just direct measures of the weekly time and frequency spent, the PSE factor is not applied to these estimates.

Changing the complexity associated with a procedure…

You may want to reflect the grade of the actual member of staff performing the PROCEDURE or OVERHEAD (e.g. a higher grade might be performing a task that could be done by a lower grade).

Adding another complexity/grade to the model…

You may want to add another level of complexity to the model (e.g. tasks performed by a Healthcare Assistant).

To add another complexity give the new grade a title in cells C49...C53 - you can also change the Grade Code letters (B49…B53) to something more relevant.

(Note: the Grade system needs to remain constant across all 3 Scenarios - only make changes in the Scenario1 tab, these will then be reflected in the other tabs.)

Splitting a procedure into more than one component…

Where a procedure is performed by 2 members of staff at different grades (e.g. CPET being performed by both a lead and assistant grade) you may want to insert an extra row for the same procedure and allocate different times / grades to reflect the relative contributions of the different staff members.

Separating out the elements included in the <30 and >30 minutes group…

To simplify the source survey many less common tests were grouped under 2 categories; < 30 and > 30 minutes.

These may have included such diverse tasks as peak flow, bronchodilator studies, ABGs, hypoxic challenge; each of which could be carried out by various different grades of staff. Adding each of these procedures as a new row along with the appropriate complexity level and timing will make your assessment more accurate.

Appendix 7: Abbreviations

AfC	Agenda for Change
ARTP	Association for Respiratory Technology and Physiology
BTS	British Thoracic Society
CNS	Clinical Nurse Specialist
CPAP	Continuous Positive Airway Pressure
CPD	Continuing Professional Development
CPET	Cardiopulmonary exercise testing
CQC	Care Quality Commission
ENT	Ear, Nose and Throat
GMC	General Medical Council
HCPC	Health & Care Professions Council
HEI	Higher Education Institution
IQIPS	Improving Quality in Physiological Services
IQR	Interquartile Range
LTOT	Long Term Oxygen Therapy
MSC	Modernising Scientific Careers
NHS	National Health Service
NIV	Non-Invasive Ventilation
OSAS	Obstructive Sleep Apnoea Syndrome
PSE	Physiologist Staff Estimate
PSG	Polysomnography
PTP	Practitioner Training Programme
RCP	Royal College of Physicians
RNS	Respiratory Nurse Specialist
STP	Scientist Training Programme
WTE	Whole Time Equivalent

Appendix 8: Factors Relating to Effective Staff Availability

Under AfC, the standard hours of all full-time NHS Staff is 37.5 hours per week (1.0 WTE).

Annual leave and public holiday entitlement is based on length of service as follows:

Length of Service	Annual Leave and Public Holiday entitlement
On appointment	27 days + 8 days
After 5 years	29 days + 8 days
After 10 years	33 days + 8 days

For part-time employers, annual leave is calculated on a pro-rata basis.

(http://www.nhsemployers.org/tchandbook/part-3-terms-and-conditions-of-service/section-10-hours-of-the-working-week)

Annual leave requirements need to be considered in service delivery as this will not be available for clinical duties. Additionally, downtime (where possible) should be considered for other periods of planned or unplanned leave including sickness, special leave, maternity/paternity leave, jury service, CPD, mandatory training etc. Staff may also be allocated time for research and audit. Staff rotas/planning should aim to manage absence to minimise disruptions to clinical services.

Staff sickness/absence can lead to cancellation of appointments and diagnostic/therapeutic procedures, and can add pressure to covering staff. There may also be financial burdens (e.g. employing agency staff).

Data by the Health and Social Care Information Centre showed that sickness absence rates for Healthcare Scientists in England ranged from 3.14% to 3.83%. This is higher than data recorded for medical/dental staff (1.06 – 1.38%). The NHS average sickness rate for all staff groups was 4.15% (April 2015 – March 2016)

(http://www.content.digital.nhs.uk/catalogue/PUB23644)

There are no recommendations on the amount of CPD that healthcare scientists need to undertake. The General Medical Council (GMC) issues guidance to doctors and places the emphasis on them to do the appropriate amount of CPD to remain up to date and fit to practice. Often, this may be to obtain a specified number of CPD credits over a time period.

http://www.gmc-uk.org/education/continuing_professional_development/26747.asp

The Health & Care Professions Council (HCPC) regulates individual health and care professions and states that CPD standards are a personal responsibility that all individuals need to meet to remain registered, however acknowledge that responsible employers will want to encourage employees to learn and develop, and to support registrants in maintaining CPD portfolios.

http://www.hpc-uk.org/registrants/cpd/employerrole/