Llywodraeth Cymru
Welsh Government

Task and Finish Group on Critical Care

Final Report

July 2019

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Introduction

Critical care patients are amongst the sickest in the hospital requiring specialist care and multi-organ support. Patients requiring critical care are relatively low in number (around 9,600 per annum) but, when critical care is required, access needs to be timely and often rapid. By the very nature of the multidisciplinary care provided, critical care beds are amongst the most costly resource within the health service.

NHS Wales has a lower number of critical care beds for the size of the population than the rest of the UK. It is therefore all the more important they are used to maximum efficiency and effectiveness by minimising avoidable or unnecessary admissions and ensuring timely discharge. However efficiencies alone are not enough to cater for the increasing demand and further investment to increase critical care capacity is necessary.

Due to our growing and ageing population, demand for critical care is increasing at around 4-5% per year. Within Wales, approx. £102 million was spent by health boards in 2017-2018 on level 2 and 3 critical care beds. The investment in critical care services has been largely static in recent years and has not kept pace with the growth in demand for services.

Background to the establishment of the Task and Finish Group

In August 2016, a report[1] highlighting significant workforce and capacity challenges across the UK was published. The Faculty for Intensive Care Medicine (FICM) Regional Workforce Engagement Report for Wales acknowledged at the time the situation in Wales is not significantly different from that found elsewhere.

In summary, the report highlighted that virtually no services meet workforce standards, principally because of a lack of dedicated intensive care medicine (ICM) overnight cover. Most overnight rotas include parallel clinical responsibilities elsewhere. Looking at the evidence presented by hospitals:

- Little evidence of regional staffing arrangements, even within health boards
- Rotas are small
- There is often no backfill for training etc
- Significant and expensive use of locums
- Difficulty recruiting consultants with recognised ICM training.

The delivery plan for the critically ill[2] covers the issues highlighted and states the strategic intention but does not identify the mechanisms for improvement.

The Critical illness Implementation Group (CIIG) which oversees the implementation of the plan, chaired by Steve Moore, has taken its time to understand its remit and appears to struggle to offer sustainable solutions, many of which require a whole system organisational commitment while attendees at the group are largely from critical care services rather than drawn more broadly from the hospital system.

[1] https://www.ficm.ac.uk/local-engagements/reports
[2] https://gov.wales/critically-ill-delivery-plan-until-2020

The annual report for the critically ill, published in August 2017[3], highlighted critical care services in Wales are improving but more progress is still needed. Areas where improvements need to be made include:

- Capacity wasted by delayed transfers of care (equivalent to 17 beds), 66% of patients were delayed by over four hours
- Limited capacity, high demand and high occupancy levels
- Variation in quality of transfer of critically ill patients between hospitals
- Development of an appropriate clinical information system.

In 2014, the Critical Care Networks in North and South Wales carried out a study into unmet demand for critical care[4] on behalf of the CIIG. In Wales, there are 5.7 critical care beds per 100,000 population compared to 7 in the rest of the UK (and 11.5 across Europe on average). The study showed that, using conservative estimates and assuming no change in current practices, 73 additional critical care beds would be required across Wales immediately with an ultimate increase of 295 beds on the 2013 bed numbers required by 2023. If one considers how staffing is determined for pods (groups) of beds, there are a few areas where bed numbers could be increased without significant staffing uplift. However, the increases may not be in the areas that are in the greatest need of additional capacity, and many units struggle with infrastructure making expansion impossible without a rebuild.

Despite this, information previously gathered from critical care units across Wales shows that there has been little recent change in the number of beds available for critically ill patients in hospitals across the country. In 2014, there were 168 critical care beds in Wales. In 2016, there were 176 — an increase of 8 beds in total over 14 hospitals with critical care units. Some of these beds have been created as Post Anaesthetic Care Unit (PACU) capacity to help the flow of elective patients through the hospital and would therefore not be available, or appropriate for any patient requiring a critical care bed.

We know that there have been shifts in patient flows such as the devastating brain injury guidance, out of hospital cardiac arrests and head injuries following the introduction of EMRTS (Emergency Medical Retrieval and Transfer Service), which is bypassing local hospitals to take sick and injured patients directly to tertiary centres. However, it is likely that even with these changes to patient flows increasing pressure on the tertiary centres, there will not be a significant drop in the activity at the district general hospitals as some patients moved to the centre will need to be repatriated back to their local health board and the vast majority of critical care units are already operating over the recommended occupancy.

Further changes are also planned with the development of interventional radiology including stroke thrombectomy, centralisation of complex vascular surgery, thoracic surgery and the planned changes to major trauma. The impact of these changes on critical care have not been clearly modelled. However, these changes will lead to a need for increased beds in the chosen centres. Despite all the pressures and challenges, there has historically been minimal mention of expansion in critical care within health board Integrated Medium Term Plans (IMTPs).

[3] https://gov.wales/docs/dhss/publications/170814criticalcarestatementen.pdf
[4] https://gov.wales/docs/dhss/publications/150619criticalen.pdf

There have been a number of previous incidents where patients have been unable to be transferred to a tertiary centre due to lack of a critical care bed. Whilst critical care clinicians in the tertiary centres at Swansea and Cardiff are doing everything in their power to admit patients from other health boards whenever they can, the planned and unplanned changes in patient flow, along with already constrained capacity means that they are not always able to do so.

While pressure on critical care beds across the health boards is a problem in general, pressure on beds in the tertiary centres for specialist treatment is of particular concern as by definition they are offering services that aren't offered at other hospitals. There are also significant delays across a number of tertiary services specialities in patients being repatriated back to their local health board.

On 7 March 2018, the Faculty of Intensive Care Medicine (FICM) published a short research survey into critical care bed capacity[5]. The executive summary of the report stated:

- The survey demonstrated that large numbers of units across the UK are either currently experiencing, or moving towards a capacity crisis. Only a minority of units did not have to make difficult decisions to ensure that patients were able to receive the care they required.

Key messages in the report were:

- 3/5 of units do not have a full critical care nursing complement
- Of those affected, the vast majority considered that bed capacity was inevitably impacted leading to cancelled operations. Quality of care and even patient safety might be impacted
- 2/5 of units have to close beds due to staffing shortages on at least a weekly basis. Only 14% of units did not have to close beds
- 4/5 of units had to transfer patients due to lack of beds. With 21% units doing this at least monthly
- The bed fill rate for Northern Ireland and Wales was estimated to be at least 95%. Scotland was 84%. NHS England data put the critical care bed capacity rate at 87%, but a number of units responded to express doubt that the rate entered for their Trusts was a true reflection of their real capacity.

The FICM report was published at a time the service had been under sustained pressure, for many weeks/months, with many units operating above their established capacity through looking after patients outside of critical care units such as in theatre recovery creating a significant strain on resources.

At the end of March 2018, Welsh Government officials met a number of critical care clinical representatives to discuss the current issues within critical care. It was clear from the discussion they were frustrated by lack of progress addressing critical care issues and they had faced sustained pressures particularly over the recent winter period. Almost all units represented had been operating over capacity and they were still unable to accommodate all patients who may have benefitted from critical care.

[5] https://www.ficm.ac.uk/sites/default/files/ficm_critical_capacity.pdf

At the meeting a number of suggestions were discussed to help to start addressing some of these issues, which included:

- Increase in long term ventilation (LTV) capacity
- Expansion of critical care bed capacity across Wales
- Workforce plan covering the recruitment and retention of staff as well as medical/nursing training and mobility of the workforce
- PACU / Development of Perioperative Medicine
- Expansion of 24 hour critical care outreach teams – identification and early intervention in deteriorating patients / education of ward staff
- High level critical care target – improve visibility and performance management
- EMRTS undertaking secondary/repatriation transfers for critically ill patients
- Advanced critical care practitioners (ACCPs) / emergency pre-hospital and immediate care (EPIC) posts.

The outcome of the meeting was considered by policy officials, the chief executive of NHS Wales, Andrew Goodall and discussed with health board chief executives following this advice provided to the Minister for Health and Social Services.

The Minister issued a written statement[6] on 12 July 2018 announcing the establishment of a nationally directed programme for critical care. This included £15 million additional funding for critical care services in Wales from 2019-20, plus there is also up to £5 million available in 2018/19 to strengthen all aspects of critical care and help to redesign the way critical care services in Wales are delivered.

Task and Finish Group

A task and finish group, chaired by the Deputy Chief Medical Officer, Professor Chris Jones, was established to develop a national model and advice on the allocation of funding. A copy of the terms of reference and membership of the group can be found in annex 1.

The group was asked to develop a phased approach to redesigning services for people who are critically ill in Wales, by providing support to services which are already in place to ensure the best use of existing capacity, develop and expand the skilled workforce, and ensure that investment in critical care capacity is targeted to support the development of specialist services. This includes ensuring an appropriate system is in place to transfer patients, when necessary to more specialist care and also back to the most appropriate local setting for ongoing care.

The task and finish group was designed to be time limited and make strategic recommendations on a new national approach to the provision of critical care across Wales including the allocation of funding.

Reflecting clinical advice, the task and finish group agreed seven work streams on, and chaired by:

- Outreach teams – Richard Jones
- Post Anaesthesia Care Units – Abrie Theron

[6] https://gov.wales/written-statement-critical-care-capacity

- Long Term Ventilation – Jack Parry-Jones
- Transfers – Sue O'Keeffe
- Workforce – Julie Highfield
- Mapping of service model, demand and capacity – Sue O'Keeffe
- Performance Measures – Olivia Shorrocks

The task and finish group also had representation from Welsh Intensive Care Society, Health Education and Improvement Wales, representation from directors of finance, planning, and nursing, as well as, the chair of the CCIG.

The group met for the first time on 8 August 2018, agreed its terms of reference, broad principles for the allocation of funding and a discussion on the purpose/scope of each work stream.

The task and finish group acknowledged from the outset it would not be possible for them to solve everyone's issues but hopefully it can provide a framework to help health boards develop services more sustainably. They appreciated the scale of the challenge they have been set, but realised it was a real opportunity to make a significant difference and establish a programme to help address issues relating to critical care capacity.

Work streams were allowed to operate as the chairs deemed appropriate, utilising virtual working and meetings as required. Each work stream was been asked to make strategic recommendations to the task and finish group on the model/approach for its area.

The task and finish group were not looking to reinvent the wheel and took on board best practice and learnt from examples from elsewhere as appropriate. Each work stream was also been asked to consider the impact of any recommendations, remembering the need to deliver consistent standards for care, thresholds, managing bed flow, demand and freeing up capacity where possible.

Members of the work streams were secured through nominations and requests, reflecting specialities and professions as appropriate, and geographically variation.

The task and finish group met on 6 occasions and also held a workshop, on 22 February 2019, with health board and professional representatives to seek views on the draft work stream recommendations.

The task and finish group agreed a number of key principles in relation to the allocation of funding. These included that funding:
- Will be allocated to health boards in their capacity as commissioners of hospital services for their populations, rather than as providers;
- Will not necessarily be split *pro rata* and given to health boards through their normal allocations
- Does not replace the need for health boards to invest in critical care services required for their local population
- Should support new ways of working, the provision of equitable services and development of a resilient workforce and

- Will take account of pressures likely to be felt in those regional centres affected by changes in treatment pathways.

The task and finish group provided has also recommendations to the Minister for Health and Social Services on the allocation of the £5 million allocation to help address critical care capacity issues over the winter period. A breakdown of the funding and how it was utilised can be found in Annex 2.

The additional £15m funding provided does not replace the need for health boards to invest locally in critical care capacity for their local populations. Funding allocations are being directed by the programme informed by discussions with health boards. Funding has not been allocated on a pro rata basis per health board or subject to a bidding process.

The task and finish group acknowledge there are big challenges ahead particularly in relation to dealing with workforce issues. The programme of work is likely to take several years to fully implement and decisions need to be taken to prioritise implementation including the use of funding.

Developments such as the inclusion of critical care within the Train Work Live campaign and the inclusion of critical care on the integrated unscheduled care dashboard are welcomed. The benefits of these should be fully utilised by health boards and built on.

Overview of key conclusions

The need for critical care capacity worldwide is increasing. Future increase in demand is due to a number of factors including significant changes in the size and age of the population, increasing prevalence of relevant comorbidities, changing perceptions as to what critical care can offer and new/emerging treatments.

Changes to pension and taxation arrangements which have occurred during the work of the task and finish group have further compounded workforce issues particularly in relation to consultant staffing. Most units are dependent on consultants doing additional sessions which many now feel is no longer financially viable.

Inadequate capacity in critical care leads to deferred or refused admissions, cancellation of planned surgery, transfers of emergency patients, and premature discharges. These are highly undesirable events which degrade the quality of care delivered and may jeopardise outcomes.

Unless admission and referral practices change, the increased future demand can only be met by an increase in total critical care capacity. The task and finish group are clear, Wales does need additional capacity, but this must be in conjunction with a combination of other initiatives/services such as intermediate care (PACUs, LTV, outreach, non-invasive ventilation (NIV) Level 1 areas etc.) and improved efficiencies (reducing delayed transfers of care (DToCs) and utilising staff effectively for example). We need to address existing workforce issues such as skills mix, recruitment, retention and training as well as increasing the numbers of appropriately skilled healthcare professionals to meet both the current and expanding capacity.

The task and finish group acknowledge the national programme set out below is ambitious and if fully implemented will help ensure Wales have critical care services on a par with the best in the UK. Critical care staff throughout Wales work in a highly pressurised environment and the lack of capacity across the system has exacerbated this. The group hopes that both staff and patients will see there is now a clear commitment, backed up by robust recommendations and additional funding to help deliver a phased improvement programme.

There was unanimous support within the group for the work stream recommendations and their phased implementation across Wales. This includes:

- 24/7 critical care outreach across all secondary care hospitals
- Development of post anaesthetic care units (PACU) in all hospitals which undertake high risk surgery; this can include elective and emergency patients
- Better utilisation of the existing critical care workforce
- Development/expansion of the critical care workforce to meet professional standards
- Phased expansion of level 3 critical care beds prioritising hospitals which provide tertiary or specialist service
- Development of a dedicated regional transfer teams for critically ill adults
- Development of a Long Term ventilation (LTV) and weaning unit in South Wales
- Development of a critical care outcome measures dashboard.

In addition, the task and finish group recommend further consideration should be given:

- To consider ways to manage critical care staffing across regions rather than just within UHBs
- Increase in the number of training post graduate training places for medical staffing, and consider training routes for nursing including ACCPs
- To national or regional planning of critical care services
- The additional funding provided by the Welsh Government should be utilised to accelerate the expansion of services for patients who are critically ill and aid health boards to remodel the way they provide critical care services within their organisations
- Funding should be provided on an indicative basis to allow health boards to develop robust implementation plans which take account of remodelling existing resources, interdependencies/impact of the development and confirmation they are definitely able to recruit any necessary staff
- Transparent reporting of critical care outcome measure with robust escalation arrangements

Key work stream recommendations

<u>Outreach work stream (Annex 3)</u>

Health boards must:

- Use the National Early Warning score (NEWS) in all clinical areas to allow rapid, objective detection of early acute deterioration
- Have a hospital specific Standard Operating Procedure that defines the response to acute deterioration. This will include details of the speed and urgency of

response, the personnel involved and a jump call procedure. This policy will apply 24/7

- Define and/or resource a team to deliver this rapid response system 24/7. Critical Care Outreach, Hospital at Night, Nurse Practitioners, Resuscitation practitioners etc. should be integrated into this team to ensure efficient use of existing resources
- Ensure that rapid response team staff are appropriately trained and have regular competency assessments in line with the forthcoming National Critical Care Outreach Credential and Career Framework
- Ensure team staff have ring-fenced time to train ward staff
- Ensure team staff keep a record of their clinical work and record clinical outcomes on the patients they see to demonstrate improvement. These metrics should be clinically relevant and standardised across Wales.

Post Anaesthetic Care Units (PACU) work stream (Annex 4)

Health boards should develop PACU's to provide care to high risk surgical patients that cannot be delivered safely on a ward in the first 24 to 48 hours post-operatively and do not require the level of care provided in a critical care setting in line with the framework developed by the work stream.

Long Term Ventilation (LTV) work stream (Annex 5)

Health boards should work with the specialist commissioner (WHSSC) to establish a single 10 bedded LTIV unit in south wales based in University Hospital Llandough.

Transfers work stream (Annex 6)

Health boards should work with the specialist commissioner (EASC) to establish a dedicated regional transfer teams for non-urgent in hours transfers of critically ill adults.

Mapping, modelling and capacity work stream (Annex 7)

The Mapping, Modelling and Capacity work stream make several recommendations; some *directly, as set out below,* affecting capacity in critical care and some *indirect,* which are set out annex 8.

Assuming the task and finish group approve the implementation of PACUs and a LTV Unit(s) and there is a reduction in DToCs the Mapping, Modelling and Capacity Workstream recommends health boards should increase their critical care beds numbers as set out below:

- 7 additional beds in Aneurin Bevan UHB
- 13 additional beds in Abertawe Bro-Morgannwg UHB (now Swansea Bay UHB) – see note below
- 7.5 additional beds in Betsi Cadwaladr UHB
- 24 additional beds in Cardiff and Vale UHB
- 2 additional beds in Cwm Taf UNB – see note below
- No additional beds in Hywel Dda if other work stream recommendations, such as PACU and outreach, are implemented.

Any proposed increases will need to be undertaken in a phased manner over the next few years. University Hospital of Wales in Cardiff and Morriston hospital in Swansea

require the greatest increase because of their high demand for tertiary services (on top of the regular demands for their catchment areas).

It should be noted the above recommendations do not take account of the Princess of Wales boundary changes which were not implemented at the time the work stream report was drafted. Additionally recommendations from this work stream must be taken in conjunction with the recommendations of all work streams for maximum impact.

Workforce work stream (Annex 8)

The current workforce for critical care is under strain and needs to be able to manage future expansion of critical care. Key recommendations to manage this are:

- Improving the capacity and flow of critical care to reduce the needs for expansion through a better utilisation of current available workforce
    - UHBs are encouraged to develop discharge coordination posts
    - UHBs are encouraged to review their allied health workforce and put in post sufficient numbers which will improve rehabilitation and reduce length of stay
- Use of extended roles and advanced practice
- A commissioned piece of work to explore management of staffing across health boards
    - Cross UHB staffing management
    - Shared contracts across units
    - UHBs are encouraged to staff to average bed utilisation
- A longer term cross Wales programme developed to improve the retention of current staffing, exploring the following.
    - Education and opportunities
    - Staff wellbeing initiatives
    - National career planning and retention strategies
- Utilising non critical care staff for critical care related service developments (e.g. transfers PACU, LTiV and Outreach).

Performance/Outcome measures work stream (Annex 9)

The work stream sought to outline high level measures proposed for the ongoing monitoring and evaluation of critical care that will:

- Measure the overall performance of the critical care service across Wales
- Implement measures to demonstrate the impact of the critical care investment, services changes and transformation

The following measures for overall performance of the critical care service across Wales have been agreed, these include:

- Delayed transfer of care – over 4 hours
- Non-clinical transfers
- Bed activity

The following measures have been recommended to demonstrate the impact of the critical care investments, service changes and transformation within each workstream:

- Outreach:
    - Number of sites offering 24/7 outreach (currently 3/16)
    - Number of cardiac arrests within regular ward patients
    - Reduction in readmissions to critical care

- Post Anaesthesia Care Units:
    - Admissions directly to critical care from PACU
    - Re-admissions to critical care after step down from PACU
    - Reduction in cancelled operations due to lack of a critical care bed
- Long Term Ventilation:
    - Number of LTV patients in acute critical care units
    - Number of days on LTV in acute critical care units
    - Bed days saved
- Transfers:
    - Transferring Docs Grade
    - Quality and Safety Assessment
- Workforce:
    - Vacancies
    - Staff retention
    - Sickness rates
- Service model, demand and capacity:
    - Delayed admissions

Implementation

Health boards, together with the responsible commissioners for services such as long term ventilation (LTiV) eg. WHSSC and transfers of critically ill adults eg. EASC, must take account of the task and finish group recommendations as part of the ongoing development and expansion of services for people who are critically ill across Wales.

The task and finish group recommend the £15m additional investment is prioritised as set out below (a full breakdown can be found in annex 10):

- Establishment of a national transfer service for critically ill adults
- Development of a Long Term Ventilation Unit with an interim expansion of LTV beds in UHL in the meantime
- Recurrent funding for the six additional critical care beds in Cardiff and Vale UHB
- One additional Level 3 critical care bed for Ysbyty Glan Clwyd in Betsi Cadwaladr UHB to support the regional services
- Funding for Powys teaching HB for improved management of deteriorating patients and critical care liaison/discharge co-ordination
- Funding for development work including a workforce plan
- Remaining funding is split between Aneurin Bevan, Betsi Cadwaladr, Cwm Taf Morgannwg, Hywel Dda and Swansea Bay university health boards against areas of agreed priority for critical care services

Each health board has completed high level pro-formas based on the work stream recommendations. It will be for health boards to develop phased implementation plans which fully take account of the task and finish group recommendations as well as actively considering issues such as remodelling existing resources, interdependencies/impact of developments, confirmation they are definitely able to recruit any necessary staff and funding/timescales for any capital implications.

It is proposed that following the publication of the task and finish group report, the current group is stood down. The responsibility for the oversight of the ongoing

implementation of the nationally directed programme should handover to the Wales critical care and trauma network (WCCTN) and critical illness implementation group (CIIG).

Together the WCCTN and CIIG will ensure appropriate arrangements are established to scrutinise health board plans to ensure alignment with the task and finish group recommendations, confirmation of the indicative allocations and spread learning across organisational boundaries. Specific performance management arrangements will be put in place between the Welsh Government and the Wales Critical Care and Trauma Network.

It is anticipated the WCCTN will provide guidance to health boards on how the implementation process will operate following the publication of this report.

Acknowledgements

The task and finish group would like to thank everyone who has actively contributed to the work streams, the Critical Illness Implementation Group (CIIG), Wales Critical Care and Trauma Network (WCCTN) and health boards for their support and understanding.

Annexes

Annex	Title
1	Task and Finish Group Terms of Reference and Membership
2	Breakdown of the allocation of £5m investment in 2019/20
3	Outreach work stream – final report & recommendations
4	Post Anaesthetic Care Units work stream - final report & recommendations
5	Long Term Ventilation Unit work stream - final report & recommendations
6	Transfers work stream - final report & recommendations
7	Mapping, modelling and capacity work stream - final report & recommendations
8	Workforce work stream - final report & recommendations
9	Performance/outcome measure work stream - final report & recommendations
10	Allocation of £15m investment

Annex 1. Task and Finish Group Terms of Reference and Membership

Mapping of service model, demand and capacity Workstream Lead – Sue O'Keeffe

On 12 July 2018, the then Cabinet Secretary for Health and Social Services announced a 3 to 5 year programme of centrally directed work would be undertaken, under the strategic direction of a Task and Finish Group, to improve the provision of services for those who are critically ill. The Task and Finish Group has been established to make strategic recommendations on a new national approach to the provision of critical care across Wales including the allocation of funding.

The Group will be supported by several work streams to develop a national model of care for those who are critically ill. The national model will look at the expansion of outreach teams, post anaesthesia care units, and long term ventilation facilities, new and more transparent performance measures, options for the transfer of critically ill patients as well as the development/expansion of skilled workforce and increasing the number of critical care beds.

Purpose of the Mapping of Service Model, Demand and Capacity work stream:

To develop a consistent model, utilising a phased approach where appropriate, for the provision of L2/L3 critical care services for people who are critically ill in Wales. This includes taking account of existing models/capacity, consideration of workforce requirements and costings.

In fulfilling its terms of reference, the work streams will take account of:

- Current relevant policy and guidance including any new guidance published during the lifetime of the group
- Current work being undertaken by health boards

Remit of the Mapping of Service Model, Demand and Capacity work stream:

- Review demand and capacity for critical care on a national, all wales basis, based on population need, not organisational demand
- Map changes in clinical pathways and their likely impact on critical care
- Consider and asses the consistent baseline and proportionate provision for critical care
    - Work closely with other work streams e.g. PACU, LTV, and Workforce etc.
- Ensure consistent standards for care, considering thresholds, managing bed flow, demand and freeing up capacity for example, escalation of treatment, NIV and/or patients with single organ failure.
    - *NB: there will be some overlap with other work streams for example, Outreach, PACU and LTV*
- Make strategic recommendations on future critical care configuration of critical care services in Wales including an assessment of potential impact the recommendations will make:
    - Whole system
    - Cost/benefit
    - Workforce
- Define phasing of above recommendations i.e. how much, by when

Method of Working:
Work streams will meet as and when required but work will be undertaken virtually where possible

Secretariat for the Mapping of Service Model, Demand and Capacity work stream will be provided by the Wales Critical Care and Trauma Network.

Name:	Job title:	Organisation:
Sue O'Keeffe (Chair)	Critical Care & Trauma Network Manager	Workstream lead
Julie Highfield	Consultant Clinical Psychologist	C&VUHB
Professor Kathy Rowan	Director	ICNARC
Matt Wise	Consultant In Intensive Care	C&VUHB
Tom Holmes	Consultant In Intensive Care	C&VUHB
Babu Muthuswamy	Clinical Director – Critical Care	ABUHB
Michael Ware	Information Manager - Cardiothoracic & Critical Care Directorate	C&VUHB
Richard Pugh	Clinical Director for Critical Care; WICS Chair	BCUHB/WICS
Michael Martin	Clinical Lead for Critical Care	HDUHB
Orla Morgan	Lead Nurse, Critical Care	C&VUHB
Richard Self	Clinical Lead for Critical Care	ABMUHB
Carly Buckingham	Service Delivery Manager, Critical Care	HDUHB
Lisa Lewis	Senior Nurse Manager, Critical Care	HDUHB
Anna Thomas	Service Manager, Critical Care	HDUHB
Piroska Toth-Tarsoly	Clinical Lead for Critical Care	CTUHB

Outreach Teams Workstream Lead – Richard Jones
On 12 July 2018, the then Cabinet Secretary for Health and Social Services announced a 3 to 5 year programme of centrally directed work would be undertaken, under the strategic direction of a Task and Finish Group, to improve the provision of services for those who are critically ill. The Task and Finish Group has been established to make strategic recommendations on a new national approach to the provision of critical care across Wales including the allocation of funding.

The Group will be supported by several work streams to develop a national model of care for those who are critically ill. The national model will look at the expansion of outreach teams, post anaesthesia care units, and long term ventilation facilities, new and more transparent performance measures, options for the transfer of critically ill patients as well as the development/expansion of skilled workforce and increasing the number of critical care beds.

Purpose of Outreach work stream:

- Develop a consistent model of 24/7 outreach across all secondary care hospitals in Wales (including consideration of a model that could contribute to the up-skilling of ward staff)
- This includes taking account of existing models/capacity, consideration of workforce requirements and costings.
- Make recommendations of level of provision required in each health board (taking account of any existing services)
- Provide advice to the workforce work stream on any potential staff implications or training requirements

In fulfilling its terms of reference, the work stream will take account of:

- Current relevant policy and guidance including any new guidance published during the lifetime of the group
- Current work being undertaken by health boards

Method of Working:

The Outreach work stream will meet regularly and work will also be undertaken virtually where possible.

Over time a wide variation in provision has developed in each Welsh hospital.
The Outreach sub-group recommends that health boards return to the core principles of Outreach and plan a 24/7 system for their hospitals tailored to the acutely deteriorating patient.
This system would:

- Identify acutely deteriorating patients and institute timely treatment.
- Optimise ward-based treatments and recognise or resolve, where appropriate, issues of DNACPR and limitations of treatment.
- Facilitate safe discharge from Critical Care and follow up on discharged patients to reduce readmission.
- Deliver education to all staff groups and undergraduates.
- Measure and report on clinical outcomes.

Name:	**Job title:**	**Organisation:**
Richard Jones (Chair)	Outreach teams lead	Workstream lead
Ifor Evans		Critical Care Network
Christopher Hancock	Programme Lead – Acute Deterioration	PHW (1,000 lives)
Clem Price		Workforce representative
Health board representatives		
Andrew Hermon		CTUHB
Gemma Ellis	Consultant Nurse Adult Critical Care	C&VUHB
Paul Frost	Critical Care	C&VUHB
Jane Morris		C&VUHB
Sally Heal		ABUHB

Rebekah White		ABUHB
Matt Dallison	Regional Advisor and Training lead for ICM in Wales/Consultant	
Amanda Jackson		ABMUHB
Chris Subbe	Consultant Physician in Acute Medicine	BCUHB
Shelley Griffiths		BCUHB
Vikki Montgomery		BCUHB
Sarah Wilson		BCUHB
Lisa Lewis	Senior Nurse Manager, Critical Care	HDUHB
Dr. Yvonna Plesnikova	Consultant Anaesthetics (ICU	HDUHB
Sian Hall	Resuscitation & Simulation	HDUHB
Catherine Burrell		HDUHB

Post Anaesthesia Care Units Workstream Lead – Abrie Theron

PACU is an opportunity to provide care to high risk surgical patients that cannot be delivered on a ward in the first 24 - 48hrs post-op, for patients that do not require the level of care provided in critical care.

1. PACU is an opportunity to provide care to high risk surgical patients that cannot be delivered safely on a ward in the first 24 - 48hrs post-operatively, for patients that do not require the level of care provided in a Critical Care setting.
2. With careful consideration and monitoring the nursing to patient ratio can be 1:3 as this would be a substantial uplift from the normal ward ratio.
3. With clear SOP's and agreement this group of patients can be under the care of the peri-operative surgeons and anaesthetists with Intensivists only contacted when their expertise is required, freeing intensivists up to care for critically ill patients.
4. PACU's will reduce cancellations and delayed starting times due to lack of critical care capacity, with loss of theatre resource and potential harm to patients.
5. By preventing suboptimal care on over stretched surgical wards, PACU will reduce length of hospital stay, patient rescue with admission to Critical Care and reduce patient morbidity & mortality.
6. Virtual PACU beds are the way forward as this ensures timely discharge of patients back to the ward.
7. Priority should be given to comparable PACU data collection across Wales via ICNARC, as clear governance of the proposed changes is essential and will influence further evolution.

Name:	**Job title:**	**Organisation:**
Abrie Theron (Chair)	Post Anaesthesia Care Units lead	Workstream lead
Anton Saayman	Consultant Intensivist	C&VUHB
Babu Muthuswamy	Clinical Director – Critical Care	ABUHB
Michael Ware	Information Manager - Cardiothoracic & Critical Care Directorate	C&VUHB
Sam Sandow	Associate Medical Director and Consultant in Intensive Care	BCUHB

Lisa Lewis	Senior Nurse Manager, Critical Care	HDUHB
Sandra Brinson	Senior Nurse Manager, Theatres	HDUHB
Gareth Scholey	Strategic Lead, PACU	C&VUHB (UHW)
Anthony Funnell	Anaesthetist, Princess of Wales Hospital	ABMUHB
Ceri Lynch	Intensivist, Royal Glamorgan Hospital	CTUHB
Trish Duncan	Liver Surgeon, Cardiff	C&VUHB
Hywel Pullen	Finance	C&VUHB
Chris Terblanche	Intensivist Swansea Bay	SBUHB
Webster Rushesha	Consultant Anaesthetists	SBUHB
Ceri Matthews	Manager	SBUHB
Najia Hasan	Consultant Anaesthetist	CTUHB
Gordon Milne	Consultant Anaesthetist	HDUHB
Karen James	Physiotherapist	

Long Term Ventilation Workstream Lead – Jack Parry-Jones

The purpose of the long term invasive ventilation and weaning (LTIV) workstream is to take these patients, once identified, out of the acute critical care services and into a bespoke LTIV unit. This will provide these patients with a service aligned to their needs, whilst also reducing the pressures on the acute critical care service daily bed capacity.

A Single 10 bedded LTIV unit in south wales, based in University Hospital Llandough and co-located with Rookwood hospital for Neuro and Spinal rehabilitation. Expanding the LTIV service to 10 beds at the same time as the Rookwood build would offer significant cost advantages, and also provide a better service for these patients. Once the LTIV service is up and running the service will be cost neutral, whilst also reducing the pressures on the acute critical bed service by up to 10 beds per year (equivalent to 3650 acute critical care bed days) on current estimates based on 2016-2017 data.

Membership:

Name:	**Job title:**	**Organisation:**
Jack Parry-Jones (Chair)	Long Term Ventilation lead	Workstream lead
Professor Nick Hart	Clinical Director	Lane Fox respiratory unit
Michael Ware	Information Manager - Cardiothoracic & Critical Care Directorate	C&VUHB
Nick Stallard	Intensive Care/LTiV	C&VUHB
Hywel Pullen	Finance	C&VUHB
Claire Nelson	WHSSC	WHSSC
Simon Barry	Consultant/Clinical Lead for Respiratory Health Delivery Plan	C&VUHB
Orla Morgan	Lead Nurse, Critical Care	C&VUHB
Mark Smithies	Intensive Care/LTiV	C&VUHB
Peter Matthews	Intensive Care	SBUHB

Transfers Workstream Lead – Sue O'Keeffe

On 12 July 2018, the then Cabinet Secretary for Health and Social Services announced a 3 to 5 year programme of centrally directed work would be undertaken, under the strategic direction of a Task and Finish Group, to improve the provision of services for those who are critically ill. The Task and Finish Group has been established to make strategic recommendations on a new national approach to the provision of critical care across Wales including the allocation of funding.

The Group will be supported by several work streams to develop a national model of care for those who are critically ill. The national model will look at the expansion of outreach teams, post anaesthesia care units, and long term ventilation facilities, new and more transparent performance measures, options for the transfer of critically ill patients as well as the development/expansion of skilled workforce and increasing the number of critical care beds.

Purpose of Transfer work stream:

To develop a consistent model, utilising a phased approach where appropriate, for the provision of transfer services for people who are critically ill in Wales. This includes taking account of existing models/capacity, consideration of workforce requirements and costings.

In fulfilling its terms of reference, the work streams will take account of:

- Current relevant policy and guidance including any new guidance published during the lifetime of the group
- Current work being undertaken by health boards

Remit of the Transfer work stream:

- Consider options for the development of a model of secondary transfers for patients who are critically ill
- Work closely with, and provide advice to the Workforce work stream on any potential staff implications or training requirements
- Consider other work/recommendations in relation transfers for example, Directory of Services, Network (Regional) escalation.
- Make strategic recommendations, to the Task & Finish Group, regarding the preferred option for a model of secondary transfers for patients who are critically ill in Wales including an assessment of potential impact the recommendations will make:
    - Whole system
    - Cost/benefit
    - Workforce.

Method of Working:

Work streams will meet as and when required but work will be undertaken virtually where possible.

Secretariat for the transfers work stream will be provided by the Wales Critical Care and Trauma Network.

Name:	Job title:	Organisation:
Sue O'Keeffe (Chair)	Critical Care & Trauma Network Manager	Workstream lead
Chris Hingston	Critical Care Consultant at UHW and EMRTS	C&VUHB/EMRTS
Greg Lloyd	Head of Clinical Operations	WAST
Ed Farley-Hills	WCC&TN Clinical Lead (North) and Consultant in Intensive Care	BCUHB/CC&TN
John Glen	EMRTS Cymru Caernarfon Base Lead; Consultant in Intensive Care	BCUHB/EMRTS

Workforce Workstream Lead – Julie Highfield

Purpose of Workforce work stream:

To develop a consistent model of provision of Critical Care Workforce to provide services for people who are critically ill in Wales. This includes taking account of existing models/capacity, and costing.

In fulfilling its terms of reference, the work stream will take account of:

- Current relevant policy and guidance including any new guidance published during the lifetime of the group
- Current work being undertaken by health boards

Work stream Overview:

- Scoping of the current and likely future workforce requirements and identifying any barriers to change and/or gaps
- Identifying current and emerging workforce models (Wales, UK and possibly internationally)
- Consider recommendations on workforce models that could be developed for helping to address gaps and pressures within the critical care workforce (including the use of extended practice)
- Make recommendations on the need for increased training places (medical, advanced practice, nursing and AHP)
- Providing input/support scrutiny to the other T&F groups.

- Method of Working:
- Work streams will meet as and when required but work will be undertaken virtually where possible.
- Secretariat for the work stream will be provided by Welsh an administrative resource to be appointed by the Wales Critical Care and Trauma Network.

Name:	Job title:	Organisation:
Julie Highfield (Chair)	Consultant Clinical Psychologist	Workstream lead
Clem Price	Workforce Planning Officer	HEIW
Michael Ware	Information Manager - Cardiothoracic & Critical Care Directorate	C&VUHB
Carole Jones	Physiotherapy Clinical Service Lead	C&VUHB

Matt Dallison	Regional Advisor and Training lead for ICM in Wales/Consultant	ABMUHB
Chris Thorpe	FICM Board member; Consultant in Intensive Care	BCUHB
Nia Bromage	Advanced Critical Care Practitioner	C&VUHB
Richard Self	Clinical Lead for Critical Care	ABMUHB
Carly Buckingham	Service Delivery Manager, Critical Care	HDUHB
Lisa Lewis	Senior Nurse Manager, Critical Care	HDUHB
Martin Driscoll	Director of Workforce & OD	C&VUHB
Pirosk Toth-Tarsoly	Clinical Lead for Critical Care	CTUHB
Ed Farley-Hills	Clinical Lead for Network	BCUHB

Performance Measures Workstream Lead – Olivia Shorrocks
To ensure that appropriate measures are in place to measure the overall performance of the critical care service across Wales, and implement measures to demonstrate the impact of the critical care investment, services changes and transformation.

Membership:

Name:	**Job title:**	**Organisation:**
Olivia Shorrocks	Performance Measures lead	Workstream lead
Ifor Evans	Wales Critical Care & Trauma Network Manager	PHW
Michael Ware	Information Manager - Cardiothoracic & Critical Care Directorate	C&VUHB
Richard Pugh	Clinical Lead for Critical Care; WICS Chair	BCUHB
Lloyd Bishop	Head of information	ABUHB

Annex 2. Summary of additional £5 million to help relieve pressure on critical care during 2018-2019

The £5m non recurrent funding was announced by the Welsh Government in July 2018 to help with existing pressures on adult critical care services particularly during the winter period. Health boards were invited to submit proposals for how they could invest the money on a non-recurrent basis to help alleviate the pressures within the critical care services. The Group made recommendations to the Minister for Health and Social Service in September 2018. Following the Minister's agreement the funding was allocated as set out below:

Recipient:	**Funding:**
Cardiff and Vale University Health Board	£1,500,000
Abertawe Bro Morgannwg University Health Board	£1,443,000
Betsi Cadwaladr University Health Board	£605,000
Aneurin Bevan University Health Board	£350,000
Cwm Taf Morgannwg University Health Board	£356,000
Hywel Dda University Health Board	£354,000
Welsh Health Specialised Services Committee (WHSSC)	£372,000
Work stream support	£20,000
Totals:	**£5,000,000**

One element of the initially agreed funding to support a pilot transfer service was reallocated as resourcing constraints meant this proposal could not be taken forward. This money was subsequently reallocated to support critical care requirements within specialised services.

Cardiff and Vale University Health Board (C&VUHB):
Opened an additional six level 3 equivalent beds on the University Hospital of Wales site; two level 3 equivalent beds opened on the 1st October 2018, and a further four level 3 equivalent beds on the 1st February 2019. These six beds were provided on a regional basis.

Abertawe Bro Morgannwg University Health Board (ABMUHB) / Swansea Bay University Health Board:
The creation of a four bed non-invasive ventilation (NIV) unit and a five bedded step down area; jointly releasing more critical care beds. Additional flexible workforce for surges and more consistent service provision. Increased access to critical care supporting services. Supporting a 24/7 ITU Outreach service at Morriston Hospital. Finally, commissioning two previously un-commissioned critical care beds and to surge capacity to increase core bed numbers at times of high occupancy and risk.

Betsi Cadwaladr University Health Board (BCUHB):
At Glan Clwyd Hospital an extra level 3 bed was opened and the provision of funds enabled expanded medical cover overnight. At Ysbyty Gwynedd/Bangor increased consultant sessions were provided, in addition, two extra HDU beds (1 Level 3 equivalent) were operated for much of this period. Wrexham Maelor Hospital put in place an extra Level 3 equivalent bed and two post-anaesthesia care unit (PACU) beds were operated over this period.

Aneurin Bevan University Health Board (ABUHB):
Provided an increase in critical care beds during winter, with two additional level 3 beds. Funding supported nursing bank and temporary staff from November 2018 until substantive posts could be secured. Funding also supported additional Consultant sessions to give the service greater robustness and flexibility in maintaining full operational status in both units. Expenditure on non-pay costs proved to be higher than originally estimated, mainly as a result of the unpredictable nature of case mix during the winter.

Cwm Taf Morgannwg University Health Board (CTUHB):
Provided an increase in critical care beds during winter, this was two level 3 beds. The funding supported additional nursing staffing costs, drugs and consumables.

Hywel Dda University Health Board (HDUHB):
HDUHB used the funding to provide a surge capacity and to increase bed levels during the winter period at the Glangwili and Withybush general hospital sites. This was the equivalent of two level 3 beds through the use of bank and temporary staff.

The Welsh Health Specialised Services Committee (WHSSC):
Funding was provided to support all Wales critical care requirements within specialised services.

Work stream support:
This funding allowed for a Workshop event on 22 February to showcase the seven workstreams and draft recommendations. Funding also went on data recording modifications, including ward watcher and bed bureau changes. This allows an increased and accurate data collection for critical are across Wales. This has also allowed critical care bed occupancy to be included within the unscheduled care dash board.

£1m delivery plan funding:
Health boards additionally benefited from non-recurrent funding provided from slippage within the £1m Critically Ill delivery plan funding, due to the delays in the procurement of a new clinical information system. Funding recipients were provided funding from CIIG on the basis they were responsible for any ongoing or recurring costs following implementation. Any proposals which had already received financial support from CIIG were excluded from consideration as part of the allocation of both the £5m and the £15m additional funding.

Annex 3. Outreach teams - Richard Jones

Over the last 15 years Critical Care Outreach Services have been introduced in many hospitals across Wales in response to the growing body of evidence demonstrating a failure to recognise and respond to acute physiological deterioration. Their original purpose was to ensure patients received timely intervention regardless of location with Outreach staff sharing critical care skills with ward based colleagues to improve recognition, intervention and outcome.

Over time there has developed a large variation in provision of Outreach services. As part of the then Cabinet Secretary's announcement to improve the provision of services for those who are critically ill there was a commitment to develop a consistent model of 24/7 Outreach across all secondary care hospitals in Wales.

Current position:
Over time a wide variation in provision has developed in each Welsh hospital.
As part of our Welsh Outreach survey, each Health Board was asked to identify what they currently provided in terms of areas covered, times of the day and week covered and skill mix of who covered.

Information gathered from across Wales in our recent survey has indicated the following differences in the provision of outreach services.
These are summarised below:

- Hywel Dda HB has no outreach service on any of their 4 acute sites.
- 24/7 outreach is available across all 3 hospitals in BCUHB and at the Royal Glamorgan Hospital in Cwm Taf
- Prince Charles Hospital in Cwm Taf is covered 12hours a day 7 days a week
- UHW in Cardiff and Vale UHB (apart from Medical Wards) is covered 12hours a day 7 days a week by Outreach
- The medical wards in UHW are covered by a Medical Nurse Practitioner 8am-6pm Mon-Fri
- Other hospitals provide an outreach service either on a Monday-Friday/9-5 basis or on an extended hours service, typically between 8am and 4 or 6pm
- The clinical areas covered by the outreach teams vary. Typically they will include the majority of the acute wards with Paediatrics and Maternity usually being excluded.
- The outreach teams vary in their banding. BCUHB hospitals are covered by band 7 nurses but other hospitals mostly use Band 6 nurses. There is a variation in the skills and competencies with some Outreach nurses being prescribers, something that is seen as a desirable addition to the role.
- The outreach teams have varying interaction and overlap with their organisation's our-of-hours structures.

Evidence:
It is widely accepted in the Critical Care community that it would add value if the existing Outreach provision in Wales was extended to cover more of the week especially outside of normal working hours.

This is backed up by the evidence and expert recommendations below:

Comprehensive Critical Care was a document produced by the DoH in 2000.
It describes a *"multidisciplinary organisational approach to ensure safe, equitable and quality care for all acutely unwell, critically ill and recovering patients irrespective of location or pathway".*

Comprehensive Critical Care recommended the need for outreach services and described their 3 objectives:

- To avert admissions by identifying patients who are deteriorating and either helping to prevent admission or ensuring that admission to a critical care bed happens in a timely manner to ensure best outcome.
- To enable discharges by supporting the continuing recovery of discharged patients.
- To share critical care skills with staff in wards ensuring enhancement of training opportunities and skills.

In 2007 NICE CG50 recommended that a hospital have a local graded response strategy to the clinically deteriorating patient and that Outreach could form a part of this response.

The UK National Outreach Forum recommend that *"There must be a hospital wide, standardised approach to the detection of the deteriorating patient and a clearly documented escalation process."*

Designed for Life the 2006 Welsh Government paper on Quality Requirements for Critical Care described outreach teams as being able to:

- Identify patients who are at risk of developing life threatening acute illness using simple risk assessment tools based on vital sign observation.
- Initiate immediate resuscitative action.
- Make appropriate referral, documentation and communication.
- Provide psychological and physiological surveillance to patients post critical care discharge.
- Provide outpatient clinics to provide psychological and physiological surveillance following discharge from hospital.
- Educate and train ward staff in the identification of deteriorating physiological signs, the use of appropriate early warning scoring systems and institution of appropriate treatments.

Measurement:
There is a variation across Wales in what existing Outreach teams' measure, how they store that data and how they analyse and respond to it.

Most Outreach teams collect data on both their work activity and the clinical data on the patients they see. Data input and storage ranges from none, to paper forms to handheld electronic databases. Data analysis is varied ranging from none at all to quarterly reports at a local clinical governance meeting. Outcomes and trends are seldom, if ever, escalated to senior management.

The Consensus Conference Metrics of MET has recently produced a draft of 10 measures that they recommend should be collected.

<u>Outreach Staff Competencies</u>

In 2012 the National Outreach Forum (NOrF) produced Operational Standards and Competencies for Critical Care Outreach Services (link above). This document set out the requirements of a hospital wide rapid response system, the required competencies of the staff involved in delivering this as well as the recommended measures that should be collected by such teams.

NOrF have recently set up a working group to establish a group to develop a *'patient focussed National Critical Care Outreach Credential and Career Framework'* by April 2020.

Summary of work stream conclusions:
To take forward "24/7 Outreach in Wales" it was important to define 'where we are' and have a clear picture of 'where we want to get to'. After defining 'where we are' discussions at the Outreach subgroup focussed on 3 possible options for Wales.

1. Scale up current provision on each site
Health Boards were asked in the Welsh Outreach Survey to state their current Whole-Time Equivalent staffing numbers and how many more they would need to simply 'Scale-up' to allow for 24/7 coverage using the current skill mix/banding of their Outreach teams.
In areas/hospitals where there was no provision e.g. UHL and HDUHB an estimate of WTEs to cover the gap was sought.

Pros- Tried and tested working model, at least within current hours. Well established interdependency relationships. Relatively simple to produce estimates of number of WTEs required.

Cons- Assumption that a model that works during the day will do so at night. Workforce out-of-hours may have developed pathways in absence of Outreach team. Different roles needed during night e.g. greater emphasis on Rapid response calls compared with ITU follow ups.
Need for large number of nursing staff to populate model.
Current ways of working may now transfer to out-of-hours period. Existing 'problems' with current models would be scaled-up too.

Estimated Cost for Wales: accurate costing by Workforce but rough estimate based on current A4C pay scale and need for projected scale-up numbers from each LHB (assuming Hywel Dda has band 6 provision) need for extra 70 Band 6s and 5 band 7s. (Midpoint)
Gap= £ 2.6Million

2. Select best available model and apply to rest of Wales
Using Comprehensive Critical Care and the National Outreach Forum's recommendations as a benchmark the models in Wales that are currently fully staffed, 24/7, with staff able to prescribe and that are well integrated into their hospital's 'acute deterioration response' systems seem to be the Gold Standard to which to aim for and consequently an option for going forward should consider recommending and resourcing this solution for hospitals where they don't exist.

Pros- Achieve the recommendations of the available best-practice guidance. Allow Outreach practitioners to assess and respond to acute deterioration in the absence of a doctor (often an issue during busy times). Cover at all times of the day. Allow for follow-up work/education/audit/QI during the day time.

Cons- for large number of nursing staff to populate model (at band 7 and therefore costly.) Potential for conflict with out-of-hours systems if imposed on top of existing structures and not integrated correctly.

Estimated Cost for Wales: accurate costing by Workforce. Estimate based on current A4C pay scale and applying BCUHB model for each LHB need 122 Band 7s(midpoint)=£4.9million
Current spend in LHBs on provision = £1.6
Gap = £3.3 Million.

3. Describe generic model for LHBs to work toward

All hospitals in Wales would benefit from a rapid response system tailored to the acutely deteriorating patient and delivered by a team that can fulfil these objectives:

1. To identify acutely deteriorating patients and institute timely treatment.
2. To facilitate safe discharge from Critical Care and follow up on discharged patients to reduce readmission.
3. To optimise ward-based treatments and recognise or resolve, where appropriate, issues of DNACPR and limitations of treatment.
4. To deliver education to all staff groups.
5. To measure and report on clinical outcomes.

This will be achieved by recommending that LHBs:

1. Use the National Early Warning score (NEWS) in all clinical areas to allow rapid, objective detection of early acute deterioration.
2. Have a hospital specific standard operating procedure that defines the response to acute deterioration. This will include details of the speed and urgency of response, the personnel involved and a jump call procedure. This policy will apply 24/7.
3. Define and/or resource a team to deliver this rapid response system 24/7. Critical Care Outreach, Hospital at Night, Nurse Practitioners, Resus should be integrated into this team to ensure efficient use of existing resources.
4. Ensure that rapid response team staff are appropriately trained and have regular competency assessments in line with the forthcoming National Critical Care Outreach Credential and Career Framework.
5. Ensure team staff have ring-fenced time to train ward staff.
6. Ensure team staff keep a record of their clinical work and record clinical outcomes on the patients they see to demonstrate improvement. These metrics should be clinically relevant and standardised across Wales.

Pros- Aspiration to generic principles allows existing structures to improve and expand along best practice evidence based lines. Measurement and education are prioritised. Once for Wales goal. Allows for integration with existing structures. Lower cost through efficient integration with existing systems.

Cons- No defined model for a LHB to use. (Less proscriptive) Solution is local and therefore may be different around Wales. Would require LHBs to plan and cost their own solution and bid for monies accordingly. Difficulty in ensuring that a LHB would follow through with the commitment. Existing barriers to integrating work forces that have historically evolved separately.

Estimated Cost for Wales: Costs will vary between LHBs depending on existing structures.

Summary of work stream recommendations:
The Outreach Workstream Sub-group and the Task & Finish group agreed that Option 3 was the most realisable, effective and sustainable option for Wales.

The final recommendation is that Health Boards must:

1. Use the National Early Warning score (NEWS) in all clinical areas to allow rapid, objective detection of early acute deterioration.
2. Have a hospital specific Standard Operating Procedure that defines the response to acute deterioration. This will include details of the speed and urgency of response, the personnel involved and a jump call procedure. This policy will apply 24/7.
3. Define and/or resource a team to deliver this rapid response system 24/7.
4. Critical Care Outreach, Hospital at Night, Nurse Practitioners, Resuscitation practitioners etc. should be integrated into this team to ensure efficient use of existing resources.
5. Ensure that rapid response team staff are appropriately trained and have regular competency assessments in line with the forthcoming National Critical Care Outreach Credential and Career Framework.
6. Ensure team staff have ring-fenced time to train ward staff.
7. Ensure team staff keep a record of their clinical work and record clinical outcomes on the patients they see to demonstrate improvement. These metrics should be clinically relevant and standardised across Wales.

Annex 4. Post-anaesthetic Care Units (PACUs) - Abrie Theron

Post-anaesthetic Care Units (PACU's) are evolving. In 2013 the Association of Anaesthetists of Great Britain and Ireland (AAGBI) defined PACU's as similar to what is traditionally known as "Recovery" in theatres[7]. In the same year Simpson and Moonesinghe described PACU as units where high-risk surgical patients, who would normally compete with other emergency admissions, can receive level 2 and 3 nurse-led, protocol driven care for 24hrs[8].

When Gareth Scholey set up the PACU unit in the University Hospital of Wales in 2015 it was to provide a protected environment to separate emergency and elective work streams and to deliver evidence-based level 2 post-operative care, with the exception of Maxillofacial patients who are ventilated overnight. Despite accommodating nearly twice as many cases as predicted in the first year (450 vs 250) only 2 operations were cancelled and there was a significant reduction in delayed starting times[9]. A similar reduction in cancellations was seen in Aneurin Bevan in the first year of their PACU[10].

Between 23rd January - 31st March 2017, Wrexham Maelor Hospital ran a pilot of an extended recovery service, in theatre recovery, with the aims of 1) improving the timeliness of emergency admissions to critical care by avoiding elective admissions and preserving emergency beds, 2) meet the unmet need of providing HDU care to high risk post-operative patients who would otherwise be sent to the ward or be cancelled and 3) reduce delayed transfer of care by preserving ward beds for the extended recovery patients[11].

Here the objective was different in that the aim was to meet the unmet need of both elective and emergency patients, which stems from the belief that the high post-operative mortality in the literature largely stems from emergency surgery that doesn't receive adequate post-operative care i.e. emergency laparotomies and fractured neck of femurs.

We are now at the point where this may further evolve to fit the particular needs of Wales.

The Need for PACU's:

According to NHS Wales Informatics Service (NWIS) data, postponement of elective surgery due to lack of critical care capacity is at a record high with 287 cases being postponed in the first six months of 2018[12]. Although it is perfectly acceptable for acutely critically ill patients to be allocated priority over elective patients, the loss of theatre resource and potential harm to the elective patients should not be

[7] Association of Anaesthetists of Great Britain and Ireland. Immediate Post-anaesthesia Recovery 2013. Anaesthesia 2013; 68: pages 288-97.

[8] Simpson and Moonesinghe Perioperative Medicine 2013, 2:5 http://www.perioperativemedicinejournal.com/content/2/1/5.

[9] G. M. Scholey, V. Jennings Wels, O. Morgan, M. Ware, C. Coslett, A. Saayman. Post-Anaesthetic Care Unit [PACU] 1st ANNUAL PROGRESS REPORT (2015-16).

[10] O. Lewis, B. Muthuswamy. Improving Patient Flow in Critical Care: Development of a Post Anaesthetic Care Unit with Simultaneous Virtual Ward Admission.

[11] Extended Recovery Pilot 2017 Audit, Report and Analysis.

[12] NWIS Cancellation Data: Procedures postponed due to a lack of a HDU / ICU bed.

underestimated. This may not be seen as a loss to Critical Care budget holders, but significantly impact the greater NHS budget.

On a UK level this has been highlighted by Wong et al. in their recent publication reporting on cancellations of planned operations as part of SNAP-2. During a 1-week period 10% of patients (n=1499) reported the same procedure being cancelled before. Requirement for critical care post-operatively was identified as an independent risk factor (odds ratio = 2.92% (95% confidence interval 2.12-4.02) with $p<0.001$)[13]. A further study of the same group with colleagues from Australia and New Zealand found that New Zealand had the least amount of critical care beds per capita, but the highest number of 'high-acuity' beds capable of managing high-risk patients outside the critical care environment per capita[14].

The Faculty of Intensive Care Medicine (FICM) has also recognised the need for "Enhanced Care" and is exploring the needs of patients who require "Level 1+" care. Older patients with co-morbidities are frequently looked after in a level 2 setting following acute illness or complex surgery, when they do not meet current admission criteria, but their needs are too complex to be managed on a ward. In the absence of national guidance FICM has established a working party to ensure quality and safety for patients managed in this setting combined with an evidence-based strategy for their development[15].

Objectives for PACU in Wales:

- PACU is an alternative environment for provision of patient care that cannot be delivered on a ward with current suggested nurse to patient ratios, in the first 24 - 48hrs post-operatively, for patients that do not need the level of care provided in a Critical Care setting.
- PACU is an essential part of the peri-operative pathway of selected, elective and non-elective, high-risk surgical patients, based on predicted mortality and morbidity during pre and post -operative risk stratification and on surgical procedure. (p-POSSUM, SORT, Nottingham Hip fracture Score, CPET)
- The purpose of PACU is to deliver an environment where intra-operative optimisation of high-risk surgical patients can be continued into the post-operative period and patients can be monitored for early complications in order to institute rapid rescue procedures to improve outcome.
- PACU is there to ensure the best possible patient outcome following major surgery. This will reduce length of hospital stay, patient rescue with admission to Critical Care and reduce patient morbidity & mortality.
- Patients in PACU that develop the need for Critical Care should be identified promptly with swift transition to the input and care required. Patients who are not ready to return to the ward at 24 - 48 hrs should also move onto Critical Care to address the issues hindering their discharge to the ward.

[13] D. J. N. Wong, S. K. Harris, S. R. Moonesinghe on behalf of the SNAP-2: EPICCS collaborators. Cancelled operations: a 7-day cohort study of planned adult inpatient surgery in 245 UK National Health Service hospitals. British Journal of Anaesthesia, 121 (4): 730-738 (2018).

[14] D. J. N. Wong, S. Popham, A. Marshall Wilson, L. M. Barneto, H. A. Lindsay, L. Farmer, D. Saunders, S. Wallace, D. Campbell, P. S. Myles, S. K. Harris and S. R. Moonesinghe on behalf of the SNAP-2: EPICCS collaborators. Postoperative critical care and high-acuity care provision in the United Kingdom, Australia, and New Zealand. British Journal of Anaesthesia, 122 (4): 460-469 (2019).

[15] A Pittard. Enhanced Care. Critical Eye Summer 2018 (14): page 8.

- PACU should not be seen as an opportunity to provide post-operative care for patients who need Critical Care i.e. predicted mortality of > 10%. It is also not for patients who are low risk and can be safely managed on a surgical ward with appropriate patient to nurse ratios and training i.e. pure epidural care.
- PACU predicates the need for multi-disciplinary team (MDT) working, agreed standard operating procedures (SOP), pathways and clear routes of escalation. The model cannot work without buy in from the Anaesthetics, Critical Care and Surgery.
- Respective processes will differ between hospitals due to the variety of case-mix and different levels of support in different areas via outreach etc. However, Health Boards will need to sign up to the package of preoperative assessment, risk stratification and provision of suitable post-op care.

Patient Selection:

- Pre-operative assessment and risk stratification are essential for resource allocation and hence for admission to PACU and Critical Care. During this process the patient's multi-disciplinary team determines the level of care needed and the area that would best provide for the patient's wishes and needs during the initial 24-48 hrs post-operatively: Ward, (Epidural unit), PACU or Critical Care.
- In the absence of multiple studies looking at different surgeries, a pragmatic approach would be to use the predicted 30-day mortality of 1% as an arbitrary point for consideration for PACU, as used by Swart et al. in colorectal surgery[16]. The recently updated Royal College of Surgeons' recommendations define a high-risk surgical patient as a patient with a predicted hospital mortality $\geq$ 5% and state that these patients should be considered for critical care[17].
- As a starting point we can therefore use a predicted mortality of between 1-5% as a rough guide for patient admission to PACU, as these patients are likely to benefit from the increased observation provided by the higher nurse to patient ratio, but do not necessarily need the intensive resources delivered by Critical Care.
- It is important to note that the current evidence base is not robust enough to use these criteria as absolute indicators for admission to PACU. Patients with a predicted mortality of < 1%, but in need of vasoconstrictors cannot safely be managed on a ward and would therefore benefit from PACU. Similarly, patients with a predicted mortality of 5 - 10% would benefit from the input provided by an intensivist, but all their needs could potentially still be met in a PACU.
- The predicted time the patient would need in a higher care environment can also determine where the patient is admitted to post-operatively. This is illustrated in the Wrexham pilot where the maximum PACU stay allowed was 18 hrs. If it was anticipated that patients would need >18hrs they were admitted to Critical Care.
- PACU's should be able to support patients needing non-invasive ventilation, intravenous vasoconstrictive and inotropic support, but PACU should exclude patients who are likely to need the following organ support – Invasive Ventilation, Haemodiafiltration, Haemodialysis and Intra-Aortic Balloon Pumps.

[16] M. Swart, J. B. Carlisle and J. Goddard. Using predicted 30 day mortality to plan postoperative colorectal surgery care: a cohort study. British Journal of Anaesthesia, 118 (1): 100–4 (2017).

[17] The Royal College of Surgeons: The High-Risk General Surgical Patient: Raising the Standard. November 2018.

- As further data becomes available these criteria will need to be reviewed and adjusted. Data collected from PACU patients in Wales could in future be used to validate admissions criteria.
- There is a conflict between elective and emergency patients competing for PACU beds and it would be for each hospital to decide on their priorities for provision of PACU beds. If the aim is to reduce cancellation of elective surgery due to lack of capacity in critical care it would be beneficial to ring fence PACU for the elective stream. In the situation where the pressure on emergency critical care provision is greater, PACU can provide for both the elective and the emergency stream, but this will be at the cost of elective surgery at times of high demand.
- For elective PACU admissions, patients should be booked with adequate notice to ensure the necessary resources are in place on the day of surgery. It is also important for planning to stipulate if it is expected the patient will need PACU care for more than 24hrs. Pt who require 48hrs in PACU should ideally be booked for a Monday, Tuesday, Wednesday or Thursday admission.

Location of accommodation and facilities:

- There are advantages in having PACU in close proximity to either theatre recovery and/or Critical Care, but it is not essential if other arrangements are in place to facilitate patient flow. If PACU is not in close proximity to Recovery or Critical Care good communication and arrangements need to be in place with agreed SOP's. Recovery needs to work towards agreed endpoints for admission to PACU if different to normal discharge criteria. Similarly, there needs to be agreed clear and open access from PACU to a designated Intensivist and Critical Care when a patient deteriorates.
- If PACU is part of theatre recovery patients can be admitted to PACU immediately after surgery. There is also the advantage of having the peri-operative team in close proximity. If this is not the case patients may need to be recovered prior to admission to PACU (as is the case in Cardiff). A further advantage of PACU close to recovery is that Recovery nurses could be trained to become PACU nurses.
- If PACU is part of or in close proximity to Critical Care, transition of care of patients who need escalation will be quicker, but this increases the risk of PACU resources being utilised by Critical Care during periods of high demand on their services. If PACU is on the same footprint as ITU it should be managed as a separate entity.
- If PACU is to provide for both the elective and emergency stream, it may be more beneficial if the PACU is located in or near Critical Care, as emergency admissions would not have received the intensive medical risk assessment and optimisation delivered in the pre-operative assessment clinic, as part of peri-operative medicine.
- PACU is to provide a protected environment for high-risk patients undergoing major surgery and must be ring fenced. As soon as this is infiltrated the model will collapse. Once management teams have bought into the model by protecting PACU, the system will work well. PACU's can however be included in surge capacity during crises where surgery, especially elective surgery, cannot be contemplated.
- In Wrexham, Cardiff and Newport PACU's were built around "virtual" beds which worked and continue to work exceptionally well[3-5]. In these models there are no beds in PACU, only spaces to accommodate patients on the beds allocated to them on the ward. As a consequence, patient's virtual beds in the ward cannot be occupied to potentially delay the discharge from PACU. This only works because

everybody, including executives, bought into the model. We feel strongly that all new PACU's in Wales should be designed around virtual beds.

- In Cardiff PACU closes on Saturday afternoons, with patients not ready for ward-based care admitted to Critical Care and reopens around midday on Monday, when the first patient is ready to be admitted. The Wrexham PACU ran for 4 nights a week (Monday – Thursday), reflecting the times of major surgery and the need for the space to be used as recovery during the working day. In order for patients not to accumulate in PACU and preventing new admissions, it is suggested that PACU should close at least once a week.
- The aim should be to run your PACU at 95% occupancy to make the best use of the resource.
- It is important that the priorities of enhanced recovery (drinking, eating, mobilising and sleep) are prioritised where PACU care allows. Ideally the PACU environment should reduce noise and allow for room to mobilise without obstruction.
- Monitoring should have the ability to be equal to that expected in HDU.

Staffing & Standards:

- Nurses form the backbone of the care provided on PACU's. High risk surgical patients should be closely monitored for deterioration in the first 24 - 48hrs following major surgery, with prompt escalation for rescue, if deterioration has been identified.
- Close nursing care is essential to provide this safety net. When established in Cardiff a HDU ratio was adopted with 1:2 nurse to patient ratio with an additional HCSW.
- If agreed that no patient should receive invasive ventilation, haemodiafiltration, haemodialysis or is managed with an intra-aortic balloon pump, consideration should be given to increase this ratio to 1:3, with a minimum of 2 nurses in the area.
- In Newport the nurse to patient ratio was 1:3 from the onset, but this increase should be done with caution and monitoring if PACU is to include patients with a predicted mortality of >3% and patients post emergency surgery.
- The ratio will be informed by the number of beds in the PACU and whether PACU is in the same area as HDU. A six bedded stand-alone PACU should have as the bare minimum 2 nurses and 1 HCSW. In smaller PACU's it will be more difficult to increase the ratio unless co-located in either HDU or Theatre Recovery. If PACU consists of 3 spaces in an established HDU potentially only 1 nurse will be needed for 3 patients, provided the patients fulfil criteria set out in this document for PACU admission.
- In Cardiff nurses from the Critical Care establishment were used to staff PACU, without a significant uplift of new nursing staff. At present Critical Care nurses are a limiting resource in Cardiff. Future PACU's should be developed by attracting and training nurses from surgical wards, recovery and other areas.
- The Wrexham pilot used nurses from recovery and anaesthetics to staff the PACU as there was no capacity from the Critical Care establishment to cover PACU. This did lead to some problems as recovery nurses were very reluctant to step pts down from a 1:1 ratio (in recovery) to a 1:2 ratio for PACU care.
- Intensive care units can consider rotating their staff through PACU. PACU is a less pressured environment and it may be beneficial for staff to have periods in PACU.

- Allied healthcare professionals (AHP) whose input are essential include, the acute pain team, physiotherapy, dieticians, pharmacy, a data manager and admin staff.
- Input from Intensivists will be beneficial, but is not essential, provided that there is a designated Intensivist that can be contacted for advice and escalation of care. Clear accountability for deteriorating patients is paramount. Basic medical cover can be provided by the patient's peri-operative team and allied healthcare professionals.
- PACU patients should ideally be reviewed by their perioperative team (surgeon and anaesthetist) at the end of the operating list and again by the same team in the morning. The majority of patients will be ready to go back to the ward at 18 - 24 hrs.
- If this is not possible the patient should continue to have 2 daily reviews. If at 48hrs the patient is still not ready for care on the ward, the patient should be admitted to Critical Care for input from an Intensivist.
- Consideration should be given to include PACU ward rounds as sessions in the job plans of properly trained anaesthetists, combined with pain ward rounds, outreach, follow-up of surgical patients on the wards and preoperative assessment clinics.
- PACU patients cannot be covered by hospital at night doctors as they may not have the expertise to deal with the patients' needs. Senior on-call trainees from Surgery Anaesthesia or Critical Care should be contacted after hours.

Costings:

- It is difficult to give a precise figure as there are many variables.
- Capital outlay will depend on whether you establish your PACU in an established critical care footprint, as in Cardiff, where the initial costs will be minimal. In Wrexham there was also no capital funding required as recovery was used.
- This needs to be compared to the significant funding required to build or reconfigure an area into a new PACU, which will be similar to that required to build a new HDU.
- With regards to staffing costs, the Wrexham pilot was the cheapest in that extra nurses were only required for 18hrs, 4 nights of the week. The Cardiff PACU is the most expensive as 24hr 1:2 nursing care is required for 5 days of the week.
- Medical staffing costs will depend on whether you decide to use the peri-operative surgeon and anaesthetist to look after PACU patients within their current job plan arrangements or whether you have a designated medic to perform twice daily ward rounds reviewing all patients in PACU.
- If PACU is to admit emergency patients the nursing cover may need to be extended to 24 hrs per day, 7 days a week with consideration given to having more medical and intensivist input.
- As a consequence of the empty spaces on the ward, one can potentially expect the ward physiotherapist and dieticians, to attend to the patient during their relative short stay in PACU, rather than employing AHP specifically for PACU.
- Below is a business case and roster for a 6 bedded PACU, running from lunch time Monday to lunch time Saturday, with a 1:3 nurse to patient ratio and 1 session of medical cover (providing 2 ward rounds a day), for 52 weeks per year.
- Maintaining a 1:2 ratio would increase the annual cost by £180 000.

Costing for a 6 bedded PACU

Staff	WTE	Cost	Notes
Consultant	0.77	94,000	Two ward rounds per day assumed to equate to 1 session. Therefore, 5 sessions per week. Assume job plan is 8 DCCs and 2 SPAs. Cover to be open 52 weeks of the year.
Nursing			
Band 7	1.00	47,000	
Band 6	3.51	159,000	Includes 15% for enhancements
Band 5	4.16	153,000	Includes 15% for enhancements
HCRW - Band 2	4.47	116,000	Includes 20% for enhancements
Sub-total nursing	*13.1*	*475,000*	
Allied Health Professions	0.00	0	Assumed that AHPs from the relevant ward(s) would attend if required.
Administration	1.00	23,000	Band 3
Sub-total pay	**14.91**	**592,000**	
Non-pay		312,000	Based on 6 beds open 5 days a week for 52 weeks at £200 per bed day. Covering consummables, maintenance, radiology and laboratory and other support.
TOTAL		**904,000**	

PACU is open from Monday lunchtime to Saturday lunchtime
Nursing roster as per attached.
The costing includes a Band 7 post to lead the PACU with a day per week supernummary.
(This could vary depending on organisational arrangements)
The costing is at mean of scale for each grade of staff.

roster

	SUNDAY		MONDAY		TUESDAY		WEDNESDAY		THURSDAY		FRIDAY		SATURDAY		Qualified		Unqualified	
	Q	UQ	Q	UQ	Q	UQ	Q	UQ	Q	UQ	Q	UQ	Q	UQ				
	Number of People on		Number of People on		Number of People on		Number of People on		Number of People on		Number of People on		Number of People on		Numbers	Total Hours	Numbers	Total Hours
Day 12.5 hours																		
Band 6			1		1		1		1		1				5.00	60.00	-	0.00
Band 5					1		1		1		1				4.00	48.00	-	0.00
Band 3															-	0.00	-	0.00
Band 2				1		1		1		1		1		1	-	0.00	6.00	72.00
Night 12.5hrs																		
Band 6			1		1		1		1		1				5.00	60.00	-	0.00
Band 5			1		1		1		1		1				5.00	60.00	-	0.00
Band 3															-	0.00	-	0.00
Band 2				1		1		1		1		1			-	0.00	5.00	60.00
Early 7.5 hours																		
Band 6													1		1.00	7.50	-	0.00
Band 5													1		1.00	7.50	-	0.00
Band 3															-	0.00	-	0.00
Band 2															-	0.00	-	0.00
Late 7.5 hours																		
Band 6															-	0.00	-	0.00
Band 5			1												1.00	7.50	-	0.00
Band 3															-	0.00	-	0.00
Band 2															-	0.00	-	0.00
Night 10 hours																		
Band 6															-	0.00	-	0.00
Band 5															-	0.00	-	0.00
Band 3															-	0.00	-	0.00
Band 2															-	0.00	-	0.00
Total Weekly hours																250.50		132.00
															WTE		**WTE**	
Hours converted to WTE required																6.68		3.52
Allowance															26.9%	1.80		0.95
Supernumery time																		
Supernumary Band 7 office time																0.20		
TOTAL WTE Requirement																8.68		4.47

Required Establishment

Grade	WTE	Hours
Band 7	1.00	37.50
Band 6	3.51	131.80
Band 5	4.16	156.09
Band 3	0.00	0.00
Band 2	4.47	167.51
Total	13.14	492.89
Qualified		325.38
Unqualified		167.51
		492.89

Total WTE	**13.14**
Check	0.00

Data Collection, Monitoring & Governance:

- Clear governance of high care areas is essential and data collection is paramount. It is important to illustrate how PACU's function and will inform further evolution.
- Mortality, admissions to critical care from PACU and re-admissions to critical care after stepdown from PACU need to be monitored to ensure robust governance.
- Consideration should be given for generic peri-operative data collection across Wales, with the same dataset for all units. The cost of this could potentially be incorporated into the funding for PACU developments.
- It was debated whether ICNARC is suitable to do this:
- In Cardiff, as PACU is part of the Critical Care foot-print, it was initially left as one ICNARC data set. Recently, it was felt to be incorrect and data has been separated since April 2018. Analysis of both sets of ICNARC data and comparison could be beneficial and inform the debate.
- ICNARC is a physiological scoring system and co-morbidity tool and often has a very low Risk of Death (ROD). The average ICNARC ROD for PACU in Cardiff is 2%.
- It is the opinion of this group that PACU data should be collected by ICNARC, but separated into 2 distinct reports, one for PACU and another for Critical Care.
- Using data from the Critical Care Minimum Data Set (CCMDS) should also be explored.

Summary and Proposal:

1. PACU is an opportunity to provide care to high risk surgical patients that cannot be delivered safely on a ward in the first 24 - 48hrs post-operatively, for patients that do not require the level of care provided in a Critical Care setting.
2. With careful consideration and monitoring the nursing to patient ratio can be 1:3 as this would be a substantial uplift from the normal ward ratio.
3. With clear SOP's and agreement this group of patients can be under the care of the peri-operative surgeons and anaesthetists with Intensivists only contacted when their expertise is required, freeing intensivists up to care for critically ill patients.
4. PACU's will reduce cancellations and delayed starting times due to lack of critical care capacity, with loss of theatre resource and potential harm to patients.
5. By preventing suboptimal care on over stretched surgical wards, PACU will reduce length of hospital stay, patient rescue with admission to Critical Care and reduce patient morbidity & mortality.
6. Virtual PACU beds are the way forward as this ensures timely discharge of patients back to the ward.
7. Priority should be given to comparable PACU data collection across Wales via ICNARC, as clear governance of the proposed changes is essential and will influence further evolution.

We therefore feel strongly that Health Boards without PACU's should give this new development serious consideration as it will reduce waste, secondary to a shortfall in critical care capacity and with careful planning has the potential to give patient outcomes equal to that from a Critical Care admission.

Annex 5. Long Term Ventilation - Jack Parry-Jones

Long term ventilated and slow to wean patients are few in number but take up a considerable number of critical care bed days in acute critical care units. These patients are often no longer critically ill, and are suffering a disservice and some risk by being co-located with the critically ill. A bespoke LTiV and weaning unit would provide a safer environment in a dedicated unit with staff to optimise their recovery and plan on-going care needs. Regionally provided LTiV units are a recommendation in the UK General Provision of Intensive Care Services (GPICS 2).
A service evaluation of patients ventilated for more than 30, 60, or 100 days demonstrated that 19 patients in Wales were ventilated for more than 100 days. If these were taken out of the acute critical care units it would free up much needed capacity, particularly in smaller units. Overall this would help critical care services in Wales manage the increasing demand for critical care. That demand is increasing due to public and professional expectations of what can be done. The major trauma centre in Cardiff is likely to increase demand for LTiV due to spinal and thoracic injuries, alongside changing expectations for chronic neuromuscular diseases that are also going to increase demand for LTiV.

All Health Board's Chief executives and Chief operating officers were asked if they would be interested in hosting an LTiV unit. North Wales accesses LTiV services in England. In South Wales the only HB expressing an interest in providing the service was CVUHB. There are also very good grounds for hosting it in Llandough due already having a small LTiV service which can be expanded, and because of significant advantages in co-locating with Rookwood rehabilitation services which are moving to the Llandough site in 2019/20.

Several LTiV services have been visited by the Llandough team which included nursing, psychology, nursing, medical and Finance. The Lane Fox service in Guys and St Thomas Trust have been very supportive of our endeavour. Work has commenced on putting the right structures and processes in place. These include referral and acceptance, a financial model that will provide economies of scale, and appropriate staffing models. The Llandough unit will need a rebuild to expand its capacity in a good environment for these patients and CVUHB estates are already involved.

An LTiV service is supported by many in the region who recognise both that it will reduce demand in the acute units and also provide a better service to these unfortunate patients. These views were expressed in the Stake Holder engagement meeting, and at the Task and Finish Group meeting on April 30th 2019.

Summary of work stream recommendations:

1. Single site for LTiV and weaning unit in Wales.
2. A phased expansion to a 10 bedded LTiV unit, co-located with the Rookwood rehabilitation service on the Llandough site (UHL).
3. LTiV unit needs to be a bespoke unit with an appropriate environment and appropriate staffing which includes physiotherapy, pharmacy, occupational therapy, speech and language, dietetics, clinical psychology, nursing and medicine.
4. Close links with service level agreements need to be firmly established with E.N.T, Urology, Gastroenterology and Spinal services.

5. The LTiV service should meet UK standards as outlined in the General Provision of Critical Care Services (GPICS 2) and Getting it Right First Time (GiRFT).
6. Clear timely referral, and acceptance criteria for all referring critical care units in Wales in conjunction with the Critical Care and Trauma Networks.
7. Close working arrangements with Welsh Health Specialised Services Committee (WHSSC) to give financial clarity to HBs for these patients
8. A downstream process from LTiV involving the Health Board's Continuing Health Care teams (CHC) to ensure that discharges from the LTiV unit are timely, and appropriate with stable care packages that are cost effective, with good clinical governance and management of risk.

Annex 6. Transfers - Sue O'Keefe

Each year, in total, there are around 450 critical care (L2 and L3) transfers. This has decreased slightly since the establishment of the Emergency Medical and Retrieval Service (EMRTS), most likely because some patients are going direct to the correct destination in the first instance e.g. major trauma patients going direct to a major trauma centre.

Most critical care secondary transfers are undertaken by the Health Boards, some are carried out by EMRTS but the numbers are low, 10% of all critical care transfers in 2018.

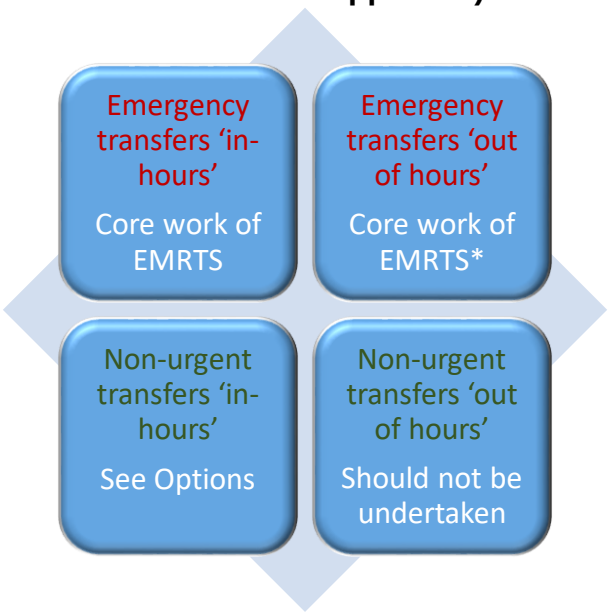
Health Boards find it increasingly difficult to release staff, particularly appropriately trained[18] medical staff, to undertake transfers. Where possible EMRTS will undertake transfers if the patient fulfils certain criteria (critically ill or injured, time critical and requires specialist intervention, or high risk of deterioration).

There is also a fourth (Welsh Air Ambulance Charity) aircraft primarily for children but also available for critical care transfers i.e. not pre-hospital care. However, whilst EMRTS provide a Helicopter Transfer Practitioner (HTP) escort, the sending hospital/HB is still required to send a medical escort. EMRTS are currently funded 08.00-20.00hrs however there is a business case pending for EMRTS 24/7 cover.

The current transfer model is less than ideal with frequent delays (usually due to for example, Welsh Ambulance Service Trust (WAST) and appropriate medical staff availability) and, not infrequently, non-adherence to the Guidelines[1] (15.2% of returned forms that have the grade of staff documented show an inappropriate grade of staff, and therefore level of training, undertaking the transfer).
Service reconfigurations, hospital designations and changes are likely to result in additional critical care transfers. The transfer model for Wales requires enhancing to ensure that patients are transferred as timely and safely as possible.

[18]Designed for Life: Welsh guidelines for the transfer of the critically ill adult.

Critical Care Secondary Transfers and Alignment with EMRTS (assumes EMRTS becomes 24/7 i.e. Business Case is approved):



The Welsh Government's Task and Finish Group therefore requested the Transfers Workstream to:

- Consider options for the development of a model of transfers for patients who are critically ill (secondary transfers/repatriations)
- Provide advice to the workforce work stream on any potential staff implications or training requirements

Recommended Option:

Dedicated Regional Transfer Teams for non-urgent transfers in hours. Such transfers could be transfers for capacity reasons or repatriations. These transfers do not form part of the core work of EMRTS and, as such, is the primary area that needs addressing to mitigate many of the issues cited above.
NB: EMRTS will not be able transfer all of the time-critical secondary patients due to primary taskings, weather etc., so some of these transfers will inevitably fall to this service too.

The model proposes dedicated transfer teams in two regions (North and South):

- Two regional assets (dedicated vehicles and drivers): 08.00hrs – 20.00hrs, 365 days a year:
- Two regional transfer teams: 08.00hrs – 20.00hrs, 365 days a year:
    - A rota of individuals in each region, staffed as outlined below. A dedicated transfer rota creates an opportunity for quality control and adherence to the standards[1].
    - North (A55 corridor), South (M4 corridor)
- Equipment will be required including trolleys, ventilators, pumps and monitors (not exhaustive), see costings section.
- Hosted by EMRTS (ABMUHB):
    - Road assets and driver provided by WAST under appropriate Memorandum of Understanding (MOU)

    - Hosting arrangements similar to those seen with EMRTS
        - Incident reporting, Workforce, Occupational Health, Management
        - ABMU hold funds: clinicians paid by home health board, ABMU recharged
- Governance arrangements as per EMRTS:
    - Utilising Air Support Desk (ASD) and Top Cover Consultant
    - Clinical and Operational Standard Operating Procedures (SOPs) of EMRTS utilised
    - WCC&TN audit transfers (as currently done)
- Personnel:
    - Emergency response trained drivers x2 regions
    - Medical escort ST3 and above[1] x2 regions
    - Second escort (ODP, paramedic, technician or nurse with relevant critical care experience) x2 regions
    - ASD staff (within EMRTS 24/7 Business Case)
    - Additional managerial support (Deputy service manager)
    - Administrator to rota coordinate x2 regions' team cover
    - Repatriation Coordinator

Impact Assessment:

The impact assessment assesses both the positives and negatives of the proposed model:

Impact – Positives:
No depletion of HB staff (and therefore core activity/list cessation etc.) – positive impact hospital safety and resilience, RTT (referral to treatment) etc.
Dedicated assets with no reliance on WAST frontline – positive impact on WAST primary taskings and therefore improved availability for community response. Positive impact on timeliness of transfers (not waiting for WAST availability)
Skilled/trained personnel due to regularity of undertaking transfers – positive impact on patient safety
Adherence to D4L Guidelines e.g. seniority of transferring escort(s) – positive impact on patient safety
Potential (medical) recruitment opportunities being able to offer staff sessions on transfer team – positive impact on recruitment - Existing or new consultants - Existing or new consultants wishing to progress to EMRTS posts (could make this role mandatory before progression to EMRTS) - Middle grade 'fellow' posts - Offered as an advanced transfer module for anaesthetic trainees (possibly with partial deanery funding) - Offered as an advanced transfer module for ICM trainees (possibly with partial deanery funding)
Developmental opportunities for 'second escort' – positive impact on recruitment
Single governance structure for all critical care transfers in Wales – positive impact on patient safety
Single point of contact for all critical care transfers in Wales – positive impact on patient safety, communication and governance

Additional tier to EMRTS – positive impact on resilience in both assets and manpower, especially in relation to major incident resilience.
EMRTS core business – positive impact on EMRTS core business (does not require a change in EMRTS philosophy which could negatively impact on their recruitment and resilience)

Impact – Negatives:
Costs – negative impact on 'other' critical care services (certainly more costly than 'do nothing' but possibly offset by improved flow, timeliness and patient safety).
Geographical constraints – negative impact on timeliness (NB: EMRTS core/air available for time critical transfers however)
Recruitment: medical (consultant). Most Consultants already fully job planned. Whether they will be prepared to undertake this role remains to be determined.
Recruitment: medical (trainee). If offered as a trainee role, then would require to be negotiated with deanery in terms of job planning, educational opportunities, base hospital etc.
Recruitment: medical (Non Consultant Career Grade (NCCG)). The fellowship role would require significant logistical input including a base for the doctor.
Recruitment second escort – potential negative impact on WAST or hospital Operating Department staffing
Staffing two regions 365 days/year – negative impact on resilience of model
Additional tier to EMRTS – potential negative impact with interface issues

Workforce Requirements:

Personnel	**Grade/Band**	**WTE**	**Costs (Revenue)**
Ambulance driver*	Band 3	5.68	£157,450
Medical escort*	ST3 and above	5.68	£681,032
Second escort*	Band 6	5.68	£267,869
Deputy Service Manager	Band 8a	1	£57,300
Administrator (cross cover with below)	Band 4	1	£26,600
Repatriation Coordinator (cross cover with above)	Band 6	1	£39,300
***Need 7/days per week, 365 days per year cover for two regions**		**Sub Total**	**£1,229,391**

Capital Requirements:

Item	**Volume**	**Costs (Capital)**	
Ambulance (lease)	2	TBC	See embed
Trolley	4	TBC but approx. £14k each	£56k + VAT
Vac Matts	4	TBC but approx. £900 each	£3,600 + VAT
Ventilators	4	TBC but approx. £16k each	£64k + VAT
Monitor Defibrillators	4	TBC but approx. £18k each	£72k + VAT

Syringe drivers*	10	TBC but approx. £2310 each	£23k + VAT
Infusion pumps*	6	TBC but approx. £2500 each	£15k + VAT
Blood/fluid warmers	4	TBC but approx. £2950 each	£11,800k + VAT
Blankets	10	TBC	
Suction Units*	4	TBC but approx. £1500 each	£6k + VAT
Video-laryngoscopes	4	TBC but approx. £14k each	£56k + VAT
Transfer Kit bags*	2	TBC but approx. £500 each	£1000 + VAT
Scoops	4	TBC but approx. £800 each	£3200 + VAT
Sub Total			**~£311,600 + VAT**

*Requires disposables, not defined or costed (see revenue requirements)

Revenue Requirements:

*NB there will be **significant revenue requirements** in terms of disposables as well: Ventilator tubing, drugs, PPE, blizzard blankets etc. Fuel costs and base hire (e.g. Cardiff airport and Llanfairfechan) will also need to be factored in.*

Total Estimated Costs				
	Revenue costs (Workforce)	Revenue costs (Drivers & lease)	Capital costs	**Total Year 1***
Using EASC/WAST Quotes	£1,072,101 (As above but excl drivers)	£255K (Driver & vehicles x2)	£300-400k (~£373,920)	**£1,701,021**
	Total Revenue Ongoing £1,327,101 p.a.			

Summary of Recommendation:

The benefits of having a dedicated transfer service will be;

- No reliance on frontline WAST assets (therefore minimal delays).
- No depletion of hospital/HB frontline staff; workforce prudency.
- Improving flow for all hospitals but especially the tertiary centres.
- Compliance with Designed for Life: Welsh Guidelines for the transfer of the critically ill adult.
- Another tier to EMRTS, adding resilience.
- Can be used for the critically ill e.g. cardiac/PPCI, vascular etc. (not just critical care).

This does however require further scoping by EASC especially in relation to the potential of aligning or amalgamating this eservice with another e.g. trauma service and/or cardiac.

It is likely that Medical Staffing will be very difficult as most Doctors are already fully job-planned with little scope for additional duties so the key risk here is medical staff recruitment;

a) Anaesthetic consultants in Wales are prepared to re-job plan to take on this work?
b) The anaesthesia STC is in a position to allocate trainees to staff the model?
c) The creation of fellowships for NCCGs can be functionally operationalised?

If the answer to the above is not favourable, then the only likely way to staff the option would involve locum/WLI remuneration (even this this is at risk with the recent taxation laws). This could be actioned as an interim while fellowships are created, and while the deanery/STC reorganise their training programme. This is however a costly service and using locum will increase those costs.

It should be noted that that no model would be able to get to *all* of the patients *all* of the time and that hospital staff will need to retain skills for occasions when they do need to undertake a transfer.

An additional recommendation is that no capacity or non-urgent transfers will be undertaken out of hours (20.00 – 08.00hrs).

Annex 7. Mapping of service model, demand and capacity - Sue O'Keefe

Much has been written about critical care capacity in Wales but little has changed in terms of capacity for many years. In the NHS previous capacity planning for critical care usually derived from an arbitrary percentage of total hospital beds however this completely ignores hospitals' case mix; those undertaking complex and specialist services will require more critical care beds than hospitals that do not undertake such work. Wales, like all parts of the UK has:

- An ageing population
- Increasing demand on critical care, around 4-5% per annum
- High occupancy levels
- Significant unmet need
- High levels of delayed transfers of care (DToCs) from critical care
- Changes in patient flows for example, out of hospital cardiac arrests, major trauma and devastating brain injuries (DBI)
- Changes in National Guidance for example, National Emergency Laporotomy Audit, Abdominal Aortic Aneurysm and DBI
- Service reconfigurations for example, centralisation of services and changes in designation of hospitals
- Been subject to Regulation 28s due to lack of capacity in specialist centres
- Workforce shortfalls
- Variance of provision of services for the critically ill for example, Critical Care Outreach, Level 1/ Single organ failure and PACU (Post Anaesthesia Care Units).

It is therefore the remit of the Mapping, Modelling and Capacity Workstream to map changes in clinical pathways, including new, impending therapies, to assess their likely impact on the critical care service to make recommendations on future critical care configuration in Wales.

This paper will;

- briefly discuss the key areas relative to this Workstream
- undertake an impact assessment
- make recommendations on future critical care configuration
- Discussion of the key areas relevant to the Mapping, Modelling and Capacity Workstream.

Critical Care Data and Information:

Critical Care is data rich. It is mandatory for all critical care Units to submit data, for all critical care admissions to both ICNARC (Intensive Care National Audit Research Centre) and CCMDS (Critical Care Minimum Dataset – Wales). These datasets do not however capture information on patients *outside* critical care so do not provide information on unmet need nor outcomes for patients unable to access critical care.

The Critical Care and Trauma Network, in 2014, undertook a detailed assessment of unmet need across Wales. The study showed that, at that time, using conservative estimates and assuming no change in practices, 73 additional critical care beds, probably mostly L2, were required across Wales. Since then some patient pathways have changed. Consideration therefore needs to be given to where additional beds need to be provided given 'patient need' (not just population need) in light of current and proposed changes in patient flows, service configurations national guidance and emerging therapies.

Nationally and internationally there are population based figures for critical care bed provision. Wales lags behind most countries with 5.7 L2/L3 beds per 100,000 population compared to 7 in the rest of the UK and an average 11.5 across Europe. It is however difficult to make direct comparisons with anywhere other than the rest of the UK due to differing healthcare models.

There is also detailed mathematical modelling available to define where additional critical care is required. This takes significant time to complete and can model in pre-existing inefficiencies. If utilised it would be required to be undertaken across the whole of Wales, not per Health Board, in order to capture the impact of changing pathways, flows and service needs and reconfigurations. The Mapping, Modelling and Capacity Workstream agreed therefore that, given the time limitations, current and pre-existing information would be used to inform the recommendations. Mathematical modelling will be recommended for all Wales as a medium to long term objective.

Delayed Transfers of Care from Critical Care (DToCs):
Critical Care Delayed Transfers of Care (DToCs) are an inefficient and expensive use of critical care facilities but are a direct reflection of the whole system flow. There are several ways in which delayed discharges impact on patient care throughout the hospital but primarily result in:

- cancelled high risk or complex operations
- deferred admissions
- refused admissions
- patients being transferred to other hospitals for critical care (non-clinical transfers) or
- patients being cared for in an environment that is sub-optimal for their needs (this also has a knock on effect to those departments).

An impact assessment has been undertaken to review the costs of DToCs both quantitatively and from a quality perspective. The impact on the individual (DToC) patient is not insignificant.

From the April 2017 to March 2018 there was the equivalent of 16 beds ‘blocked’ due to delayed discharges; it is estimated that these Critical Care DToCs cost NHS Wales at least £10m. DToCs are worsening year on year so the costs are likely to increase accordingly.

Narrative Survey:
Datasets and quantitative data answer specific questions posed however they do not elicit the views of the clinicians working in critical care. A survey was undertaken early November 2018 with the aim of supplementing current and prospective data with narrative from a clinician perspective.

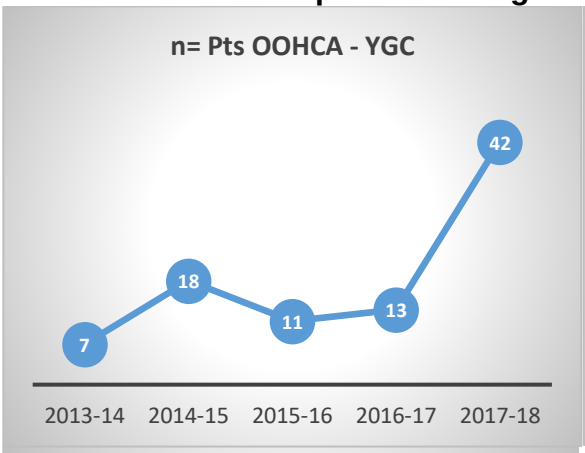
Many of the findings support the Delivery Plan for the Critically Ill recommendations. Key discussions were around:

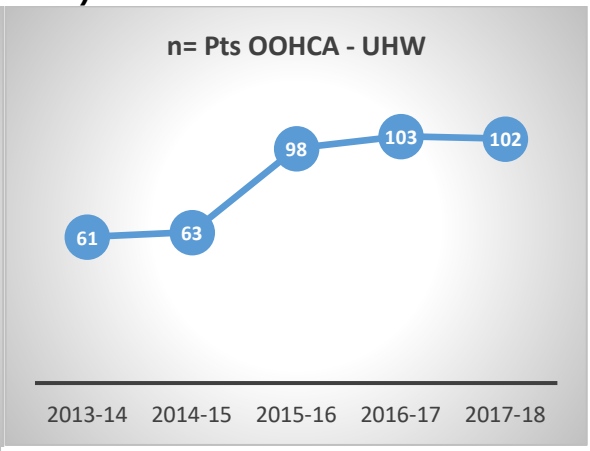
- Early treatment limitation decisions for common chronic illnesses/complex illness/longer term inpatients should be undertaken in OPDs.
- There is a large variation in NIV delivery across Wales but not universal compliance with the NCEPOD Report ‘Acute Non-Invasive Ventilation – Inspiring Change’ (2017) nor the Delivery Plan for the Critically Ill (2016).
- There is variance of acute renal care across Wales – some hospitals do not have acute renal services out of hours or at all.

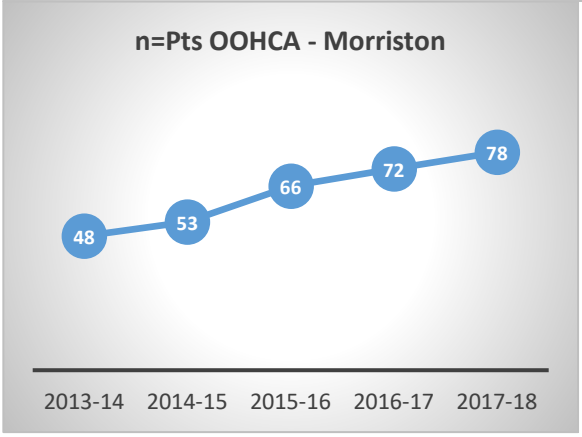
- Engagement with 'other' specialties for example neurophysiology, cardiology (ECHO) microbiology, emergency endoscopy and psychiatry etc. etc. affects length of stay on critical care.
- Delayed Transfers of Care (DToCs) are an issue – see section specific to DToCs.

Changing Flows:
In recent years there have been changes in patient flows such as with devastating brain injury (DBI) guidance and out of hospital cardiac arrest (OOHCA). This is enhanced by the introduction of Emergency Medical Retrieval Service (EMRTS) taking patients to the correct place in the first instance. The majority of these changes have been done without business cases for increased critical care capacity as a result of increased demand. For those centres affected the impact is significant in terms of bed days. For patients admitted to critical care with OOHCA alone the increase is demonstrable.

WardWatcher data for patients admitted to the Critical Care Units with Out of Hospital Cardiac Arrest 24 hours prior to admission (excludes patients who arrested or re-arrested in hospital following OOHCA):







Further changes are planned with the development of a Major Trauma Centre for South Wales, as well as centralisation of complex vascular surgery, stroke thrombectomy and potentially thoracic surgery. Despite this significant work and inevitable impact on specialist critical care units, there was minimal mention of critical care expansion within the HBs 2018 Integrated Medium Term Plans (IMTPs), as is noted below.

Centralising services does not equate to being able to reduce bed capacity in non-specialist District General Hospitals Critical Care Units as there will not be a significant drop in activity at the individual sites. Cohorting all these patients into two/three sites does have an impact on the designated centres however. The average length of stay for patients admitted with an OOHCA alone is 5.2 days. The increases in bed days to the three hospitals cited above

equates to approximately 0.5 L3 bed per Unit. Adding in other services (noted above) will have additional impact.

National Guidance, for example National Emergency Laporotomy Audit (NELA) and Abdominal Aortic Aneurysm (NICE [out for consultation])
NELA (2018) standards specify that high risk patients should be admitted directly to critical care following their surgery. If high risk patients are admitted directly to a ward after their emergency surgery they may not receive the required level of monitoring, assessment and postoperative care. Evidence shows that more patients die if they are initially cared for after surgery on a general ward and then subsequently require treatment in a critical care unit than if they are transferred directly after surgery to a critical care unit. Patients are likely to require unplanned admission to critical care if they deteriorate on the ward or require a return to theatre following their initial emergency laparotomy.

The NELA Report therefore recommends *'commissioners, provider executive boards and medical director review adequacy of critical care bed capacity, based on estimation of high risk patients and emergency surgical caseload, and work to address any shortfall. Capacity needs to be sufficient to admit all high risk patients (predicted mortality ≥5%) and minimise premature discharge from critical care'*. In Wales, there is inadequate capacity for consistent admission of all high risk emergency surgical patients and, in some HBs this has affected outcomes (evidence via Peer Review).

This is a nationwide issue impacting on all Critical Care Units.

The current patient pathway of endovascular aneurysm repair (EVAR) which does not routinely require patient to be admitted to critical care is under review due *'inferior late survival compared with open repair'*. The NICE guideline 'Abdominal aortic aneurysm: diagnosis and management', currently out for consultation, recommends open repairs, especially for unruptured aortic aneurysms. These patients will require critical care post-operatively.

The impact of these patients will be noted in the three vascular centres; University Hospital of Wales, Morriston and Glan Clwyd.

Business Cases (and IMTPs):
As part of the Mapping, Modelling and Capacity Workstream's work the Health Boards' Chief Executive Officers were written to requesting a copy of their existing critical care business cases. This was in order to assess what additional critical care capacity has been planned (albeit not yet approved) in light of any proposed service reconfigurations or changes that may impact on critical care. There may also have been HBs planning general expansion.

Only ABUHB and BCUHB submitted pre-existing business cases. C&VUHB report a business case in progress however it was not submitted to the Workstream.

Aspiring Services (see also Workforce Workstream Report):
The Workforce Workstream circulated a Workforce/Bed provision questionnaire. With the aim of *'gathering and verifying data and narratives around the critical care workforce for Wales to make recommendations to the Welsh Government Task and Finish Group for Critical Care Capacity'*.
Amongst many other questions the questionnaire asked '*Are you expecting to expand or increase staffing and/or capacity?'*

Results collated from this questionnaire alongside information from the Business Cases (cited above section) indicate:

	AB*	ABM	BCU*	C&V	CT	HD
Current Level 3 equivalent bed numbers	23	27	25.5	26/28	14.5	22
2019/2020	25	40	29 (At YGC site)	32 (note this is already planned and in progress for Feb 2019)	No data	No data
Beyond 2021	28			40-50		

*Referenced in HB's Business Cases.

NB UHW 26 in September 2018, increased to 28 with WG winter pressures monies (HB commitment to continue increase).

Narrative explanation:

- **AB –** Business case cites a clinical futures plan (mathematical modellers from the University of South Wales and ABCi department) which states the current 23 beds needs to increase to 25 beds in 2021 with the opening of the Grange university hospital and then to 28 beds in 2024 to ensure a safe occupancy rate for critical care.
- **ABM –** Anticipated need to expand to 40 beds (no business case submitted).
- **BCU –** Business case cites requirement for medical staffing and to increase capacity to 16 beds (from 12) at the YGC site.
- **C&V –** First phase expand to 32 level 3 equivalents across two sites (utilising winter pressures £1.5m). Long term plan to expand to 50 beds based on 2014 modelling project (no business case submitted).
- **CT –** No feedback and no business case submitted. However the Princess of Wales Hospital to move to CTHB April 2019, the impact of critical care services is as yet unknown.
- **HD –** No feedback and no business case submitted.

Workforce Requirements:

The workforce requirements for critical care are being reviewed by the Workforce Workstream. The Mapping, Modelling and Capacity Workstream work closely with the Workforce Workstream however.

CAR T-Cell Therapy:

CAR T-cell therapy is an emerging therapy primarily used to treat blood cancers (this may well extend to other cancers in the near future). UHW are one of the four centres in the UK accredited to use this therapy. It is anticipated that use will expand over the next 10 years. The likelihood is that ~70% patients who receive CAR T-cell therapy will need L2/L3 care. Although there are no diagnostic uncertainties the impact on critical care will be significant.

At the time of writing this report there is little data available of length of stay or number of patients expected per annum.

As this therapy will only be used in UHW the impact will be on C&VHB. The impact is likely to be small initially but will increase in the next few years.

Extracorporeal membrane oxygenation (ECMO):
The use of extracorporeal membrane oxygenation (ECMO) in adults has rapidly increased as the technology has evolved, although there is little definitive evidence that it is beneficial. ECMO is now being used in acute respiratory distress syndrome (and was used extensively for this indication during the influenza H1N1 pandemic), as a bridge to lung or heart transplant, and in post-cardiac arrest patients. ECMO is not currently commissioned in Wales but may be in the future. If it is commissioned it is highly likely that it will be undertaken in UHW.

Potential Relocation of Elective Services e.g. Upper GI Services:
The Mapping, Modelling and Capacity Workstream considered proposing the relocation of some elective surgery out of the University Hospital of Wales and possibly Morriston with the aim of freeing up critical care capacity.

After consideration (see embed for full detail) and because the majority of these elective patients are cared for in PACU at UHW there would be no benefit on general ICU capacity of moving major elective surgery to another site.

'Blocks' in the system:
The predominant block in critical care is delayed discharges from critical care (DToCs – see section 2) with the equivalent of 16 critical care beds blocked across Wales. There are however other 'blocks' cited, these are;

- No named Consultant/parent team for 'ownership' and ward allocation
- Attaining investigations for example, flu testing, ECHOs and neurophysiology for OOCHA patients
- Limited/no specialist nursing care on wards for patients with for example, tracheostomies, chest drains and in some cases epidurals and diabetic ketoacidosis regimes.

Frailty Scores pre ICU:
It is well documented that there is an ageing population and that this places a significant demand on critical care services. Frail patients, treated in critical care, are almost twice as likely to die in the year following admission to critical care and even more likely to need nursing home care after discharge from hospital.

Frailty is not always associated with age, however

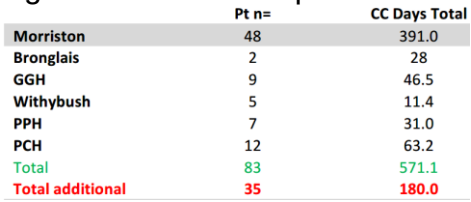
- The mean age of critical care admissions in Wales is 62.2 versus 61 across the UK.
- Prior dependency where 'some (minor/major) assistance with daily activities' is required equates to 29.1% admissions in Wales, versus 21.7% for the total case-mix programme in the UK (see All Wales ICNARC Report in section 1).
- Additionally, both in-hospital and out of hospital cardiac arrest admissions are higher in Wales; 3.3% vs. 2.4% and 3.5% vs. 2.9% respectively.

Aligned with undertaking frailty assessment is the Delivery Plan 2016 guidance *'Ensure all acute admissions to secondary care are reviewed by a consultant within 12 hours of admission with a clearly documented decision about DNACPR and escalation of care'*.

Impact Assessment

The impact assessment reviews areas to help consider the potential effects of proposed recommendations on critical care, workforce, and the wider hospital.

	Impact Critical Care Occupancy/Capacity	Impact Elsewhere
Implementing PACUs	• Some reduction in (L2) critical care occupancy and bed days (creating capacity)	• *Specific Workstream looking at PACUs • Reduced cancelled operations (for lack of a critical care bed) – improved RTT • Improved compliance with Delivery Plan Guidance, NELA etc. • Improved patient safety
Implementing LTV Unit(s)	• Reduction in (L3) critical care occupancy and bed days (creating capacity) ○ Some Units more than others	• *Specific Workstream looking at LTV Unit(s)
Reducing DToCs	• Significant reduction in critical care occupancy and bed days (creating capacity) ○ Equiv 16-17 critical care beds blocked at any one time in Wales	• Improved rehabilitation • Improved patient experience • Reduction psychological distress • Significant reduction in costs (~£10m per annum) • Unmet need improved as flow will improve
Resolution of 'blocks' in the system	• Some reduction in critical care occupancy and bed days (creating capacity)	• Improved patient experience • May require investment outside critical care e.g. ECHO technicians and neurophysiologists
Implementing actions in Delivery Plan e.g. Level 1/single organ failure care	• Reduction in (L2) critical care occupancy and bed days (creating capacity) ○ Some Units more than others	• Will require investment in L1 areas • Will require staff training
Changing Flows e.g. OOHCA, DBI	• Increase in (L3) critical care occupancy and bed days for some	NB: Cannot disinvest from non-specialist Units - patient numbers are very low individually but

	(specialist/designated) Units impacting on capacity • [Small] Reduction in (L3) critical care occupancy and bed days for some Units (creating capacity)	cumulative impact on centralised service significant. For example:  Out of Hospital Cardiac Arrest Data for 2014/15
Service Changes/ Reconfigurations e.g. MTC, and/or changes in hospital designation	• Increase in (L2/L3) critical care occupancy and bed days for some (MTC/designated) Units impacting on capacity • Reduction in (L2/L3) critical care occupancy and bed days for some Units (creating capacity)	• As above. Cannot disinvest from non-specialist Units - patient numbers are very low individually but cumulative impact on centralised service significant.
[Emerging] National Guidance	• Increase in (L2/L3) critical care occupancy and bed days for all Units impacting on capacity (NELA, DBI) • Increase in (L2/L3) critical care occupancy and bed days for some (Vascular) Units impacting on capacity (NICE AAA)	• Improved patient outcomes
Relocation Elective Services e.g. Upper GI	• Minimal reduction in occupancy and bed days (UHW)	• Significant impact on staffing as moving services requires more than just moving a surgeon • Impact on 'other' hospital's flow, PACU, wards etc.
Ageing Population 4-5% per annum) + increasing frailty	• Increase in (L2/L3) critical care occupancy and bed days all Units impacting on capacity	• Increase will be year on year • This is a whole system issue, not just critical care.
Novel therapies e.g. CART T-Cell Therapy	• Increase in L2/L3 critical care occupancy and beds days in specialist centres	• Minimal

	Pt n=	CC Days Total
Morriston	48	391.0
Bronglais	2	28
GGH	9	46.5
Withybush	5	11.4
PPH	7	31.0
PCH	12	63.2
Total	83	571.1
Total additional	35	180.0

Recommendations
The Mapping, Modelling and Capacity Workstream make several recommendations; some directly affecting capacity in critical care and some indirect.

Indirect:

Mapping, Modelling and Capacity Workstream recommendations		
Aim: To improve efficiency and effectiveness of current critical care capacity, to reduce unmet demand and, where appropriate, make recommendations for additional capacity.		
Issue	**Recommendations**	**Rationale**
Patient outcomes (in a pressured and changing system)	Undertake annual outcome and capacity indicators in Welsh critical care units (ICNARC reports)	• Monitoring patient and/or service related outcomes that reflect capacity will provide intelligence on a) changes made b) change required
Delayed transfers of care from critical care (DToCs)	Make a Tier 1 target: 'ensure 95% patients are discharged within 4 hours'	• DToCs given equal priority for wards beds as admissions • Considerable cost savings to NHS Wales (up to £10m p.a.) • Significant increase in critical care capacity (in the absence of direct investment) • Improve quality of care
Blocks in the system (increasing length of stay on critical care)	Work with Workforce team to review provision ECHO, neurophysiologist, etc provision	• Reduce delays waiting for diagnostics and thus LOS on critical care • Increase in critical care capacity
Delivery Plan for the Critically Ill objectives not complied with e.g. Level 1 areas - NIV, Renal care, Consultant reviews within 12 hours and documented decisions about DNACPR and escalation of care.	Enforce compliance with key objectives in the Delivery plan for the Critically Ill to 2020	• Inappropriate admission avoidance • Increase in critical care capacity
Demand for critical care among an older population is increasing in the UK	Formal assessment of frailty for patients who fulfil criteria	• Inappropriate admission avoidance
Demand for critical care – National Guidance	Increase capacity accordingly	• Known improved patient outcomes.

Potential relocation of elective services	Review in 3-5 years	• No gain on critical care capacity to be had on moving services currently. • Situation may however change in the future
Novel therapies/changing guidance	Annual review of emerging therapies and national guidance that may impact on critical care and critical care capacity	• Horizon scanning to ensure proactive approach areas which will impact on critical care
Service reconfigurations	Include critical care teams (and relevant specialities) in the early planning phases for all service reconfigurations	• Impacts on critical care considered alongside planning, not retrospectively. • Critical care capacity needs built into business cases
Unknown unmet demand	Implement, and make mandatory, the use of the Retrieval and Transfer Service (RTS) module in WardWatcher (as developed Queen Alexandra, Portsmouth)	• Defining unmet need • Knowledge critical care demand ± time of acceptance and time of admission • Analysis alongside ICNARC reports to review demand vs. capacity
Defining ongoing capacity requirements	Undertake mathematical modelling of critical care capacity for all Wales in 3-5 years' time	• Define future capacity needs once current investment embedded.

Direct:
The above 'indirect' recommendations will have some impact of releasing capacity in critical care, in the case of DToCs, were they to be significantly improved the release of capacity will be considerable.

Implementing PACUs and a LTV Unit(s) will also help free up some capacity. There is no doubt however that additional critical care beds are required in Wales, especially in the tertiary/specialist Units.

Assuming the Task & Finish Group approve the implementation of PACUs and a LTV Unit(s) and there is a reduction in DToCs the Mapping, Modelling and Capacity Workstream recommends:

	ABUHB	ABMUHB	BCUHB	C&VUHB	CTUHB	HDUHB
Current L3 equivalents	23	27	25.5	26	14.5	22
Increase to, as proposed in	28 (Grange)	0	29	*50** (UHW)	0	0

HB's Business Cases			(YGC only)			
Increase to, as proposed by Workstream	**30 (Grange)**	**40**	**33 (YGC +3.5 as per BC) (WM and YG +2 each)**	**50 (UHW)**	**16.5 (PC and RGlam +1 each)**	**0^**

*Business Case not submitted – verbal report
^Hywel Dda team report additional beds not required provided other workstreams implemented e.g. PACU

Narrative explanation:
Any proposed increases will need to be undertaken in a phased manner over the next few years.

UHW and Morriston require the greatest increase because of their high demand for tertiary services (on top of their regular demands for their catchment areas). UHW has a definitive plan (although not shared with the workstream). Morriston do not appear to have a definitive plan (despite request) but clearly need additional capacity. Both Morriston and UHW will be unable to accommodate the increases in their current footprint so will require some capital for re-build/ modification.

Glan Clwyd also requires additional capacity (PPCI, OOHA increases and centralisation of vascular) however the need is less than the two larger centres in South Wales, UHW and Morriston. There is however physical space in their Critical Care Unit as, at the time of writing this report, four physical bed spaces are not commissioned. It is proposed that these beds are funded to open in a phased response. It is also proposed to increase the beds in Wrexham Maelor and Ysbyty Gwynedd by two L3 equivalents each. All beds for BCUHB can be accommodated within their current footprint. It should be noted however that, whilst attempting to accommodate the increase in beds in BCUHB within their current footprints it leaves them with the lowest number of *L3 equivalents* per 100,000 population.

Apart from the two tertiary specialist centres in South Wales Hywel Dda Health Board has the largest number of beds per population at 5.75 *L3 equivalents* per 100,000. Even after the proposed additional beds are accounted for in other HBs Hywel Dda will still have the largest number despite no increase proposed. The Hywel Dda team felt they did not need an increase 'provided that PACUs were established on their sites'. It is also worthy of note that they do not have any pending business cases for increase in critical care capacity.

ABUHB has a definitive plan for expansion in the new Grange University Hospital taking them to 28 L3 equivalents 2023/2024. The Mapping, Modelling and Capacity Workstream recommend however a further expansion (within the footprint) to 30 *L3 equivalent* beds. Increasing capacity in ABUHB may also help off load UHW.
Cwm Taf Health Board do not appear to have any plans to increase critical care capacity. The Mapping, Modelling and Capacity Workstream recommend however

adding in two L3 equivalent beds within the current footprint of the Units; one in Prince Charles Hospital and one in the Royal Glamorgan. Increasing capacity in CTHB may also help off load UHW.

At the time of writing this report the Princess of Wales Hospital is still part of ABMUHB (there are plans to merge it with Cwm Taf Health Board). There is no physical room for increased bed capacity but the Mapping, Modelling and Capacity Workstream recommend increasing the L3 equivalents from 6 to 8.

Summary

The need for critical care capacity worldwide is increasing. Future increase in demand is due to a number of factors that include significant changes in the size and age of the population, together with increasing prevalence of relevant comorbidities and changing perceptions as to what critical care can offer.

Inadequate capacity in critical care leads to deferred or refused admissions, cancellation of planned surgery, transfers of emergency patients and premature discharges. These are highly undesirable events which degrade the quality of care delivered and may jeopardise outcome.

Unless admission and referral practices change, the increased future demand can only be met by an increase in total capacity. That said, Wales does need additional capacity and a combination of implementing intermediate care areas (PACUs, NIV Level 1 areas etc), improved efficiencies (reducing DToCs for example) as well as increasing critical care (L2/L3) beds is the best solution for Wales. An increase in the number of critical care beds will require an increase in the numbers of appropriately skilled healthcare professionals to care for the increased number of patients.

Defining who needs additional capacity where is inherently difficult. Not least because demand will increase 4-5% year on year. A simple percentage critical care beds required completely ignores hospitals' case-mix; those undertaking complex and specialist treatments will require more critical care beds than hospitals that do not undertake such work. A model based only on average values is far too simple for the task of planning and managing critical care capacities.

To some extent population needs assessment can be utilised however this does not account for patients travelling for specialist care. The Mapping, Modelling and Capacity Workstream has attempted to take a pragmatic approach, it has tried to suggest new ways of working, asserted that efficiencies in the system are improved and proposed where additional capacity should be funded mostly, within the current footprints of existing Units.

Annex 8. Workforce - Julie Highfield

The scope of the workforce work stream was:

- To scope the current and likely future general critical care clinical workforce requirements and identifying any barriers to change and/or gaps
- Identifying current and emerging workforce innovations that could be developed for helping to address gaps and pressures within the critical care workforce (including the use of extended practice)
- Providing input/support scrutiny to the other T&F groups' models

The work stream carried out a survey of all general critical care units in Wales, and integrated this information with Critical Care and Major Trauma Network reports, Critical Care National Nursing Network and Royal College of Anaesthetics Faculty of Intensive Care Medicine reports. These were cross checked against the GPICS Standards for critical care. Workforce gaps were quantified where possible. Workforce innovations were identified via the survey and wider engagement with UK and international critical care via social media.

Additional workforce requirements were cross-checked against UHB plans for bed-base expansion.

In addition, workforce models for PACU, Transfer, Outreach and LTiV were scrutinised and integrated into the report.

Brief findings are:

- The current clinical workforce does not fully meet GPICS standards across Wales.
- Many of these limitations are explained by a lack of investment to meet the standards
- In addition a number of factors influence and hinder recruitment
- The need for bed-base expansion will be hindered by workforce availability, and efforts to consider a more effective ways of managing capacity should be considered, as detailed in the capacity work stream, in addition to 5 key workforce recommendations, summarised below.

Summary of work stream recommendations:

- Improving the capacity and flow of critical care to reduce the needs for expansion through a better utilisation of current available workforce
    - UHBs are encouraged to develop discharge coordination posts
    - UHBs are encouraged to review their allied health workforce and put in post sufficient numbers which will improve rehabilitation and reduce length of stay
- Use of extended roles and advanced practice
- A commissioned piece of work to explore management of staffing across health boards
    - Cross UHB staffing management
    - Shared contracts across units
    - UHBs are encouraged to staff to average bed utilisation
- A longer term cross Wales programme developed to improve the retention of current staffing, exploring the following.

    - Education and opportunities
    - Staff wellbeing initiatives
    - National career planning and retention strategies
- Utilising non critical care staff for critical care related service developments (e.g. transfers PACU, LTiV and Outreach).

Annex 9. Performance Measures - Olivia Shorrocks

This paper sets out the high level measures proposed for the ongoing monitoring and evaluation of critical care that will:

- Measure the overall performance of the critical care service across Wales
- Implement measures to demonstrate the impact of the critical care investment, services changes and transformation.

Measure the overall performance of the critical care service across Wales

The following measures have been agreed:

- Delayed transfer of care – over 4 hours.
- Non-clinical transfers.
- Bed activity.

In introducing these measures, it was felt there needed to be a data source that all units recognised. Following concerns raised about the use of CCMDS data set a decision was taken to work with Wardwatcher to create a bespoke report to capture additional data points directly from units. The following data sets are now being collected directly from the Wardwatcher database:

- Admissions in month.
- Delayed admissions in month.
- Activity level 3 days, hours, minutes.
- Activity level 2 days, hours, minutes.
- Activity level 1 days, hours, minutes.
- Patients discharged alive.
- Patients discharged alive out of hours (22.00 to 06.59).
- Patients discharged as non-clinical transfers. (Note this is only those discharged from critical care, the non-clinical transfers database will give details of all non-clinical transfers)
- Patients delayed over 4 hours.
- Accumulated delays (in days) beyond 4 hours.

All definitions of the above as per ICNARC definitions. This data is now operational and a monthly dashboard is generated to help inform the service. See attachment (Please note this is still in development and there are some formatting and labelling changes to be made).

This dataset will be presented to the Wales Information Standards Board to ensure data standardisation, once the initial reporting issues have been resolved.

Implement measures to demonstrate the impact of the critical care investments, services changes and transformation:

Discussions have taken place with each of the work stream leads on how best to capture performance changes in their areas and the recommended performance measures are detailed below under each work stream. The process of setting up these data feeds, standardisation of measures and collating of data for these measures is ongoing. It may take some time for these to be fully operational as the services are just starting and the data is not readily available.

Outreach

Recommended performance measures:

- Number of sites offering 24/7 outreach (currently 3/16)
- Number of cardiac arrests within regular ward patients
- Reduction in readmissions to critical care.

Post Anaesthesia Care Units

Recommended performance measures are:

- Admissions directly to critical care from PACU
- Re-admissions to critical care after step down from PACU
- Reduction in cancelled operations due to lack of a critical care bed.

Long Term Ventilation

Recommended performance measures:

- Number of LTV patients in acute critical care units
- Number of days on LTV in acute critical care units
- Bed days saved.

Transfers

Recommended performance measures:

- Transferring Docs Grade vis a vis the D4L Guidelines
- Quality and Safety Assessment.

Workforce

Recommended performance measures (quarterly)

- Vacancies
- Staff retention
- Sickness rates.

Service model, demand and capacity

Recommended performance measure:

- Delayed admissions.

Annex 10. Allocation of £15m additional funding for critical care

To aid the implementation of the Task and Finish Group recommendations to help address issues with adult critical care capacity, the Minister for Health and Social Services announced the recurrent allocation of an additional £15 million.

As set out in the main Task and Finish Group report, the Group agreed a number of funding allocation principles which including investment should be prioritised for national, regional services and it did not replace the need for health boards to invest in their services for their local population.

Health boards were invited to return pro-formas highlighting their service gaps against the draft Task and Finish Group recommendations and the priorities for investment within their health board. This information was considered by the group, it was noted there were a number of gaps within the pro-formas and it was disappointing no health board articulate any existing plans to invest in their services.

It should also be noted that Hywel Dda did not provide costings against their pro-formas and neither Swansea Bay UHB nor Cwm Taf Morgannwg UHB submitted pro-formas covering Princess of Wales Hospital.

Based on discussions with members of the task and finish group there was clear agreement the following services should be prioritised for investment:

- Establishment of a national transfer service for critically ill adults (estimated full year cost of **£1.7m**).
    - This development will improve patient safety, aid better use of limited critical care (particularly units which provide regional services) and emergency ambulance resources, allow transfers to happen on a planned basis, ease staffing pressures as units would no longer need to release staff who during shifts, address governance concerns, link with wider developments such as major trauma, expansion of EMRTS.

- Development of a Long Term Ventilation Unit with an interim expansion of LTV beds in UHL in the meantime (interim cost of **£830,000**).
    - This development would release capacity within critical care units across Wales, particularly in Mid and South Wales, where most units have patients who have been in a critical care bed for often over 100 days due to a need for ongoing ventilation. This unit will provide a better environment for these patients, in a lower acuity setting, on a more cost effective basis. It will also release capacity within critical care units.

- Recurrent funding for the six additional critical care beds in Cardiff and Vale UHB (full year cost **£4.5m**).
    - Beds were opened utilising funding from the £5m to support regional/specialist services.
    - Significant pressure on critical care services within UHW due to the regionalisation of a number of services and changes in clinical practice this expansion goes part way to addressing this gap without the need for capital investment.

- One additional Level 3 critical care bed for Ysbty Glan Clwyd in Betsi Cadwaladr UHB (full year cost **£800,000**).
    - Increased pressure on critical care services within YGC due to the regionalisation of a number of services such as PCI and vascular this expansion goes part way to addressing this gap without the need for capital investment.

It also agreed Powys should be allocated funding of £130,000 and £20,000 should be held for development work e.g. workforce plan.

This would total £8 million leaving the remaining £7million to be allocated.

The Group did not feel they were able to make clear recommendations based on service need at this stage without substantial clarification from health boards in relation to service models, staffing and more robust costings which would have delayed the process by several months.

In light of this, a number of options have been discussed with both Task and Finish Group members and internally within Welsh Government in relation to the allocation of the remaining funding.

It is proposed that the remaining funding is split between the following health boards and they will be directed to invest in line with prioritises they have previously identified as set out below:

- Aneurin Bevan UHB – Capacity/Workforce (£1.642m)
  Has the lowest bed critical numbers per head of population in Wales, health board already has some PACU/Outreach services though further investment is still required
- Betsi Cadwaladr UHB – PACU/Outreach (£1.825m)
  Has previously piloted PACU during winter pressures but have no established service
- Cwm Taf Morgannwg UHB –Outreach/PACU (£1.380m)
  Have differing models of outreach across the health board and funding would provide a more equitable service and does not currently have any PACU
- Hywel Dda UHB – Outreach (£1.041m)
  Currently there is no critical care outreach within the health board
- Swansea Bay UHB – PACU/Outreach (£1.112m)
  Currently, there is no PACU unit within Morriston and development of a unit would help address capacity issues within the main critical care unit/Outreach services though further investment is still required.

The above proposals would also be a significant step towards providing a more equitable service for people who are critically ill across Wales.