



# Adult Critical Care Pharmacy Workforce Strategy.

December 2022

## Contents

<b>Contents</b> .....	<b>1</b>
<b>Working Group Participants</b> .....	<b>3</b>
Task and Finish Group .....	3
Additional Consultation and Workshop.....	3
<b>Critical Care Pharmacy Strategy</b> .....	<b>4</b>
<b>Introduction</b> .....	<b>4</b>
<b>Understanding the Pharmacy Family</b> .....	<b>5</b>
Pharmacists.....	5
Pharmacy Technicians .....	6
Pharmacy Assistants .....	7
<b>Clinical Pharmacists in Critical Care</b> .....	<b>8</b>
<b>Outcomes - Pharmacists</b> .....	<b>9</b>
<i>Clinical</i> .....	9
<i>Financial</i> .....	10
<b>Strategic Aim - Pharmacists</b> .....	<b>12</b>
<i>Overall aims</i> .....	12
Short term (within 3 years).....	12
<i>Support Required - Pharmacists</i> .....	12
Short term (within 3 years).....	12
Medium term (3 to 5 years).....	12
<i>Evidence of achievement</i> .....	13
<i>Additional Enabling Functions to be explored</i> .....	13
Clinical Negligence Scheme for Trusts (CNST) .....	13
Commissioning for Quality and Innovation (CQUIN) .....	13
<b>Pharmacy Technicians in Critical Care</b> .....	<b>14</b>
<b>Outcomes – Pharmacy Technicians</b> .....	<b>14</b>
<i>Clinical / Operational</i> .....	14
<i>Financial</i> .....	15
<b>Strategic Aim – Pharmacy Technicians</b> .....	<b>15</b>
<i>Overall aims</i> .....	15
Short term (within 3 years).....	15
Medium to long term (3 to 10 years) .....	15
<i>Support Required – Pharmacy Technicians</i> .....	15
Short term (within 3 years).....	15
Medium term (3 to 5 years).....	15
<i>Evidence of achievement</i> .....	16
<b>Pharmacy Assistants in Critical Care</b> .....	<b>16</b>
<b>Outcomes – Pharmacy Assistants</b> .....	<b>16</b>
<i>Operational</i> .....	16
<i>Financial</i> .....	17
<b>Strategic Aim – Pharmacy Assistants</b> .....	<b>17</b>

<i>Overall aims</i> .....	17
Short term (within 3 years).....	17
<i>Support Required – Pharmacy Assistants</i> .....	17
Short term (within 3 years).....	17
<i>Evidence of achievement</i> .....	17
<b>Interdependencies with Other Services</b> .....	<b>18</b>
Pharmacists.....	18
Pharmacy technicians .....	18
Ward based pharmacy assistants .....	19
<b>Appendix 1: Financials</b> .....	<b>20</b>
Anatomy of direct medicines savings (Illustration, per bed day).....	20
Anatomy of litigation savings against medication error (illustration, NHSE system) .....	21
Anatomy of medication waste savings through use of assistants / pharmacy technicians .....	22
<b>Appendix 2: Staffing Pipeline</b> .....	<b>24</b>
Data on current Pharmacist pool .....	24
Data on current Pharmacy Technician pool.....	25
<b>Appendix 3: Research Recommendations</b> .....	<b>26</b>
<b>References</b> .....	<b>27</b>

## Working Group Participants

### Task and Finish Group

Anna Vogiatzis, NHSE National Programme Manager Adult Critical Care  
Mark Borthwick, Consultant Pharmacist, Oxford (Pharmacy representative, Intensive Care Society)  
Reena Mehta, Consultant Pharmacist, KCH London (Pharmacy representative, Intensive Care Society)  
Greg Barton, Principal Pharmacist, Whiston Hospital (Pharmacy representative, Clinical Reference Group)  
Diane Whyte, NHSE Elective Recovery: Workforce Transformation Team  
Devina Halsall, NHSE North-West (Regional pharmacy representative)  
David Sapsford, Consultant Pharmacist, Cambridge (Pharmacy representative, Intensive Care Society)  
Ramani Moonesinghe, NHSE National Clinical Director, Critical and Peri-operative Care  
Richard Cattell, NHSE Deputy Chief Pharmaceutical Officer  
Bruce Warner, NHSE Deputy Chief Pharmaceutical Officer

### Additional Consultation and Workshop

Richard Bourne, Consultant Pharmacist, Sheffield  
Fraser Hanks, Critical Care Pharmacist, GST London  
Raliat Onatade, Chief Pharmacist, North-East London Clinical Commissioning  
Elizabeth Fidler, NHSE Senior Professional Advisor Pharmacy Technician Practice  
Jennifer Morris, Pharmacy Technician, Royal Free, London  
Chezel Abela, Pharmacy Technician, Manchester  
Michelle Sullivan, Pharmacy Technician, Saint Bartholomew's Hospital, London  
Shelly French, Pharmacy Technician, Saint Bartholomew's Hospital, London  
NHSE Adult Critical Care Planning Programme Workforce Group

# Critical Care Pharmacy Strategy

## Introduction

Medicines are the commonest healthcare intervention<sup>1</sup>. Their therapeutic effects are used for diagnostics and treatment, as well as to facilitate other physical interventions such as surgery or advanced respiratory support. They are woven into the very fabric of healthcare, touch on almost every healthcare profession and have some part to play in the care of almost every patient.

In critical care, medicines are integral to the patient care provided by doctors, pharmacists, nurses, and the allied health care professions, as well as the work of healthcare assistants, porters, and housekeepers. The procurement, distribution, prescribing, administration, monitoring, governance, safety, and storage of medicines impacts on every aspect of critical care medicine.

Pharmacy departments have long held a principal place in the management and use of medicines. Half a century ago this was limited to procurement and supply, but as healthcare has evolved and developed, the complexity of medicines and extent of the risks encountered have grown exponentially. Pharmacy staff have largely migrated away from the vaults and storehouses of medicines to become a clinical specialty with a patient-centred focus. They now work in the wider healthcare environment, bringing therapeutic expertise with them, developing knowledge, skills, behaviours, and experience that mitigate medication risk, and optimise pharmacotherapy, involving the use of evidence-based practice to improve patient outcomes.

The use of medicines continues to become increasingly complex and is involving an ever-increasing portfolio of medicines. Patient pathways include an increasing number of interfaces, and interactions with different professionals are growing. New technological advances have brought an expansion in the molecules used therapeutically and an explosion in biotechnology as evidenced by the shift towards the use of monoclonal antibodies. Most recently, the potential of Advanced Therapy Medicinal Products has started to be tapped (CAR-T). Future complexity will come from wider implementation of pharmacogenomic and pharmacometric data to achieve the goal of precision medicine/dosing to optimise treatments and patient outcomes.

Alongside these developments, the healthcare service is being stretched by challenges brought about by the recent pandemic, an aging population, and an investment programme that has not kept pace with societal needs and medical inflation.

Because of the core role that medicines play in the healthcare system, pharmacy services must evolve further to support these challenges, and must do so at every level of the system.

Fortunately, as demonstrated during the pandemic, pharmacy is fully capable of doing so, and the opportunity exists to tap into enormous potential that can be harnessed now and developed further.

## Understanding the Pharmacy Family

Pharmacy departments consist of pharmacists, pharmacy technicians, pharmacy assistants, information technology specialists and administration staff, and on occasions other healthcare professions are employed for specific roles (such as medication safety nurses). Registered pharmacy professionals are comprised of pharmacists and pharmacy technicians.

For the purposes of this document, the focus will be on three broad staff groups – pharmacists, pharmacy technicians and pharmacy assistants.

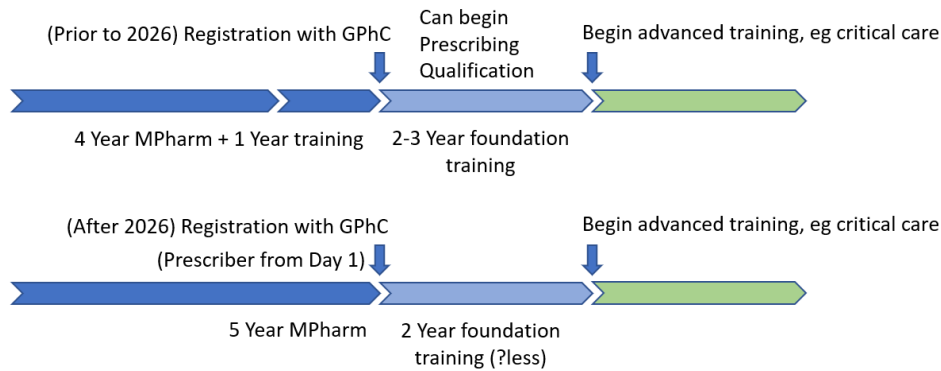
### Pharmacists

To become a pharmacist, an individual undertakes a four-year full-time level 7 master's degree (MPharm), plus a year in professional training, before finally an examination by the pharmacy regulator, the General Pharmaceutical Council (GPhC), to be accepted on the register. This encompasses a total of five years training from university entry to registration as a pharmacist.

The pharmacist qualification is moving towards a formal five-year degree, with the professional training element integrated into the master's degree programme. This move is to further strengthen the clinical skills of pharmacists, accelerate attainment of advanced-level practice and to integrate research skills. Pharmacists will also be independent prescribers on registration, rather than the current route whereby prescribing rights are gained by an additional regulated qualification.

About 75% of pharmacist registrants work in community pharmacy or in primary care, only 21% of registrants work in hospital<sup>2</sup>. Hospital entrants typically undertake a further two to three years of general clinical training to equip the pharmacist with the knowledge, skills, experiences, and behaviours required for clinical practice. This is usually achieved by means of a level 7 post-graduate clinical diploma. Some progress this postgraduate education to a second master's degree though further study and research, and a minority go on to undertake doctorate level training.

Clinical pharmacists begin to specialise when the clinical diploma has been completed (e.g., into critical care). There is little in the way of formal training programmes to support pharmacists in clinical specialties from this point on.



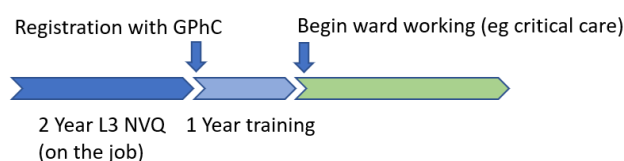
## Pharmacy Technicians

Pharmacy technicians undertake a two-year training programme that consists of a mix of vocational experience and study. The registrant qualification is a Level 3 national vocational qualification (NVQ) on a course that has been accredited by the pharmacy regulator, the GPhC. It is significant to note that the pipeline to produce a pharmacy technician registrant is short, and the course is undertaken whilst the candidate is working within the pharmacy department.

About 55% of pharmacy technicians work in community pharmacy or in primary care, about 41% of registrants work in hospital<sup>2</sup>.

Pharmacy technicians often begin work in the dispensary - most hospital dispensaries are managed by, and primarily staffed with pharmacy technicians. As the pharmacy technician gains experience, they begin to take on other duties and training that increasingly takes them into the clinical environment, with direct contact with patients, whether in the outpatient or in-patient setting. With increasing experience, pharmacy technicians will undertake medication history taking, checking patients own medicines for re-use in the hospital and other ward-based medicines management activities. This is usually linked with an additional Level 3 qualification that takes another year.

Pharmacy technicians then progress further on the Agenda for Change pay scales through management and more specialist roles. There is no seamless way for a pharmacy technician to become a pharmacist, the current route would be to leave the workplace and undertake the 5-year qualification route required for all pharmacists.



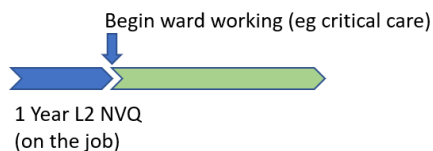
## Pharmacy Assistants

Pharmacy assistants undertake a Level 2 course/NVQ that has been accredited/recognised by the GPhC, and typically take one year to complete. The trainee assistant completes modules in areas that are generally considered to be transferrable skills (e.g., Patient centred care, health and safety, teamwork, etc), and also gains skills that are specific to the handling of medicines (e.g., dispensing, medicines supply, pharmaceutical stock management). The course is undertaken whilst the candidate is working within the pharmacy department.

On completion of the course, the individual is **not** registered with the GPhC, pharmacy assistants are not regulated per se, the course material used to gain qualifications are.

Because there is no register, it is not known what proportion or numbers of pharmacy assistants work in the various healthcare environments.

In hospital environments, career progression is varied with many choosing to undertake pharmacy technician training, while some pharmacy assistants find invaluable roles in specialised areas such as maintenance of robotic dispensing systems. Ward based roles are becoming more prevalent, with ward-based pharmacy assistants increasingly supporting clinical areas in direct stock management (paper administration, medicines returns, expiry date checking, etc)





## Clinical Pharmacists in Critical Care

The critical care pharmacist role was first comprehensively described in 2005 by the Department of Health in England<sup>3</sup>. The role has become increasingly evidenced and embedded, with standards and recommendations incorporated into GPICS<sup>4</sup>, the expected level of activity specified in the NHS Adult Critical Care Service Specification<sup>5</sup>, and an inspection program against specific pharmacy based key lines of enquiry performed by the CQC<sup>6</sup>.

### *NHSE Commissioned activities (D05, 220502S)*

#### **Personnel**

- Designated Advanced Level Pharmacist
- Involvement in the ODN
- Seven-day input

#### **Direct patient care activities**

- Medicines reconciliation (on admission and discharge)
- Independent patient medication review
- Attendance of multi-professional ward rounds

#### **Professional support activities**

- Clinical guidelines
- Medication-related clinical incident reviews
- Clinical audit and evaluation

Despite these, there remains unwarranted variation in the level of pharmacy provision to critical care<sup>7</sup>. Whilst it might be expected that there would be some low level and natural variation between organisations that are geographically close, clear and statistically significant variation between NHS regions is also apparent<sup>8</sup>

### *Key lines of Enquiry, CQC*

#### **Effective Domain**

E3 Effective, competent staff - Clinical pharmacists providing a service to critical care must have the minimum of Advanced Stage 1 competencies in adult critical care pharmacy.

E4 Professional standard updated as per GPICS v2 - Consultant Intensivist led multi-disciplinary clinical ward rounds within Intensive Care must occur twice every day (including weekends and national holidays). The ward round must have daily input from nursing, microbiology, pharmacy and physiotherapy

## Outcomes - Pharmacists

### Clinical

Appropriately deployed pharmacists reduce medication error rates and optimise the use of medicines<sup>9,10</sup>. More than 8% of admissions to adult ICUs in the UK are as a consequence of preventable adverse drug events<sup>11</sup>. Once within critical care, the intercepted medication error rate in UK units is 6.8%,<sup>12</sup> which is comparable with the rate found outside of critical care, and in the international literature<sup>13,14</sup>. Many medication errors have a low likelihood of causing harm, however, in critical care we know that pharmacists identified 4.2% (1 in 25) of prescription items which contained an error with a moderate to severe impact rating, requiring corrective action<sup>12</sup>.

Pharmacists also optimise the use of medicines, the optimisation rate of prescription items with a moderate to high impact rating in UK critical care units is 5.6% (1 in 18). The proportion of high impact rating contributions is even greater at weekends<sup>15</sup>.

A high proportion of contributions are made at the interfaces when the patient is admitted to critical care, or discharged from critical care, although approximately half the optimisation activity occurs when the pharmacist is attending the multi-professional ward round. Pharmacists that work on units with high medication safety resources make significantly more clinically important medicines optimisations compared to those on low-resourced units (Odds Ratio >3). These contributions are proactive rather than reactively identifying and correcting medication errors after they have occurred<sup>16</sup>. Tipping the focus towards proactive quality use of medicines rather than reacting to identified errors after their occurrence is an example of good practice and is consistent with GIRFT principles<sup>7</sup>. The Healthcare Service Investigation Branch have also made a general safety recommendation around defining the work of clinical pharmacy teams between initial medicines reconciliation and discharge to strengthen the identification and reduction of high-risk prescribing errors in hospital<sup>17</sup>

Several systematic reviews indicate the benefits of inclusion of clinical pharmacists within care teams working in critical care and wider hospital practice. Within critical care, clinical pharmacists inclusion in the multiprofessional team reduced patient adverse drug events and reduced patient mortality<sup>18</sup>. On transitions into and out of critical care, pharmacist-led interventions improve medication safety,<sup>19</sup> and reduce continuation of inappropriate medication on hospital discharge<sup>20</sup>. With wider hospital practice, medication reviews by clinical pharmacists improves medicines optimisation,<sup>21</sup> and activities such as medicines reconciliation have benefits in patient healthcare utilisation after hospital discharge<sup>22</sup>.

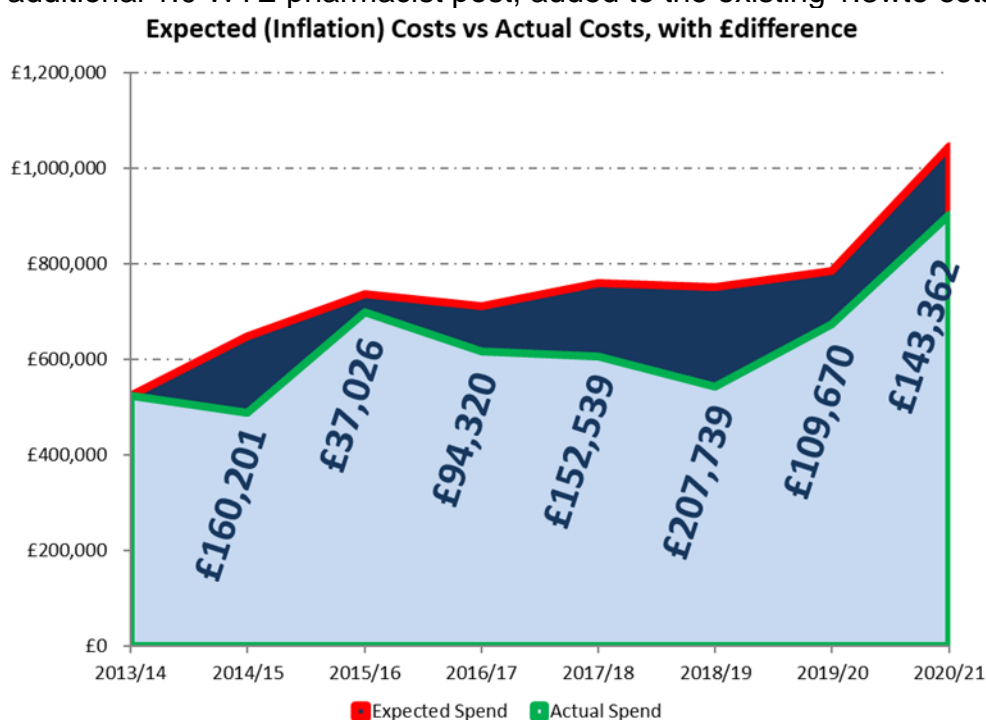
These benefits result from direct patient care activities, and from wider functions such guideline implementation, clinical governance, education and training, research, service development and audit.

## Financial

Evidence of improved financial outcomes are already incorporated in national standards such as NICE NG5<sup>1</sup>, and in NHS England strategic reports such as Carter<sup>23</sup>

A scoping review of health economic evaluations of adult critical care pharmacy services identified a median cost benefit ratio of £6.43 [2.31-23.29] from 5 international studies based on critical care pharmacist undertaking medication review and attending multiprofessional ward rounds (Crosby A personal communication 20<sup>th</sup> May 2022). Several international studies find large cost savings associated with the introduction of a pharmacist to the critical care team<sup>24-27</sup>. UK specific data are limited to an abstract describing the financial effect of replacing an existing non-critical care pharmacy trained workforce on a cardiac critical care unit with a trained critical care pharmacy workforce, resulting in direct cost savings of £20 per bed day (£175,275 per annum)<sup>28</sup>.

Local unpublished data from the Oxford General Critical Care unit show the expected spend of medications through inflationary pressure over time, against the actual spend. Assuming practice does not change at all, expenditure would follow the red line on the graph. The cost difference between the red line (expected through inflation) and actual expenditure (green line) is displayed for each year since this inflation rate began to be calculated. In 2016, there was investment in an additional 1.0 WTE pharmacist post, added to the existing 1.3wte establishment.



In addition to direct cost savings in medicines budgets, further cost avoidance is expected through reduced adverse events (and their management costs), reduced length of stay, reduced need for incident investigation, and reduced instances of litigation. Clinical pharmacists, along with pharmacy technicians and pharmacy assistants, are also responsible for ensuring drug expenditure data is processed accurately to ensure reimbursement of commissioned drugs. For Guy's and St

Thomas' Foundation Trust for 2020-21, the critical care pharmacy team processed £1.1 million of commissioned drugs, ensuring that this income came back into the Trust.

## Strategic Aim - Pharmacists

### Overall aims

#### Short term (within 3 years)

Pharmacist services to adult critical care must meet the standards set out in the current NHS England D05 service specification,<sup>5</sup> and current Guidelines for the Provision of Intensive Care Services<sup>4</sup>.

Pharmacist services to adult enhanced care areas must meet the standards set out in the most up to date specifications for these areas<sup>29,30</sup>

Pharmacist services to support, collaborate or lead research, service improvement, and audit

### Support Required - Pharmacists

#### Short term (within 3 years)

All NHS organisations with adult critical care and/or enhanced care services to audit existing pharmacy services against standards within 6 months of publication of strategy (repeat 2 yearly).

All NHS organisations with adult critical care and/or enhanced care services to publish time-scaled plans to close any gap against standards within 9 months of publication of strategy and within 3 months of subsequent repeat audits.

Operational Delivery Networks to coordinate the above work, possibly as part of a regular programme of peer review/peer support visits.

The Care Quality Commission to consider the plans as part of regular inspections of organisations who provide critical care services and include commentary within inspection reports.

A National Training Programme to be developed between existing partners (e.g., United Kingdom Clinical Pharmacy Association, Faculty of Intensive Care Medicine, Royal Pharmaceutical Society) to formalise and standardise the training offered to critical care pharmacists, in order to support critical care, enhanced care and the credentialing process.

Health Education England to fund an agreed number of places on courses on an annual basis to meet the needs of NHS organisations in England (agreed with Adult Critical Care Planning Programme Workforce Group).

#### Medium term (3 to 5 years)

All lead critical care pharmacists for an organisation to be credentialled by the Royal Pharmaceutical Society as meeting minimum requirements for advanced critical care pharmacists (specialised credentialing launch expected Spring 2023).

Regional coordination and oversight of workforce provided by Regional Consultant Pharmacists permanently funded through ODNs or equivalent structures (this might link with the Adult Critical Care Planning Programme Telemedicine Workstream, yet to be convened).

### Evidence of achievement

- Audit results held by ODNs indicate no gap in provision from standards / commissioned activity.
- CQC inspections reveal no gap in provision.
- Courses / National Training Programme in place, with no access problems
- All pharmacists working on critical care credentialed at the appropriate level, with a succession plan in place.
- At least one consultant pharmacist in every ODN, and at Integrated Care Board geography where appropriate (as determined by ODN/ICB needs)
- No inter-regional variation evident.

### Additional Enabling Functions to be explored

Given the expected quality of care improvements, and potentially large economic benefits of appropriately deployed pharmacy teams to critical care across the system, additional incentives are needed to encourage organisations implement existing standards and commissioned features (GPICS, D05).

### Clinical Negligence Scheme for Trusts (CNST)

The CNST scheme is funded through member contributions, the size of which is calculated on an individual organisation basis. The cost of obstetric / maternity incidents is significant, and so a separate maternity incentive scheme is offered that further adjusts contributions based on a range of quality measures that can be put in place to reduce risks.

In critical care, medication error was the third most common reason for litigation pay-outs in 2017/2018, and the value of pay-outs are increasing at about 40% per annum.<sup>7</sup>

A CNST incentive scheme to improve quality in critical care in which the level of pharmacy service is a factor should be explored.

### Commissioning for Quality and Innovation (CQUIN)

The CQUIN scheme provides a mechanism to incentivise the rapid adoption of quality interventions within the NHS and thereby quickly realise the benefits of those interventions. Given that an appropriately deployed pharmacy service in critical care improves quality, reduces length of stay (frees up bed capacity), reduces direct and indirect costs (medication costs, litigation costs), the appropriate deployment of pharmacy services to critical care represents a good target for incorporation into future CQUINs and as such, should be explored for future schemes.

## Pharmacy Technicians in Critical Care

There are several exemplar pharmacy technician roles in place in critical care units around England, although they are not widespread<sup>8</sup>. The GPICS standards are “There must be sufficient patient-facing pharmacy technical staff to provide supporting roles”, with no further guidance on what is considered sufficient<sup>4</sup>.

A specific workshop/focus group was held with pharmacy technicians working in critical care, senior pharmacy managers, and critical care pharmacists to better understand the existing role and scope.

Pharmacy technicians provide a valuable supportive role, undertaking activities such as medicines history taking, medicines management, and expenditure reporting, freeing up and enabling more time to be spent on medicines optimisation activities by clinical pharmacists.

The technical and medicines management skills required are generic rather than bespoke, and this means that many of the activities carried out by pharmacy technicians are not limited by a specific training need for critical care. Local training with regard to critical care context, patient cohort and common medicine management issues would be required as part of an induction process, along with FFP3 fit testing and the ability to work in the appropriate level of PPE where necessary.

## Outcomes – Pharmacy Technicians

### Clinical / Operational

Pharmacy technicians can perform medicines history taking as part of the medicine’s reconciliation process. A significant impediment to this in critical care is the loss of access to the patient as an information source when they are intubated and ventilated, however in enhanced care areas this would be much less of a problem, indeed enhanced care pathways would be well suited for pharmacy technician input due to high patient throughput.

Pharmacy technicians also order medications that have been screened as clinically appropriate by a pharmacist. Pharmacy technicians could perform many of the required safety & security/CQC audits that would be otherwise done by pharmacists. Additionally, pharmacy technicians would take on much of the workload associated with managing medication shortages (providing written information / memos, email comms, liaising with procurement and distribution, etc).

These activities free up pharmacist time to undertake other priorities, such as ward round attendance or individual patient medicines optimisation as described in commissioning.

In some pilot schemes, pharmacy technicians are undertaking medicines administration as part of specific medicines administration rounds. These are currently limited to enteral or topical medicines and have not been undertaken in critical care areas<sup>31–33</sup>. Extension of this into enhanced care areas and critical care could also release nursing time in the future. During COVID surges when there was pressure on critical care nursing teams, some centres deployed pharmacy

technicians to assemble and prepare intravenous doses alongside nursing colleagues (personal communication, data on file, presented at SOA 2021). There is no legal barrier to this <sup>34</sup>

### Financial

Much of the financial case for pharmacy technicians is with the expectation that they undertake activities that release pharmacists to focus on medicines optimisation. In addition, pharmacy technicians are adept at overseeing systems that recover the costs of medicines, but in a way that does not impede access to those medicines.

*Example of a pharmacy technician led cost recovery system*

#### **King's College Hospital**

*"Some medications are kept available in critical care that are excluded from the Payment by Results tariff yet may be required urgently. The pharmacy technician ensures that these medicines are retrospectively booked out to the correct patient and the costs recouped back into the organisation (equivalent to approximately £45k per annum)"*

## Strategic Aim – Pharmacy Technicians

### Overall aims

#### Short term (within 3 years)

To increase the provision of pharmacy technician support in critical care areas in order to release available pharmacist time for patient focussed clinical activity.

#### Medium to long term (3 to 10 years)

To support medicines administration on critical care areas by assisting / collaborating with nursing staff in medicines preparation (intravenous medicines) or administration (enteral / topical medications)

### Support Required – Pharmacy Technicians

#### Short term (within 3 years)

All NHS organisations with adult critical care and/or enhanced care services to actively review pharmacy technician input into critical care or enhanced care areas to seek opportunities for added value roles within 6 months of publication of strategy (repeat 2 yearly).

Operational Delivery Networks to coordinate the above work.

#### Medium term (3 to 5 years)

Informed standards for pharmacy technician staffing levels in critical care cannot be made due to lack of available evidence, and evidence cannot be collected due to lack of pharmacy technician staffing in critical care. Therefore, NHS England to fund a two-year pilot and evaluate the effects of adding pharmacy technicians to critical care teams, both in a large organisation and in a smaller organisation, on outcomes



such as time released of other professionals (pharmacist, nursing), economic outcomes and on adverse incidents. The pilot must also gather data on additional training needs to inform future planning.

#### Evidence of achievement

- Review results held by ODNs
- Pilot scheme funded, undertaken, with resultant report published and incorporated into GPICS / relevant NHSE Adult Critical Care Service Specification

## Pharmacy Assistants in Critical Care

There are a number of pharmacy assistant roles in critical care around England. There are also several job titles in existence to more firmly align the role with the clinical area (e.g., Medicine Support Workers, Medicines Management Assistants, Ward Based Pharmacy Assistants).

These roles are not mentioned in GPICS, and no standards currently exist.

A working group of the Adult Critical Care Planning Programme, having reviewed nursing tasks and workload, believe there is a key and highly significant role for pharmacy assistants embedded in critical care. These staff would specifically take on tasks usually left to critical care nurses and thus free up nursing time/capacity. Pharmacy assistants will work under the supervision of pharmacists, pharmacy technicians, registered nurses and/or clinical leads. They will support critical care units in medicines management and assurance. They will be expected to ensure that treatment/medicines rooms are clean, tidy, and adequately stocked to support the needs of the unit (this includes putting stock away, electronic cabinet management, etc). In particular, they will replenish and rotate stock, as well as perform checks for expired medicines for disposal, and returning other usable medicines to pharmacy for re-use as appropriate. They also accelerate supply of medication from pharmacy therefore minimising delays of critical medicines. Information technology solutions are available that allow bedside nurses to create “shopping lists” that can be picked by the pharmacy assistant and delivered to the nurse at the bedside, releasing nursing time to care. This may be a particular advantage for nurses working in side rooms or where infection control measures are in place.

They will additionally perform appropriate medicine safety checks (e.g., medicines fridge and room temperature monitoring, CD checks with nursing staff), recording results at every shift, as well as conduct medicines management and handling audits under the supervision of appropriate nursing and pharmacist / pharmacy technician oversight.

## Outcomes – Pharmacy Assistants

### Operational

Undertake the day-to-day medicines stock related tasks with the aim of releasing nursing time. This includes ordering and put away of medicines stock, return and re-use medicines, ensuring patient specific medicines transfer to other ward areas with

the patient, checking of expiry dates, etc. The term 'medicines' includes intravenous fluids and renal replacement fluids, and also includes controlled drugs when the task is undertaken with a registered nurse (e.g., assisting with ordering, assisting with checking stock levels).

To undertake the assembly and maintenance of pre-prepared 'kits' that included medicines, such as pulmonary embolism kits, line trolleys, difficult airway trolleys, resuscitation trolleys, transfer bags and hypo-boxes, for example  
Assistants can work directly with nurses to support the bedside provision of medicines, assembling materials for preparation (not administration), safe return of medications to pharmacy for re-use, and forwarding of medicines to other clinical areas with the patient when they move care location.

### Financial

In a pilot trial undertaken at Bristol Royal Infirmary, the deployment of 0.25wte pharmacy assistant time to 21 critical care beds returned savings on fridge items worth £1,035 per calendar month, through re-use of items and forwarding of items when patients stepped down to lower levels of care. These data were for refrigerated items only, information was not captured for room-temperature medicines (unpublished data).

## Strategic Aim – Pharmacy Assistants

### Overall aims

#### Short term (within 3 years)

To increase the provision of pharmacy assistant support in critical care areas to free up available nurse time for patient focussed clinical activity (indirect cost savings)

To reduce medicines expenditure (direct cost savings)

### Support Required – Pharmacy Assistants

#### Short term (within 3 years)

All NHS organisations with adult critical care and/or enhanced care services to draw up plans to include pharmacy assistants within 6 months of publication of strategy (repeat 2 yearly)

Operational Delivery Networks to coordinate the above work

### Evidence of achievement

- Review results held by ODNs
- Medication returns data show return on investment
- Wellbeing surveys of nursing staff demonstrate improved satisfaction / positive support for the service

### *Example of an Integrated team*

#### **Sheffield Teaching Hospitals**

*“Sheffield Teaching Hospitals (STH) employs both medicines management technicians (MMTs) (4 WTE) and a medicines management assistant (MMA) (1 WTE) as part of its critical care pharmacy team. An advanced-level clinical service is provided to all critical care areas within STH, which is comprised of eighty-three level 2/3 beds, split between six units across two separate sites.*

*Over the course of the past fiscal year, the MMA saved approximately £92k through good stock management practice (e.g., ensuring unused non-stock items were transferred back to pharmacy, or transfer of short-dated stock to areas with higher usage) across all critical care areas. This is in addition to a further £15.5k saved by the MMTs through similar good practice (e.g., recycling of discarded stock).*

*An advanced-level clinical service is provided by a team of specialist pharmacists, fully integrated into the multiprofessional team in line with GPICS V2. This includes daily attendance at multiprofessional ward rounds, and a high level of prescribing activity including both medicines reconciliation and optimisation. This clinical activity is enabled through the work of the MMTs, freeing up pharmacist time to focus on clinical responsibilities. For example, in the past three months, approximately 80% of drug histories performed in critical care areas were performed by MMTs (n=863/1088). In addition, the MMTs order around 3,400 items per year on average, saving both pharmacist and nursing time, and ensuring timely provision of critical medicines.”*

## Interdependencies with Other Services

### Pharmacists

Clinical pharmacists working within critical care may have job plans that include an element of working in roles serving other parts of the hospital. This is particularly true for organisations that have smaller critical care units, or where pharmacists work in critical care for weekend and bank holiday cover to support the main critical care pharmacist(s).

Any budget for critical care pharmacists almost always lies within the pharmacy budget, and not within the critical care budget<sup>8</sup>. Critical care pharmacists are at risk of being redeployed away from the critical care area in order to support activity such as prescription screening and dispensing in the pharmacy department, or activities to meet medicines reconciliation targets in high turnover ward areas. Mechanisms must be in place to ensure the expected critical care input is maintained if other service pressures increase.

Pharmacists who are deployed to critical care areas as a support activity (e.g., weekends / bank holidays / annual leave cover) must have access to the same training as permanently base personnel

### Pharmacy technicians

Ward based pharmacy technicians are increasingly being sought after to work in other clinical areas both inside secondary/tertiary care organisations, and also in

primary care (Primary Care Networks and GP surgeries). Within secondary/tertiary care, they can be easily redeployed to other clinical areas because of desirable transferable skills, and thus a feature that makes them readily employable in critical care also makes them highly sought after in other areas. Pharmacy technicians are at risk of being pulled back to dispensaries when dispensing workload becomes high, or moved to high throughput clinical areas to support medication history taking / reconciliation, a widely used key performance indicator

A key statistic that will likely determine the utility of a pharmacy technician in critical care is the admission rate to the unit. Smaller critical care units with one to two admissions per day are unlikely to benefit from the medicines history taking aspect, for example., whereas a larger unit with a higher admission rate, or a high throughput area such as an enhanced care area, will benefit from this, facilitating other activity (e.g. enabling the pharmacist to attend the ward round)

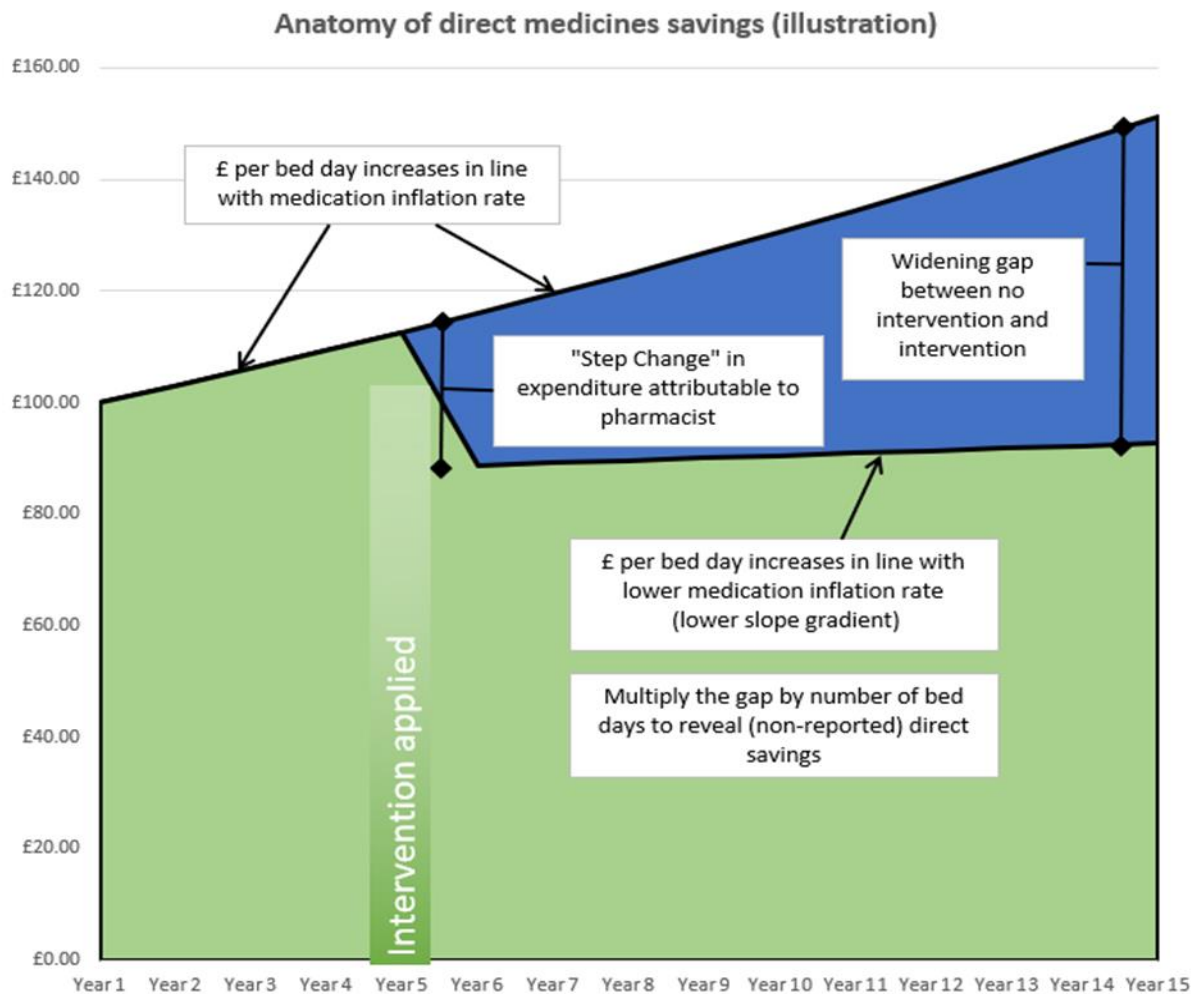
### Ward based pharmacy assistants

Pharmacy assistants are crucial members of the pharmacy department, performing dispensing roles and picking stock in pharmacy stores. Uplifts to pharmacy staffing in line with service developments (such as new clinical services, new wards physical and virtual) are not always successful and thus new ward-based pharmacy roles may be viewed as an available resource to help tackle historical staffing gaps in pharmacy.

The expected availability of ward-based pharmacy assistants may dictate lines of management. A daytime service would be through pharmacy, whereas a 24/7 service will need close liaison with nursing structures to ensure appropriate management / supervision.

## Appendix 1: Financials

### Anatomy of direct medicines savings (Illustration, per bed day)



Assumptions from <https://www.kingsfund.org.uk/publications/critical-care-services-nhs>

#### 2018/19

- Admissions: 208,982
- Beds: 4,140
- Occupancy: 80.4%

∴ Step change (No pharm service vs pharm service) = £24.3million (range £17m to £37m)

After five years due to inflation suppression, difference = £37.2million (range £29m to £51m), growing at about £4m per year

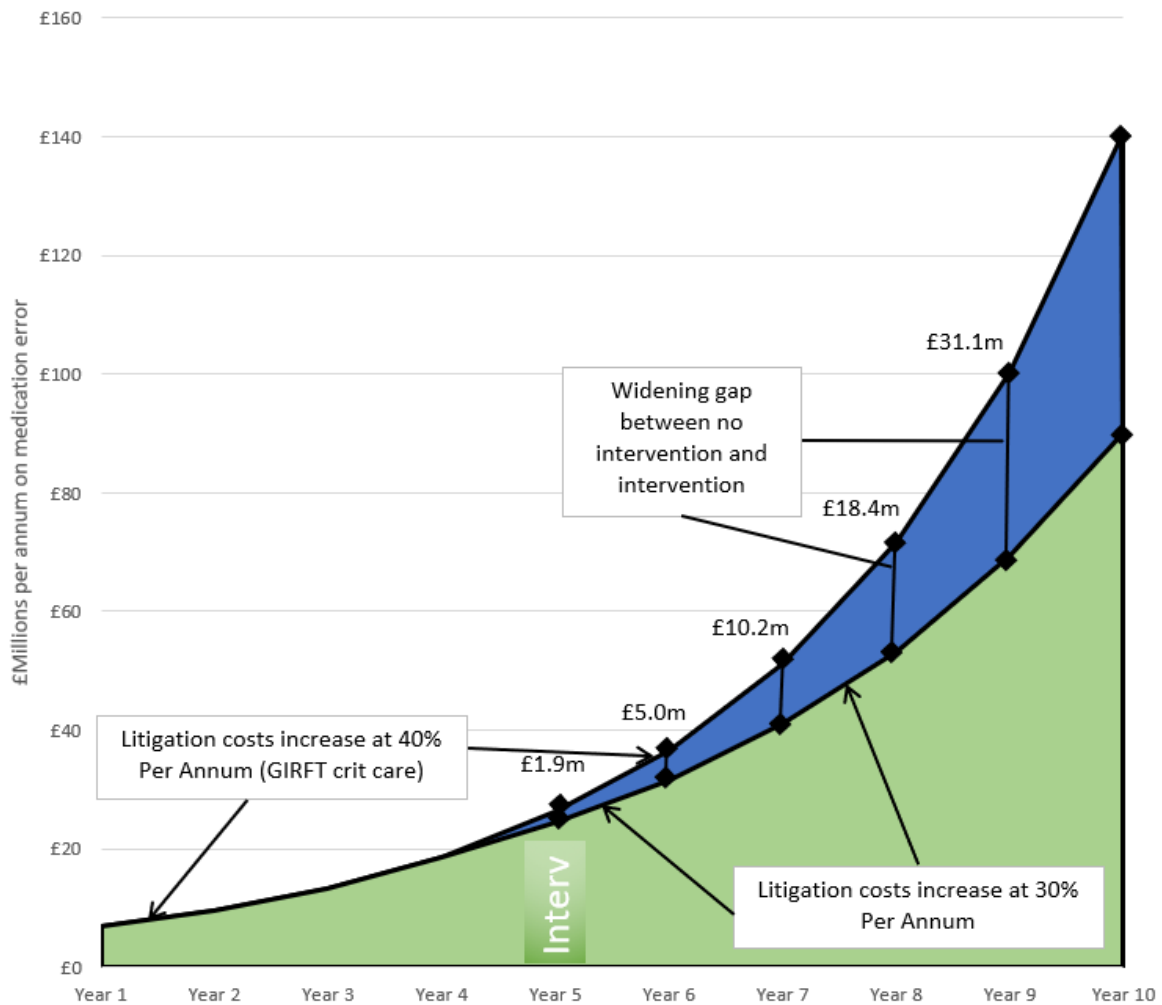
#### Cost of Critical Care Pharmacists

- Beds: 4,140
- 4140 (580 + 116 continuity) = 696 pharmacists x £53,000 = £36.9m

Critical care pharmacist provision at 39% of expected (2020, Workforce data on file)

Anatomy of litigation savings against medication error (illustration, NHSE system)

**Anatomy of litigation medicines savings (illustration)**



**Assumptions from GIRFT Adult Critical Care Report 2022**

- Medication errors 30 claims (2017/18), total cost £6.8 million, cost per claim £227,286
- Claim costs rising at 40% per annum
- Assuming an appropriately funded pharmacy service limits medication error rate of rise to 30%

**Critical Care Bed capacity**

- Systematic review – approx. reduction of 1.33 (0.9-1.75) days in critical care length of stay
- Admissions: 208,982 (Kings Fund)
- Potential reduction in LOS = 271,677days (188,084 – 365,719), equivalent to 744 critical care beds per annum (515 - 1,002)

Critical care pharmacist provision at 39% of expected (2020, Workforce data on file, manuscript submitted)

## Anatomy of medication waste savings through use of assistants / pharmacy technicians

- BRI and Sheffield experience: approx. £250 to £350 meds returned/recycled per week per critical care location
- 247 locations in England, 52 weeks
- $52 \times 247 \times £250 \text{ to } £350 = £3.2\text{m} - £4.5\text{m}$  per annum (does not include efficiency savings through reduced disposal/incineration of pharmaceutical waste, reduced processes to replenish destroyed stock, etc)

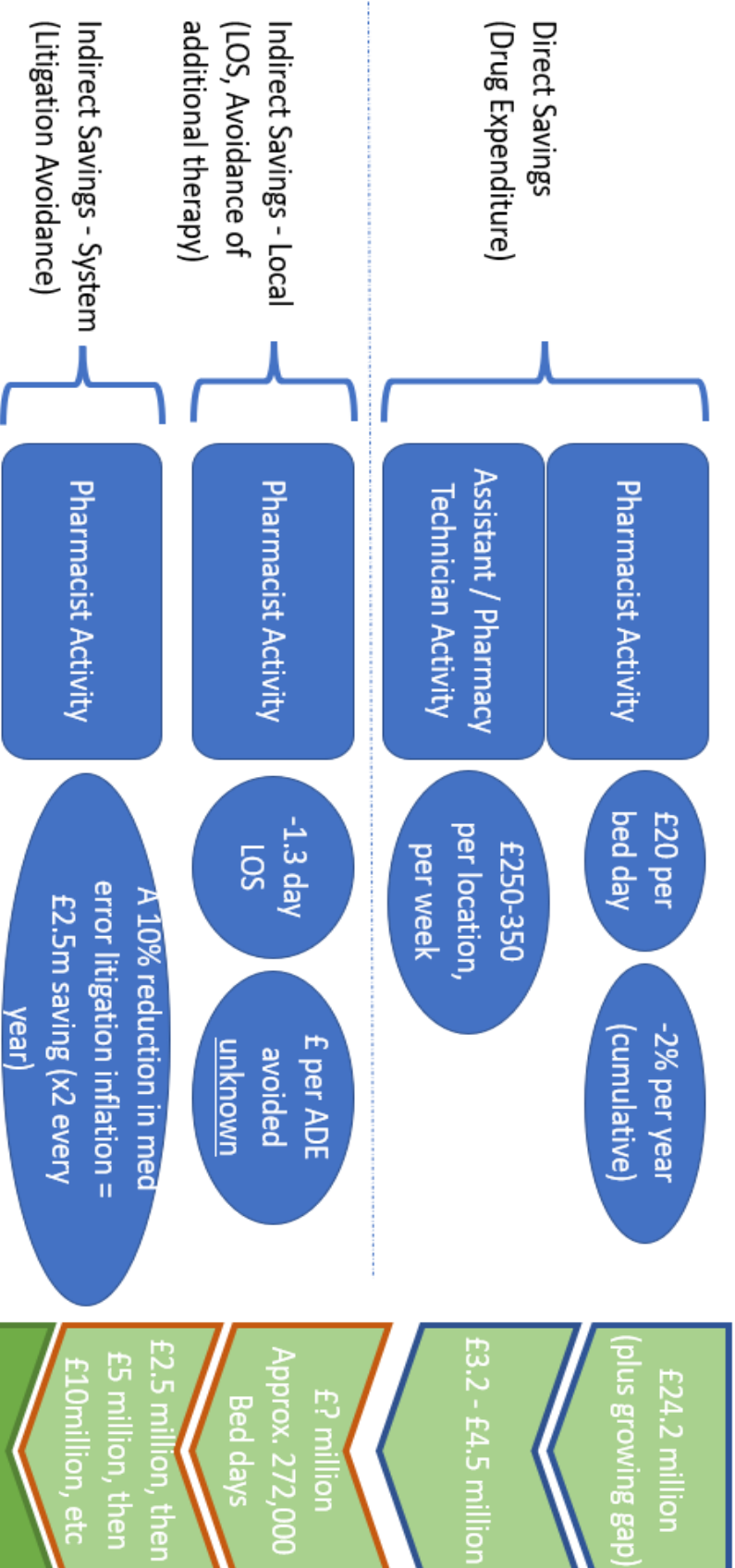
### **Cost of basic pharmacy assistants service**

0.5wte Assistant per location

475 locations, approx. 0.5wte Assistant per location (top-up, put away, returns)

$=475 \times 0.5 \times £22\text{k} = £5.2\text{m}$

## Estimated economic impact of appropriate funded Pharmacy Service to Critical Care in England (per annum)



Calculations based on England 2020 (pre-covid, Kings Fund)

4140 Beds (@80% occ) = 1,208,880 Bed days

247 Locations

208,982 admissions



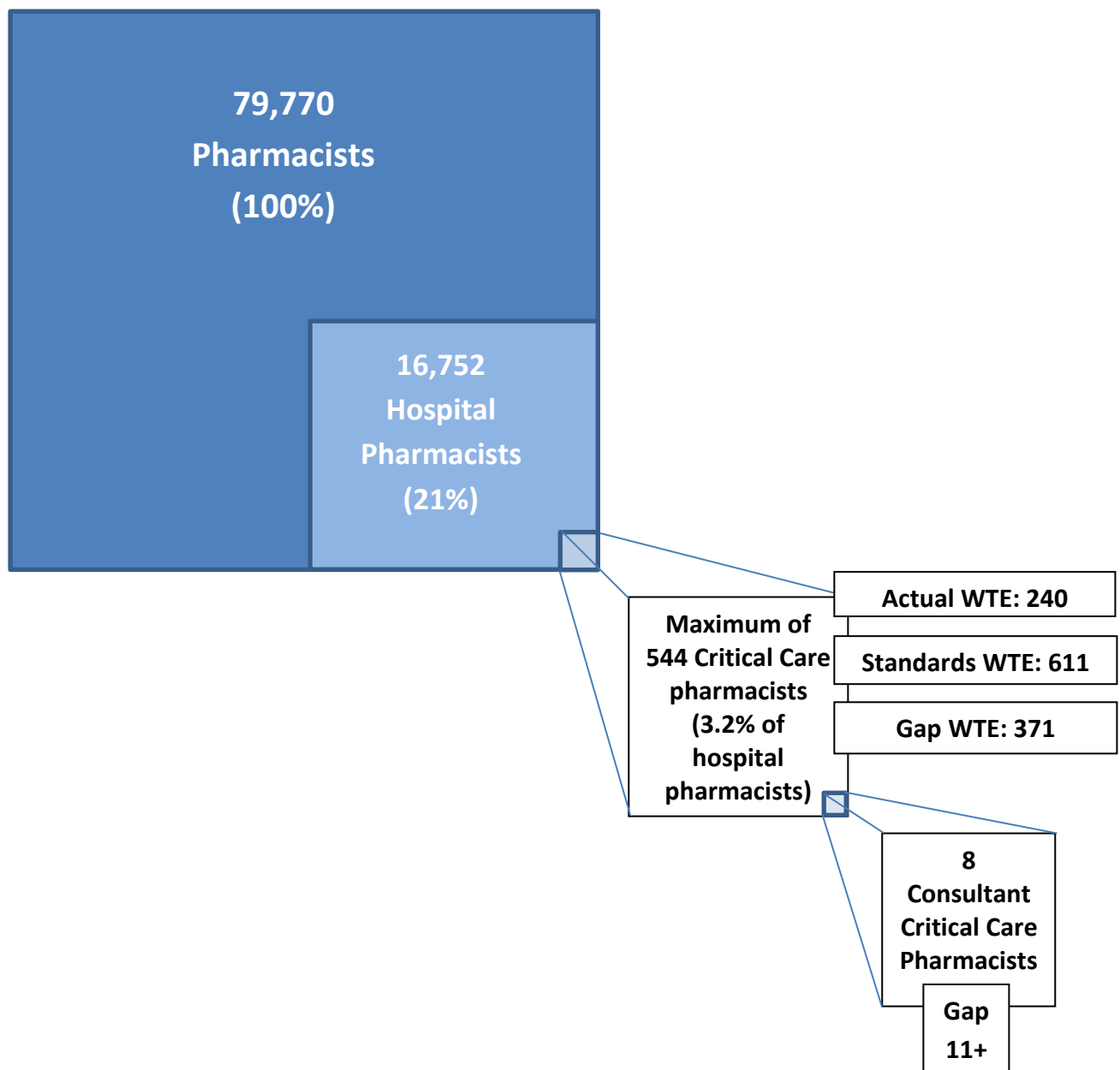
## Appendix 2: Staffing Pipeline

Data on current Pharmacist pool

Entry points for critical care pharmacists: -

- From A level – 5 years plus two years (minimum)
- From non-hospital pharmacy environment – 3 years including Level 7 diploma
- From another hospital role – likely after a short induction of a few weeks (if under supervision of critical care pharmacist)

UK Data (Crit care workforce data on file, manuscript submitted)

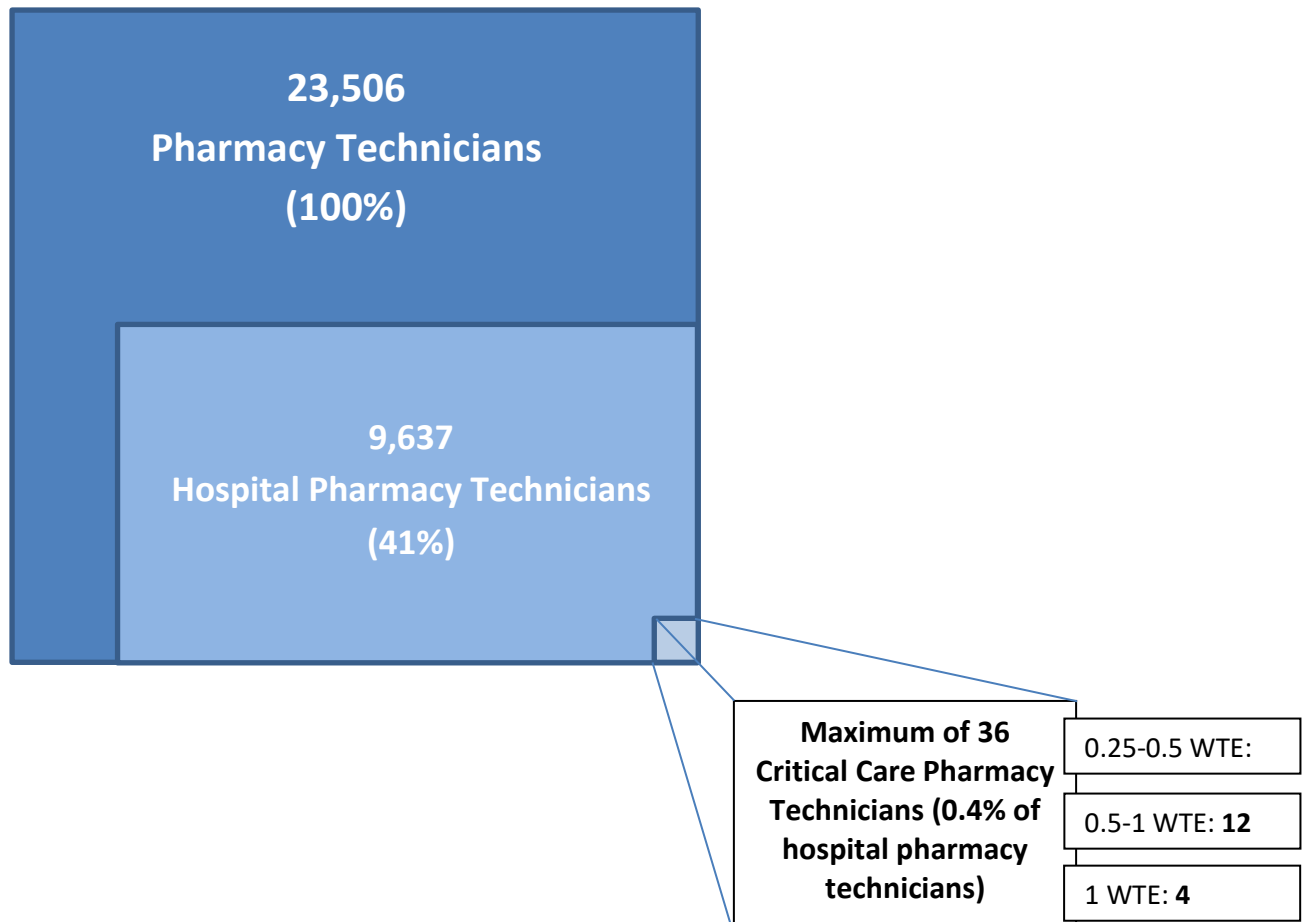


Data on current Pharmacy Technician pool

Entry points for critical care pharmacy technicians: -

- From GCSE – 2 years plus one year (minimum)
- From non-hospital pharmacy environment – 3-6 months hospital induction
- From another hospital role –short induction of a few weeks

UK data (Crit care workforce data 2020 on file, manuscript submitted)



### Appendix 3: Research Recommendations

Priority areas for investigation to inform future rollout/standards for critical care pharmacy: -

Quantify the impact and time released for critical care nurses by the provision of a ward-based assistant service, including at different levels of provision (daylight 5/7, 7/7 services, 24/7 services).

Quantify the impact and time released for critical care pharmacists by the provision of pharmacy technician support (medicines management technicians). Determine the optimum staffing model in terms of the 'admission rate' of the critical care area

Investigate the impact on medication administration error rate of deploying a supporting pharmacy technician or pharmacy assistant workforce (as distinct from medication prescribing error), when implementing a 'bedside medicines assembly' service. Further investigate the feasibility and impact of the provision of a patient-side medicines preparation service by pharmacy technicians working with critical care nursing staff

Understand and quantify any effect that the deployment of pharmacy assistants / pharmacy technicians has on critical care staff wellbeing (e.g., on parameters such as burnout, turnover, sickness rate, staffing ratios)

## References

1. NICE, Medicines, Medicines optimisation: the safe and effective use of medicines to enable the best possible outcomes. *NICE Guideline*. (2015).
2. Brigg, T. *et al.* *Survey of registered pharmacy professionals 2019*. (2019).
3. Keith Young *et al.* *Adult Critical Care: Specialist Pharmacy Practice*. (Department of Health (England), 2005).
4. FICM & ICS. *Guidelines for the Provision of Intensive Care Services V2.1*. (2022).
5. NHS England. *Adult Critical Care Service Specification (D05, 220502S)*. (2022).
6. Care Quality Commission. *Inspection framework: Critical Care (Acute and independent healthcare)*. (2019).
7. Batchelor, A. *Adult Critical Care GIRFT Programme National Specialty Report*. (2021).
8. Borthwick, M., Barton, G., Bourne, R. S. & McKenzie, C. Critical care pharmacy workforce: UK deployment and characteristics in 2015. *Int. J. Pharm. Pract.* **26**, 325–333 (2018).
9. Rudall, N. *et al.* PROTECTED-UK – Clinical pharmacist interventions in the UK critical care unit: exploration of relationship between intervention, service characteristics and experience level. doi:10.1111/ijpp.12304
10. Ridley, S. A., Booth, S. A. & Thompson, C. M. Prescription errors in UK critical care units. *Anaesthesia* **59**, 1193–1200 (2004).
11. Elliott, R. A., Camacho, E., Jankovic, D., Sculpher, M. J. & Faria, R. Economic analysis of the prevalence and clinical and economic burden of medication error in England. *BMJ Qual. Saf.* **0**, bmjqs-2019-010206 (2020).
12. Shulman, R. *et al.* Pharmacist’s review and outcomes: Treatment-enhancing contributions tallied, evaluated, and documented (PROTECTED-UK). *J. Crit. Care* **30**, 808–813 (2015).
13. Dornan, T. *et al.* *An in depth investigation into causes of prescribing errors by foundation trainees in relation to their medical education. EQUIP study*. (General Medical Council, 2009).
14. Ryan, C. *et al.* Prevalence and causes of prescribing errors: The PRescribing Outcomes for Trainee Doctors Engaged in Clinical Training (PROTECT) study. *PLoS One* **9**, 1–9 (2014).
15. Cheng, C. *et al.* Development, implementation and evaluation of a seven-day clinical pharmacy service in a tertiary referral teaching hospital during surge-2 of the COVID-19 pandemic. *Int. J. Clin. Pharm.* (2022). doi:10.1007/s11096-022-01475-8
16. Bourne, R. S., Shulman, R. & Jennings, J. K. Reducing medication errors in

- critical care patients: pharmacist key resources and relationship with medicines optimisation. *Int. J. Pharm. Pract.* **26**, 534–540 (2018).
17. HSIB. *Summary report: The role of clinical pharmacy services in helping to identify and reduce high-risk prescribing errors in hospital.* (2020).
  18. Lee, H. *et al.* Impact on patient outcomes of pharmacist participation in multidisciplinary critical care teams: A systematic review and meta-analysis. *Critical Care Medicine* **47**, 1243–1250 (2019).
  19. Rice, M., Lear, A., Kane-Gill, S., Seybert, A. L. & Smithburger, P. L. Pharmacy Personnel's Involvement in Transitions of Care of Intensive Care Unit Patients: A Systematic Review. *Journal of Pharmacy Practice* 089719002091152 (2020). doi:10.1177/0897190020911524
  20. Bourne, R. S. *et al.* Medication-related interventions to improve medication safety and patient outcomes on transition from adult intensive care settings: a systematic review and meta-analysis. *BMJ Qual. Saf.* bmjqs-2021-013760 (2022). doi:10.1136/bmjqs-2021-013760
  21. Graabæk, T. & Kjeldsen, L. J. Medication reviews by clinical pharmacists at hospitals lead to improved patient outcomes: a systematic review. *Basic Clin. Pharmacol. Toxicol.* **112**, 359–373 (2013).
  22. Mekonnen, A. B., McLachlan, A. J. & Brien, J.-A. E. Effectiveness of pharmacist-led medication reconciliation programmes on clinical outcomes at hospital transitions: a systematic review and meta-analysis. *BMJ Open* **6**, (2016).
  23. Lord Carter of Coles. Operational productivity and performance in English NHS acute hospitals: Unwarranted variations. *NHS England.* 87 (2016).
  24. Kopp, B. J., Mrgan, M., Erstad, B. L. & Duby, J. J. Cost implications of and potential adverse events prevented by interventions of a critical care pharmacist. *Am. J. Heal. Pharm.* **64**, 2483–2487 (2007).
  25. MacLaren, R., Bond, C. A., Martin, S. J. & Fike, D. Clinical and economic outcomes of involving pharmacists in the direct care of critically ill patients with infections\*. *Crit. Care Med.* **36**, 3184–3189 (2008).
  26. Klopotoska, J. E. *et al.* On-ward participation of a hospital pharmacist in a Dutch intensive care unit reduces prescribing errors and related patient harm: an intervention study. *Crit. Care* **14**, R174 (2010).
  27. Leguelinel-Blache, G. *et al.* Impact of Quality Bundle Enforcement by a Critical Care Pharmacist on Patient Outcome and Costs\*. *Crit. Care Med.* **46**, 199–207 (2018).
  28. Parker, J., Clymer, M., Owen, O., Bourne, R. & Rosser, J. Poster 15: Inclusion of specialist critical care pharmacists to the multidisciplinary team on an adult cardiac critical care unit significantly reduces drug expenditure. in *Association of Cardiothoracic Anaesthesia and Critical Care Annual Scientific Meeting* (2017).

29. The Faculty of Intensive Care Medicine & Centre for Perioperative Care. Guidance on Establishing and Delivering Enhanced Perioperative Care Services. (2020).
30. Critical Care Committee of the UK Clinical Pharmacy Association. *Pharmacy services needed for enhanced care*. (2022).
31. Keers R.N., *et al.* *Evaluation of pharmacy TECHnician supported MEDication administration rounds (TECHMED) on reducing omitted doses: a pilot randomised controlled trial and process evaluation in a university teaching hospital*. (2017).
32. Seston, E. M., Ashcroft, D. M., Lamerton, E., Harper, L. & Keers, R. N. Evaluating the implementation and impact of a pharmacy technician-supported medicines administration service designed to reduce omitted doses in hospitals: a qualitative study. *BMC Health Serv. Res.* **19**, 325 (2019).
33. Silverio, S. A. *et al.* The implementation of a Technician Enhanced Administration of Medications [TEAM] model: An evaluative study of impact on working practices in a children's hospital. *Res. Soc. Adm. Pharm.* **16**, 1768–1774 (2020).
34. Bateman, R., Lowe, R. & Root, T. *Preparation of Medicines in Clinical Areas by Pharmacy Staff: The Legal and Regulatory Framework*. Specialist Pharmacy Services (2017).