

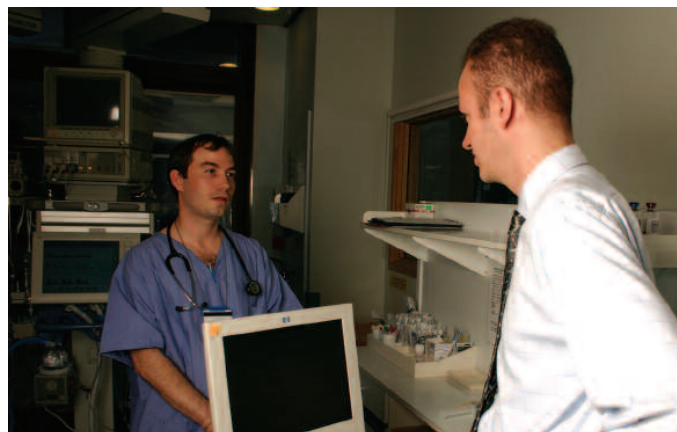
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A career as a . . . critical care pharmacist

By Haley Hill, MRPharmS

The Intensive Care Society guidelines state that all intensive therapy units should have a dedicated pharmacist.

This article discusses what is involved in critical care pharmacy practice and looks at the role of the specialist pharmacist



Critical care pharmacists work closely with the medical team

Critical care pharmacy practice is developing, with the profile of pharmacists increasing within the multidisciplinary team. Taking on more responsibilities within this specialty, pharmacists are involved in areas such as clinical risk management, training and research. The recent approval of the career pathway for critical care pharmacists¹ has highlighted the skills and competencies required, and provides a structured training programme from basic-grade to consultant pharmacist. This article, based on interviews with Mark Tomlin, consultant critical care pharmacist at Southampton University Hospitals NHS Trust, Catherine McKenzie, principal critical care pharmacist at Guy's and St Thomas' Hospital NHS Foundation Trust and Christine Chung, lead pharmacist, imaging and anaesthetics at Chelsea and Westminster Hospital looks at the general role of a critical care pharmacist.

Background

Critical care concerns the complete process of caring for the critically ill patient. In addition to the needs of the patient during the period of illness itself, the term also encompasses the needs of those at risk of critical illness and those who are recovering or have recovered from such illnesses.²

Generally, a critical care pharmacist will predominantly cover the intensive therapy

unit (ITU) where patients are defined as requiring advanced respiratory support alone, or basic respiratory support together with the support of at least two organ systems (including patients with multi-organ failure).² Therefore, the pharmaceutical management of a critically ill patient is a complex task, requiring knowledge of drug therapy in all chronic and acute disease states, often severe in nature. It is generally a role given to an "experienced pharmacist" but most hospital pharmacists will have some involvement in critical care whether it be on-call queries, covering the workload of a critical care pharmacist or a patient transfer from an ITU to a high dependency unit or a general ward.

Knowledge

Oral therapy is often not possible for critically ill patients and alternative routes of drug administration are frequently required. Injections make up approximately 20 to 30 per cent of prescribed medicines for inpatients on general wards, whereas in an ITU approximately 95 per cent of prescribing is for intravenous administration. Thereby, pharmacists working in an ITU are moving into an area dealing almost exclusively with intravenous therapy: bolus injections, intermittent infusions and continuous infusions. Mr Tomlin explains that experience and knowledge in a number of areas (listed below) are a fundamental requirement to practise competently as a critical care pharmacist. "These areas of expertise are unique to pharmacists and differentiate us from other health care professionals,

making pharmacists an invaluable part of the critical care multidisciplinary team," he says.

Formulations The alternative routes of administration required in an ITU mean that pharmacists are often required to offer advice on formulations ie, suitability for administration via a nasogastric tube or a percutaneous endoscopic gastrostomy tube. The critical care pharmacist needs an adequate knowledge of which formulations can be crushed or dissolved and be able to suggest alternative medicines where necessary.

Interactions Polypharmacy is common in an ITU, often involving high doses or high-risk drugs. Therefore an understanding of drug-drug and drug-disease interactions is imperative.

Compatibilities ITU patients are frequently prescribed several intravenous therapies for administration via a central line. Pharmacists need to be able to give information and advice on the compatibility of intravenous drugs.

Pharmacokinetics and bioavailability Critically ill patients will invariably have some degree of renal or hepatic impairment and medical interventions, such as haemofiltration and dialysis, are often required in an ITU setting. Knowledge of the distribution, metabolism, clearance and appropriate therapeutic drug monitoring (TDM) of a medicine is vital to optimise treatment outcomes. Also, critically ill patients often have reduced gastric

Haley Hill is staff editor at *Hospital Pharmacist*

Panel 1: Career history — Christine Chung

Ms Chung began her career in critical care pharmacy as a preregistration trainee at Central Middlesex Hospital. After completing her training she went on to work as a locum at Homerton Hospital for six months.

This was followed by a basic grade rotation at The Lewisham Hospital NHS Trust where she completed her London School of Pharmacy certificate in pharmacy practice and then acted as medicines information co-manager for five months.

This gave her a broad-based experience in hospital pharmacy and the foundation skills to take on a new position as anaesthetics pharmacist at Barts and The London NHS Trust. She says: "As a basic grade, I always used to panic when I had to deal with an intensive therapy unit (ITU) drug chart. I saw this job as the ideal opportunity to learn more about the specialty."

Initially, she worked under the close supervision of a senior critical care pharmacist during an eight week induction on ITU, after which she attended ward rounds unsupervised. She says: "Attending consultant-led ward rounds gave me an

understanding of the medical aspect of critical care and helped me learn a team approach to patient care."

During her two years in the post, Ms Chung mainly covered ITU at The Royal London Hospital which predominantly dealt with patients with major head injuries from road traffic accidents. She also covered The London Chest Hospital, dealing with patients who had undergone mitral valve replacements and coronary artery bypass grafts, and Barts and The London, dealing with patients after major cardiac surgery. During this time she completed the London School of Pharmacy diploma in pharmacy practice core course, and the critical care and teaching and learning modules followed by the University of Brighton cardiovascular module.

In 2001, Ms Chung took on her present role as lead pharmacist, imaging and anaesthetics at Chelsea and Westminster Hospital, where her role includes training pharmacists in critical care and parenteral therapy: "I took on this position so I could have more of a managerial role and help to train and develop others", she says.

absorption, and knowledge of the bioavailability of drugs will assist decisions on appropriate therapy. An understanding of bioavailability is also necessary to advise on dose equivalencies when the route of administration or form is changed.

— Multidisciplinary team

Critical care pharmacists work closely with other members of the multidisciplinary team. Communication is vital in order for the team to make informed decisions regarding patient care. Ms Chung says: "It is important to understand detailed information on the medical state of the patient before any pharmaceutical interventions can be made." Most ITU pharmacists will attend consultant-led ward rounds, during which any pharmaceutical issues can be discussed, providing the prompt resolution that is necessary for the critically ill patient.

The nature of critical care prescribing means pharmacists need to draw knowledge from other areas of expertise. It is also important to build a rapport with the consultants, anaesthetists and nurses as such communication is vital to gain an understanding of their prescribing practices, share knowledge and provide input from a pharmacist's perspective.

— Evidence base

A text-book approach is not appropriate for critical care pharmacy. Many of the drugs are

prescribed for unlicensed indications or at unlicensed doses. Ms McKenzie comments: "It is difficult to generate good evidence as there are limitations to conducting research in critical care, eg, small patient groups and issues with obtaining patient consent."

Due to the limited use of evidence-based medicine in critical care, guidelines are generally local and based on the consultant's personal experience. Mr Tomlin says that although several major trials (multicentre and multinational) have been conducted, information is generally obtained from small group patient studies, focus groups and conference consensus. Critical care pharmacists have to work together to build consensus and standardisation.

At Guy's and St Thomas' Hospital NHS Foundation Trust, critical care pharmacists work with the medical team to produce guidelines to support practice based on their appraisal of evidence and personal experience. These guidelines are available for all clinical staff to access on an intranet website.

Both Ms McKenzie and Mr Tomlin are committee members of the United Kingdom Clinical Pharmacy Association Critical Care Group (designed for hospital pharmacists across the UK with a special interest in critical care). The association set up an e-mail network which provides a forum for communication and enables pharmacists to draw on each other's experience. Mr Tomlin points out that "in critical care, answers are rarely straightforward and queries may receive

three or four different responses depending on the experience in each individual situation. The pharmacist then, using their own judgement, interprets the risks and benefits and applies the information to a specific situation." Ms McKenzie advises: "When there is limited evidence, go back to first principles. Use the information you have on a certain drug and apply it to the critical care setting."

— Interventions

The scope for pharmaceutical interventions in critical care is broad. Issues such as impaired organ function, dialysis, haemofiltration, impaired circulation and impaired respiration can alter drug handling significantly. Pharmaceutical problems are rarely isolated and critical care pharmacists need to exercise their judgement, make decisions and offer advice, taking all the pharmaceutical and medical issues into account.

TDM Drug clearance is often reduced in critical illness due to impaired organ function. Therefore, the monitoring of drugs with a narrow therapeutic index is especially important for a critically ill patient. Pharmacists are uniquely qualified to manage the TDM of such drugs, and sample taking, interpretation of results and subsequent dose adjustment is often overlooked by other disciplines. Mr Tomlin leads and manages TDM within his unit and, as a supplementary prescriber, he also makes any necessary dosage adjustments to the drug chart.

Fluid balance Critically ill patients are often prescribed many infusions. Together with organ impairment (eg, renal failure or heart failure), this can often lead to fluid overload. Pharmacists frequently offer advice on increasing the concentration of infusions and also provide information on the sodium content of drugs and infusion fluids, suggesting alternatives when necessary, for fluid restricted patients.

Prescribing practice The expenditure per patient is proportionally much higher in critical care compared with other wards. Pharmacists are ideally placed to monitor the prescribing of high-cost drugs, collate the evidence base for their use and suggest cheaper alternatives that do not compromise patient care.

Also, with the reduction of methicillin resistant *Staphylococcus aureus* infections a national target, pharmacists are becoming more involved in the monitoring of antibiotic prescribing in order to reduce the development of antibiotic resistance and ensure antibiotics are prescribed appropriately and cost effectively.

Risk management Drug therapy in critical care is more high risk than on general wards.

Ms McKenzie says: "If a critically ill patient is receiving 20 or so intravenous drugs, the probability of something going wrong is quite high, especially with known high-risk drugs such as potassium [intravenous concentrated potassium solutions]." Ms McKenzie is greatly involved in risk management in critical care and believes this is an area for pharmacists to manage. An example she gave was activated protein C. "The potential benefit in critically ill patients is high, but so is the risk of bleeding to death." Therefore at Guy's and St Thomas' Hospital NHS Foundation Trust, a system was developed for pharmacists to score the patients to determine whether treatment is appropriate. The pharmacist then discusses the result with the consultant before a decision is made.

Dosing in renal and hepatic impairment Pharmacists play an important role in advising appropriate dosage adjustments for patients with organ impairment. Ms Chung says that in her experience there are rarely straightforward answers where dosing adjustments are concerned and emphasises the importance of considering each case on an individual basis, giving an example of antibiotic dosing in renal failure. She says: "The risk of accumulation has to be balanced with the risk of under-treating the infection. You cannot solely rely on the data sheet and the renal handbook. If the patient

is at risk of dying from sepsis and the effects of accumulation of the drug carry a lower risk then it is generally better to treat with a full dose and advise the nurses and doctors to monitor for signs of accumulation."

Supply In critical care, the simple issue of supply is an important aspect of patient care, with pharmacists often dispensing the drugs and personally delivering them to the ward. Mr Tomlin says: "I usually take up the drugs myself because when a patient is critically ill and urgent drug administration is required, my priority is to get the drug to the patient as quickly as possible."

— Future

The recently approved career pathway will increase the profile of pharmacists and enhance their role within the multidisciplinary team as well as help standardise the pharmaceutical care provided for critically ill patients.

The definition of critical care has been developed to encompass all patients at risk of and recovering from critical illness and, with this, the role of the specialist critical care pharmacist is extending to provide appropriate pharmaceutical care to these patients. Ms McKenzie helps to deliver this care by her involvement in the development of early warning scores and training other ward

pharmacists on how to spot patients at risk of critical illness.

Ms McKenzie adds that the way forward for consultant critical care pharmacists is to develop new levels of expertise. She says: "Consultant pharmacists will be in a position to undertake research in drug therapy and publish their findings in order to increase knowledge of drug handling in critical care. If pharmacists do not conduct this research in critical care — it will not be done."

— Conclusion

Pharmacy practice within a critical care setting is a challenging yet rewarding experience. It is a specialty in which a pharmacist's expert knowledge of drugs can make an invaluable impact on patient care. The specialty of critical care pharmacy not only requires extensive broad-based knowledge, but also the ability to apply this knowledge to a critical care situation. Mr Tomlin comments, "it is both a specialist and a generalist area and you never know what will come through the door".

— References

1. Adult critical care —specialist pharmacy practice. London: Department of Health; 2005.
2. Levels of critical care for adult patients. London: Intensive Care Society; 2002.