IMPLEMENTING A NURSE-LED COMMUNITY INTRAVENOUS ANTIBIOTIC SERVICE

Karen Regan and Jacqueline Morgan outline how the introduction of a service to provide care traditionally offered in hospital has given patients the choice to receive treatment at home and extended the role of district nurses.

Abstract

At its inception in 2011 the @home community intravenous (IV) service used available staff resources to deliver IV antibiotics to patients in the community. The service model included two advanced nurse practitioners as clinical leads alongside the core district nursing services. Policies, guidelines and care bundles underpinned safe practice, and roles were developed and expanded to meet new challenges. Limitations were identified and significant lessons learned. Service developments benefited patients by allowing them to receive treatment at home. Audit and review has improved service delivery and prevented complications that can hinder patients’ progress.

OUTPATIENT PARENTERAL antimicrobial therapy (OPAT) has been used in many countries for more than 30 years with success, supporting its clinical justification and cost effectiveness. It has delivered significant benefits to healthcare organisations and patients. Traditionally, such services have been led by infectious disease departments. More recent developments in areas such as microbiology, acute medicine and primary care have been found to have a significant role to play in intravenous (IV) therapy services (Chapman et al 2012).

Setting the Direction (Jones 2009) identified that current health service provision in Wales was unsustainable, acute bed-based services were overused and there was a lack of community service developments. Together for Health (Welsh Government 2012) advocated that evidence from small-scale developments should inform future community service expansion and provide alternative care for patients closer to home.

Cwm Taf University Health Board Informatics Department identified that in 2011/12, 199 patients were admitted for IV therapy. From this number senior managers estimated that about 139 (70%) of them could have been treated at home had there been a community IV service available.

In response to these findings, Cwm Taf developed a nurse-led community based IV antibiotic service to enable earlier discharge for patients whose only reason for hospitalisation was their...
need for IV antibiotics. The service aimed to deliver a community-based service to patients equivalent to the traditional service provided in the hospital environment, funded within current resources.

To ensure patient safety, practice was underpinned by the development of policies, guidelines and a district nurse care bundle. The bundle consisted of information on the management of midlines, the procedure for the administration of antibiotics, a visual infusion phlebitis score and troubleshooting guidelines. Clear pathways of communication were established with secondary care colleagues, which included the management of any issues arising out of hours. A database of patients was established and this, along with patient documentation, became the basis for audit and review of service provision.

Home service model
According to Chapman et al (2012), team structures and clear lines of clinical responsibility are vital to ensure a high-quality service. In Cwm Taf, the team structure in the community consisted of two advanced nurse practitioners (ANPs) and the core district nursing service.

The ANPs were relocated from their previous community positions once they had completed their MSc in advanced clinical practice and independent prescribing courses. They were identified as clinical leads and service co-ordinators responsible for assessing and co-ordinating patient care for the new IV service, which was set up in 2011. They provided training and support for the district nursing teams, who were able to provide a seven-day service.

In the first two years, the ANPs actively promoted the service in secondary care by visiting wards, speaking to staff and undertaking presentations. This face-to-face contact was essential for establishing and promoting the new service development.

The consultant in secondary care retained responsibility for patients for the duration of their therapy. All medication was prescribed by the medical team and medication issued via the hospital pharmacy. The radiologist, microbiologist and pharmacist were involved in the transfer process and were a valuable source of support for the community teams.

Referral process
On referral, patients were assessed by the ANPs using an assessment bundle. This ensured that holistic assessments were undertaken before patients were transferred home. The bundle included details of patients' vascular devices, antibiotic regimens, allergies, monitoring arrangements and home circumstances, and a patient information leaflet about the service. The inclusion criteria for referral required that the patient’s home environment was safe and their condition stable. Because most patients required mid- to long-term antibiotics for chronic infections, venous access was made via either a midline, peripherally inserted central catheter (PICC) or Hickman line. District nursing capacity dictated that medication could be administered twice daily.

Once a patient was accepted to the service, management plans were agreed and documented. Communication with the medical team about any changes in treatment was via telephone; non-urgent information was exchanged via email. The patient’s GP and the community nursing team were informed of the patient’s transfer by telephone.

On the whole, the district nursing teams supported the initiative and could see the benefits for patients, although some team members found it difficult to accept referrals for timed lengthy calls when their existing caseloads were already busy. The teams also faced other demands and there were limited resources, so initially their ability to respond, particularly at weekends, was sometimes challenging. Alternative ways of working across areas and in teams were considered to accommodate patients’ needs.

Training and support
The district nursing teams were familiar with the routine management of PICC and Hickman lines because they often managed patients referred from a neighbouring specialist cancer centre, whose policies and guidelines on central lines had already been adopted in the community. Midlines, which were peripheral lines, were a relatively new concept, so policies, guidelines and care bundles were developed to support the management of these devices.

Training for the teams was completed as required when referrals were received. Once a referral was accepted, an ANP met with the district nurses at the patient’s home. This ensured that the prescription chart was clearly written, medication was available and monitoring arrangements were clear.

Education and support was provided to the district nursing team and focused on the administration of antibiotics and management of line complications. Drug monographs and district nursing care bundles were developed as a resource to guide training and support practice. These documents were incorporated in the district nursing care plans and proved to be a valuable resource.
Service limitations
A number of limitations were identified, particularly in the early stages of the service development.

Patients referred to district nursing teams from secondary care usually required antibiotics long term, which gave the teams the opportunity to develop and consolidate their skills. However, the unpredictable, sporadic nature of the transfers and the limited exposure of some teams to the process meant that developing confidence and competence across the area was slow. In the initial stages, this inevitably prevented the timely transfers of some patients. Weekends and bank holidays were a particular challenge for teams who had not been involved with the process previously.

The capacity and skills available in the teams to manage patient referrals appropriately was limited. The inclusion criteria did not cover patients requiring antibiotics more than twice a day or those who had a cannula in situ. Such patients were excluded from the service because the opportunities to practice cannulation in community settings were limited. There were also too few practitioners in secondary care who could place midlines, which meant that some patients did not receive midlines while others experienced delays in discharge.

Lessons learned
Multidisciplinary professional engagement is essential for establishing an effective service. Communication with an identified medical lead on the management of patients in the community was vital to ensure patient safety.

The nature of OPAT service provision means that it involves less patient supervision, so particular attention must be paid to minimising risk and ensuring patient safety (Chapman et al 2012). The clinical governance arrangements in Cwm Taf established clear communication pathways, assessment, co-ordination and patient management; service delivery by a community ANP along with secondary care colleagues has enabled better management of such risks.

Early recognition and management of phlebitis has prevented the need to readmit some patients to re-site midlines, and enabled completion of their treatment as planned, as illustrated by the examples in Box 1. These case studies illustrate that a simple solution resolved symptoms, avoided the need for line replacements and improved patient comfort.

An opportunity to improve service delivery emerged as a result of the expanding use of PICC lines to deliver long-term antibiotics in the community. As the number of patients with PICC lines escalated there was an increase in the number of referrals from community nurses to ANPs for complication management and line replacements.

In December 2013, concerns about this increase led the main author (KR) to gather retrospective information from the Welsh clinical portal, notes, staff and patient interviews. The aim of this exercise was to identify factors that may have contributed to the growing number of PICC line complications. Data was collected in relation to monitoring community nurse referrals and focused on five complications:

- Withdrawal occlusion.
- Total occlusion.
- Sluggish return.
- Migration with occlusion.
- Line migration.

In the preceding six months, six out of 17 patients had required 14 lines to complete treatment. It became evident that, although some occlusions presented because of line migration, most occurred as the result of nurses having difficulty withdrawing blood before administering medication. Sluggish return was also noted as a factor that preceded blocking in some instances.

In response to these findings, three recommendations were put into practice:

- The guidelines on the Administration of Medication via PICC Lines were amended to read: 'only flashback of blood is required prior to the administration of antibiotics’ (first procedure amendment in January 2013).
- Additional education and support was provided by the ANPs to specific teams who referred patients with occlusion issues.
- Evidence was presented to the medicines management committee proposing that urokinase be made available as community stock for ANPs to prescribe and administer for withdrawal occlusions.

### Box 1 Treatment case studies

- A 40-year-old woman was referred for a ten-day course of once-daily ertapenem 1g prescribed by the consultant to treat recurring urine infections. She was transferred home with a midline in situ. On the second visit, she complained of some discomfort in her upper arm and there was some redness at the entry site. Her visual infusion phlebitis (VIP) score was 2. There were no other signs or symptoms present. She was advised to apply warm compresses to her upper arm three to four times a day. The discomfort and redness had gradually resolved by the next day and she continued with her treatment.

- A man was prescribed a daily teicoplanin infusion for osteomyelitis via a midline. He presented with some discomfort in his upper arm and was found to have a VIP score of 1. Application of warm pads three to four times a day also settled his symptoms and he continued without any interruption to his treatment.
Data collection continued monthly to monitor the effects of the recommendations in practice.

In May 2014, further analysis of information identified that, in spite of the recommendations made the previous December, the number of patients referred for occlusions and line replacements remained high (Figure 1).

Further investigation revealed some variation in practice among district nurses. Current guidelines advised using 1x10ml syringe to withdraw blood and a separate one to flush the line. Findings showed that any delay in swapping syringes to flush the line after withdrawing blood seemed to precede blocking. As a result, the guidelines were amended for a second time to read: ‘Use a 20ml syringe with 15ml of sodium chloride to withdraw blood and flush the line’ (second procedure amendment in May 2014). This allowed nurses to flush the line immediately if blood return was absent or sluggish without having to use a different syringe. It also instilled confidence to retry withdrawing blood before referring for occlusion problems.

In spite of these issues, timely access and administration of urokinase to patients in the community led to improvements in the management of some line complications between January and May 2014. During this period, urokinase was administered on eight occasions for withdrawal occlusion and three for sluggish return. All lines remained patent, resulting in patients continuing with their treatment and avoiding unnecessary line replacements.

A summary of data collected between January 2014 to October 2014 (Figures 1 and 2) illustrates a reduction in referrals for complication management over this period, particularly following the second amendment to the guidelines.
During this period, occlusions reduced from 22 to nine, and the number of line replacements reduced from 11 to eight (Table 1). The administration of urokinase continued to be successful in most cases. Table 1 displays results. It demonstrates that, following the second amendment to the guidelines in May, there was a significant reduction in referrals for occlusion management.

This service development has demonstrated how a systematic review of practice and procedures led to the identification of causes directly related to the problems. As a result, actions and recommendations were quickly generated to standardise practice and with the aim of delivering high-quality economic services to patients in Cwm Taf.

The findings and recommendations were shared with colleagues in secondary care with the aim of promoting partnership working and improving the quality of care for patients. Overall, use of the amended guidelines, continued educational support and the use of urokinase significantly reduced the number of referrals for line occlusions and line replacements in the community.

**Service developments**

The development of the community-based IV service has led to the identification of the need to standardise, develop and disseminate policies and guidelines to underpin safe practice across care boundaries. This has improved multidisciplinary communication between teams in hospital and the community, as stakeholders liaise and work to share expertise, knowledge and best practice.

Working closely with procurement and secondary care the purchasing of midlines was standardised. Previously, the general hospitals purchased two types of line, which caused some discrepancies in practice. In the interest of patient safety it was deemed necessary to standardise equipment use.

As a result, one type of midline, a single-piece system, is purchased across the health board and training made available for staff on line insertion and management. A suitably placed cohort of nurses

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**Figure 2** Patients referred to the @ Home Community Intravenous Service for PICC* line complications following second amendment of procedure

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<td>1</td>
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<tr>
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* Peripherally inserted central catheter
received training in the placement of midlines, and opportunities to consolidate this training have been established. This will ensure that patients receive expert care, that resources in secondary care are used more appropriately and that transfers to community are timely.

Updated facilities in the radiology department have provided more timely placements of central lines for patients. Close collaboration with consultant radiologists has promoted the development of good working relationships and improvements in practice.

Practice procedures were amended and availability of urokinase in the community was established following an unacceptable number of referrals for withdrawal occlusions in central lines. These developments led to a marked reduction in referrals from district nurses for such line complications and also a reduction in the need for line replacements.

### Future developments

The district nursing service in Cwm Taf is supported by a community IV team, which comprises two advanced nurse practitioners. The referral criteria are limited mainly to secondary care patients who require antibiotics via midline, PICC and Hickman lines. Medium to long-term antibiotics can be administered only once or twice daily. In the future, the service aims to include referrals from GPs for community patients who require short-term antibiotics via cannulae. It is envisaged that, to facilitate this, the community IV team must expand, with the relevant training opportunities offered as required. Clinical governance pathways that concern referral, responsibility, accountability and the issuing of medications will also be established. The criteria could be expanded further to include patients who may require other IV medication while adhering to already established clinical governance pathways in secondary care.

### Outcomes of service provision

Between 2011 and 2014, 4,375 bed days were made available in local hospitals for more acutely ill people; 75% of those days had been made accessible in the past year.

In the community, 98% of the nursing teams have had the opportunity to manage a patient in receipt of IV antibiotics. The team has also expanded to include another ANP. A small number of GP referrals have been adequately treated in the community and there are plans to extend provision. This service development has also provided the opportunity to forge relationships with primary care colleagues.

After the first year, eight postal questionnaires were sent to patients who had received IV antibiotics in the community, and all evaluated the service positively. One patient stated: ‘This is an excellent idea. I feel a lot better in myself by being treated at home. I was in hospital for five weeks, only needing one injection a day, and I was getting very frustrated. At home, I could get back to a normal routine much quicker.’

### Conclusion

There have been significant service developments, lessons learned and patients have had positive experiences since the service first started operating in 2011.

This small-scale development has used available community resources to deliver an IV antibiotic service, which was equivalent to the care provided in hospital. Secondary care beds have been used more appropriately and patients have been given the choice to receive treatment at home. District nursing teams have had the opportunity to expand and develop their roles.

Knowledge and expertise has been shared across care boundaries, improving clinical practice and contributing to the development of policies, guidelines and care bundles.

### References

