

Outpatient Parenteral Antibiotic Therapy in Different Countries

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ABSTRACT

Home and outpatient parenteral antibiotic therapy offers potential cost savings as well as improved quality of care in many countries. This form of therapy has been successful in countries with adequate resources for health care, but the potential benefits in other countries should also be considered. Parenteral therapy can be provided by a visiting nurse, at an infusion center, or through self-administration models, depending upon patient need, resources available, and the experience of the medical team. There are, however, a number of factors to consider in establishing or developing an outpatient infusion therapy program. A dedicated team of health care workers with knowledge of parenteral therapy and with access to medications and devices for vascular access and infusion is essential. Other considerations include the local geography, home environment, knowledge of medicine, and cultural attitudes. Financial and political problems are often limiting factors. The concepts involved in managed care continue to expand outpatient and home therapy in the United States and will likely bring change to other countries as well.

Key Words: *antibiotic therapy, costs, intravenous, managed care, outpatient*

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The use of intravenous (IV) antibiotics for the treatment of serious infections has become commonplace around the world. It is accepted as the standard of therapy for many infections, including sepsis, meningitis, endocarditis, intra-abdominal infections, pneumonia, and osteomyelitis. Intravenous antibiotics have traditionally been given in the hospital, but increasingly they are given at home or in a clinic or physician's office.

Over the past decade, in the United States, the cost of medical care has progressively increased to over one trillion dollars per year, or more than 12% of the Gross National Product. There has been increasing concern about these health care costs and the willingness of the

citizenry and employers to pay for it. In response to the spiraling costs, "managed care" has emerged with restrictive measures and changes in incentives to reduce costs through limiting the use of resources. The impact of managed care on the quality of care has yet to be adequately assessed.

One of the few areas of medicine that offers the potential to save money as well as improve the quality of patient care is that of home and outpatient IV antibiotic therapy (OPAT). With the cost of a day in the hospital in the United States at more than \$1000, it is easy to construct outpatient IV therapy programs that can be far less expensive.¹⁻³ This form of treatment has expanded rapidly since it was first reported in 1974 and now accounts for more than a billion U.S. dollars in expenses annually.⁴ It appears that it is not only a cost savings, but that it provides an improved quality of life as well, with minimal, if any, compromise in outcomes.⁵⁻⁷

Although the greatest use of OPAT has been in the United States, there have been pioneering efforts in Canada as well.⁸ Recently, there has been an interest in outpatient therapy in many other countries as well, with reports of successful programs in Argentina,⁹ Australia,¹⁰ Canada,^{11,12} Israel,^{13,14} Mexico,¹⁵ Norway,¹⁶ The Netherlands,¹⁷ and Venezuela.¹⁸

Intravenous therapy outside the hospital, has only recently become possible, with the introduction of new antibiotics, better catheters for vascular access, and improved infusion devices. Health care professionals have pioneered the development of OPAT and worked together to develop safe and effective programs. The involvement of a team of health care workers, including a physician, nurse, and often a pharmacist and social worker is particularly important.^{19,20} Although cost savings have been the primary driving force in the rapid expansion of OPAT in the United States, there are other benefits as well, such as the ability of many persons to return to work or school while undergoing therapy, avoidance of the antibiotic-resistant organisms of the hospital, plus quality-of-life factors (e.g., sleep, privacy, clothing, and food quality).

It is commonly agreed that hospitalization for IV antibiotic therapy is often not necessary, yet it remains a requirement in many countries. This article explores

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the reasons for the variations in use of OPAT among different countries and cultures.

MODELS FOR DELIVERY

The most common models for delivery of outpatient infusion therapy may be classified as (1) the visiting nurse model, (2) the infusion center model, and (3) the self-administration model.²⁰ If a visiting nurse service is already established and well developed in a country, this model may work well to provide parenteral antibiotic therapy, especially if it needs to be given only once a day. The nurse simply visits the home and gives an intramuscular injection or uses an intravenous line to infuse the antibiotic. This model offers the safety of supervised administration by a nurse and is a particular advantage for a patient who is confined to bed. It also offers the opportunity to assess a patient in the home environment, which may be quite revealing.²¹ It may not be useful, however, if the visiting nurses are not trained in intravenous therapies or if travel to the patient's home is difficult because of long distances, traffic, or weather. The safety of a nurse visiting some neighborhoods must also be considered. Costs become a factor if multiple infusions per day are needed or home visits are costly (over \$100 each in the United States). In some countries (i.e., Austria and Israel), the visiting nurse model for OPAT is impractical because nurses are not allowed to start intravenous lines.

The infusion center model is an easy one to establish. Patients travel to the infusion center for therapy. In this model, the infusion center may be located in a hospital clinic, a doctor's office,²² an emergency room,¹³ a nursing home, or a free-standing infusion center.²³ This model offers the advantages of ready access to professional staff as well as medical equipment, medications, and often laboratory and x-ray facilities as well. The center may also be used for other intravenous therapies, such as chemotherapy, blood transfusions, and fluid therapy. In this model it is convenient for the doctor to see patients. Again, the ability to use a once-a-day antibiotic is an advantage. The major limitation to the model is difficulty for the patient, and often the family, to travel to the facility. In some countries, pharmacists may administer parenteral medications in their stores, especially if there are no restrictions on medication use and ordering. An interesting variation is the use of a mobile van to travel to the patient to provide parenteral medication in the home or inside the van.¹⁸

The model of self-administration has the advantage of avoiding even the once-a-day travel. Patients who are stable on IV antibiotic therapy usually need to be seen only once or twice a week by the physician if they can administer their own medications. Infusions are given by the patient or family member using a gravity drip system, or with an automatic system such as a battery-driven, computer-operated pump that can be easily

carried around. Generally, patients can be trained to be efficient in self-administration and may do as good a job as hospital nurses can.⁸ This system allows the patient great freedom and reduces the expenses of an infusion center or nursing visits. It may be a problem, however, if the patient or family is not trained well or if there are questions about their reliability.

ADVANCES IN TECHNOLOGY

A wide variety of technology is now available for home and outpatient therapy.²⁵ The classic steel needles and short plastic cannulas remain useful but have their limitations in prolonged therapy, especially if the therapeutic agents cause phlebitis. There is now an assortment of Silastic and polyurethane catheter lines available that can be placed into a large central vein and used for months or even years. These consist of lines that are inserted directly into the subclavian vein under the clavicle then tunneled under the skin to an exit site on the anterior chest. In Mexico City, these have proven particularly successful in providing chemotherapy, when supervised by a well-trained IV nursing staff.¹⁵ Another variation is the subcutaneous port, which is positioned beneath the skin and can be accessed with a special angled needle. Recently, there has been great interest in central venous access through peripherally inserted central catheter (PICC) lines. These are usually inserted in an antecubital vein then threaded to the superior vena cava with the help of a guidewire, which is easily removed. These PICC lines can be placed by a nurse and appear to be remarkably safe and long lasting.^{26,27} The Silastic or polyurethane catheters come in sizes varying from 3 to 5 French and can be passed through 20- to 16-gauge needles.

New infusion devices have been developed that range from elastomeric and even osmotic pumps to advanced computer technology (Figure 1). The elastomeric pumps have a balloon within a plastic bulb that can be filled with medications and stored for infusion later. Pressure for infusion is generated by the balloon inside. Battery-driven, computer-operated pumps are able to administer medications at virtually any intervals or rates needed. Some pumps can run for days at a time. Some have computers that can be re-programmed over the telephone to change dosing. With these new pumps, reliability of drug administration can be as good as, if not better than in the hospital, and with minimal nursing or other staff time.

ENVIRONMENTAL FACTORS

Geographic factors may play a major role in the potential application of outpatient parenteral therapies. If there is a sparse population with poor travel routes or a rugged, mountainous terrain, outpatient therapy may not be feasible. Weather may also play a significant role.

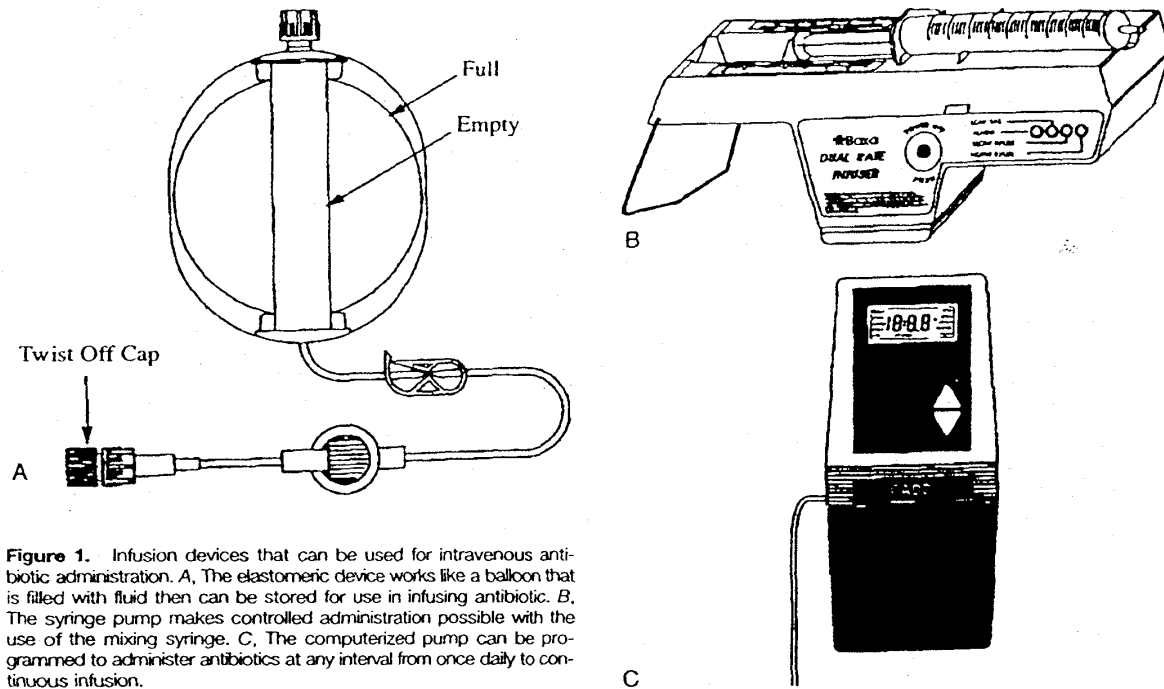


Figure 1. Infusion devices that can be used for intravenous antibiotic administration. A, The elastomeric device works like a balloon that is filled with fluid then can be stored for use in infusing antibiotic. B, The syringe pump makes controlled administration possible with the use of the mixing syringe. C, The computerized pump can be programmed to administer antibiotics at any interval from once daily to continuous infusion.

particularly during the winter or monsoon seasons. Traffic may be a major obstacle in some large cities where it may take 2 hours to cross town. Outpatient therapy is usually not practical unless the travel time to a medical facility is less than an hour.

The home environment should also be considered. Many homes do not have the facilities for cleaning or the level of sanitation available in a hospital. It may be far safer and more reasonable to keep a person in the hospital if the home situation is unclean or unsafe or without running water or sanitation. Access to a telephone and emergency transportation are additional important factors. An inadequate home environment may result in a slow recovery or recurrence of the disease that is being treated. In many situations, a patient may be better off in the hospital from simply a nutrition or safety standpoint.

There are additional considerations in regard to safety. Some patients should stay in the hospital if they live in a high crime neighborhood or have to deal with warfare or curfews that prevent access to emergency care or needed medications. The safety of the health care worker must also be considered. It may not be appropriate to have a nurse visit a home in a high crime or unsafe neighborhood, particularly after dark.

LEVEL OF HEALTH CARE KNOWLEDGE

The basic level of health care knowledge of a population should also be considered in regard to the potential value

of outpatient therapy. In some countries the knowledge of medicine and disease may be rudimentary with few medical services and no available hospitals. In other countries, there may be a well-established visiting nurse service that easily can be utilized to provide community care in lieu of hospitalization. With outpatient therapy, the patient and family play an important role and must have some basic knowledge of anatomy, physiology, medicine, and disease. An understanding of aseptic technique is essential when considering outpatient therapy. A few days in the hospital may also provide an opportunity for intensive education and training. If there is a reasonable knowledge of health care by the people being served and adequate resources to provide outpatient care, OPAT should be possible.

The delivery model used for OPAT will vary according to the development or sophistication of the country in regard to health care and the resources available. If a visiting nurse service is well developed, nurses easily can be used to provide intramuscular or intravenous medication. For countries in which the medical care system is centered in hospitals, outpatient infusion units may be successful with patients coming to a hospital infusion center on a daily basis. For countries with greater resources to devote to health care, the self-administration technique may be useful, because although it can save staff and overhead expenses, it does require some investment in vascular access and infusion devices as well as well-trained medical personnel to evaluate, treat, and monitor patients who traditionally have been treated in the hospital.

CULTURAL ISSUES

Patients and their families should have a basic knowledge of health care to allow safe, effective outpatient therapy. It is also important that they have a positive attitude toward this and be willing and able to learn about outpatient therapy.²⁶ Some patients and their families expect the services of a hospital when they are sick and may be offended by the suggestion that they provide more care for themselves. Selection of the right patients is critical to the success of an outpatient program.⁷ Outside the hospital, the patient becomes an integral part of the health care team and must play a greater role in the evaluation and treatment of his or her own disease. Knowledge of the disease, its symptoms, and the possible adverse effects of the medication are important, as there is little monitoring between visits by the nurse or to the clinic. Patients must be able to take some responsibility for their course of treatment and should be able to alert their nurse or physician promptly about new symptoms or any problems that arise. For example, it may be difficult for patients to understand why it is necessary to continue OPAT once they start to feel better. They need to know that their infection may relapse if they do not complete the course of therapy.

In some cultures there may be a fear of modern technology, which may preclude use of some of the more sophisticated devices. In other countries there may be a preference for parenteral medications, as with intramuscular injections in Italy. Generally, intravenous therapy is well accepted and even looked to as testimony of the seriousness of one's illness and, hence, the need for sympathy or respect.

It should also be recognized that hospitals play an important social role in many cultures. If a person is hospitalized, the family is usually obligated to visit and pay respect to the ill individual. Illness may be an important event in many people's lives, indicating a need for a change in lifestyle or bringing knowledge of a poor prognosis. A period of hospitalization may allow the individual to adjust to the new circumstances of their life, which may be more difficult at home. It may also be a time of honor and respect. Patients do not get that respect if they are treated at home with intravenous therapy or told they can go back to work with a portable pump. Hospitalization also allows escape from the rigors of work or school—which may be good or bad.

FINANCIAL AND POLITICAL CONSIDERATIONS

Virtually all countries other than the United States have a universal health care system. However, their ability to provide medical care to the populace varies tremendously. Some countries do not have the finances to build hospitals so their primary form of therapy is through

outpatient clinics when medication is available. Most countries have a system of public and private hospitals for care and provide IV antibiotics through these facilities. Even in developing countries, however, there is often a wealthy elite who prefer to be treated at home and can easily pay privately for medical care, antimicrobials, and technology, if they are available. When economies progress to where people can purchase health insurance, there are incentives for outpatient care, depending upon the cost of hospitalization.

In some countries, hospital care costs may be low and, hence, incentives for outpatient care are small. The cost of outpatient care also may vary depending upon the model used and the price of the visiting nurse services or outpatient facilities. The least expensive model is usually that of the infusion center, although the most sophisticated self-administration systems may be less expensive in advanced medical environments.

The potential economic impact of outpatient therapy on the health care worker should also be considered. Nurses may make more or less money in outpatient care than in the hospital, depending on the reimbursement systems. They probably also feel that their job may be threatened if they train patients in self-administration. Physicians generally make less money with outpatient care in a fee-for-service system, because the patient may be seen only a few times a week, whereas in the hospital the patient may be seen by two or three different physicians each day. In a capitated system or when the doctors are on salary, their income may stay the same even though their work is less with outpatient care.

In many areas, hospitals are the focus of health care, and their income is dependent upon keeping their beds filled. If a hospital is not operating at or above capacity, then outpatient care threatens bed occupancy. In this situation, hospital administrators and staff may be reluctant to encourage or allow OPAT.

There are also problems with allocation of finances in public health care. In the British system there are usually separate budgets for hospital, physician, and visiting nurse care. Outpatient parenteral therapy overlaps all three of these areas, but neither the physicians, nurses, nor hospital administrators want to contribute toward it. In Canada, some of the provincial governments have funded independent studies of OPAT programs, particularly for HIV-infected patients.

Another problem may be access to medications and technology. When money is available for medications and equipment, there may still be problems getting them, because of customs, taxation, government approval, or an absent sales or distribution system.

Managed care in the United States will be a tremendous force in encouraging home and outpatient therapy. The incentive is obviously to reduce costs of care. If a for-profit organization can save \$500 or more per patient per day, it will aggressively try to do so and pass the

savings on to shareholders. It is not clear what the safety limits are to OPAT. It will be important to define them.

CONCLUSION

Advances in antibiotic development and intravenous therapy technology, and the interest of the medical professions have made OPAT practical in most countries. Outpatient parenteral therapies offer the potential for cost savings as well as improving quality of patient care. To determine the most appropriate model of delivery of outpatient parenteral therapy and to assemble the appropriate people to provide it, organizers must overcome multiple potential obstacles, in terms of basic knowledge of health care, access to medicines and technology, environmental factors, cultural issues, and of course, financial and political constraints. All of these factors must be considered to develop an understanding of the potential value in establishing an OPAT program in various communities or countries. The influence of managed care will likely grow and stimulate outpatient therapy in the United States and, potentially, in other countries as well.

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