Lindsay Semple - Economic Case Study – Year 2011 – 2012 Outpatient Antimicrobial Therapy (OPAT), NHS Greater Glasgow and Clyde.

Outpatient Parenteral Antibiotic Therapy (OPAT) is an alternative to inpatient care for those who require parenteral antibiotic therapy for moderate to severe infections but are otherwise well enough for treatment to commence/continue on an outpatient basis. OPAT has been in many countries for over 30 years and a wealth of evidence has accumulated supporting its clinical justification and cost effectiveness.(1) OPAT is patient focused, delivering high quality, seamless care to patients with a variety of infections in an ambulatory setting.

Background

Antibiotic therapy is used in all hospitals across the country. At any one time it is estimated that about 30% of inpatients are receiving an antibiotic and that half of these will be given intravenously(IV). Many patients require prolonged IV therapy e.g. bone and joint infections , endocarditis etc. and this dictates the length of hospital stay. In other patients the main reason for hospital admission is for the short to medium term (4-14 days) administration of IV antibiotics eg. skin and soft tissue infections such as cellulitis(2) and bursitis. Many of such patients could be safely cared for in the community if the infrastructure to manage them was in place.

Prior to the development of the OPAT project, there was no such service available in Glasgow. All patients requiring intravenous antibiotic therapy had to remain an in-patient to receive their course of treatment. To inform the development, an OPAT feasibility study was performed in all patients receiving IV antibiotics at the Regional Infectious Diseases Unit for the West of Scotland in Gartnavel General Hospital. This demonstrated that the majority of patients hospitalised with infection and requiring IV therapy would prefer to be treated out of hospital if possible. (appendix 1)

Introduction

Pre OPAT service set up, patients with infection were assessed and managed by a variety of different specialists, the patient journey often complex with duplication of tasks, investigations and frequent ward transfers. Patients had

no choice in how and where they were managed if IV therapy is required. If antibiotic therapy is prolonged this results in a significant period away from home and work for the patient, increased level of dependency, increased opportunities/risk of hospital acquired infection particularly with prolonged hospital stay. Many of these patient groups could be managed partly or fully in an ambulatory care setting if an appropriate service were available.

With the modernisation agenda for the delivery of future health care we are challenged to design services that are patient centred, flexible in nature and offer alternatives in care delivery settings.

The aim of the OPAT project, therefore, was to redesign the patient journey offering both a clinically and cost effective service for patients whose main reason for hospitalisation is the administration of parenteral antibiotics. The service is patient focused and needs led and provides high quality seamless care between the secondary and primary care setting and supports the shift of patient activity from hospital to the community. It provides an alternative to a prolonged hospital stay or an alternative to admission for a suitable group of patients

Drivers for Change

The guiding principle for this project is the delivery of the agenda set by "Designed to Care" (3). It is our intention that the redesign of services will:-

- Improve clinical effectiveness by ensuring that performance meets agreed standards and that these standards are driven upwards.
- Promote the adoption of more effective care based on evidence
- Involve patients to a greater extent in decisions about their own care and treatment.
- Provide patients with more information about their health and about the options for treatment when they are ill.

Need

Specific drivers for change are split across three broad categories:

- **Clinical need**
- **Patient need**
- **Organisational need**

Clinical Need

- To provide a high quality, efficient, clinically effective service.
- To provide a standardised service to a currently fragmented and dispersed population who cannot be effectively managed in isolation.
- Need for robust clinical pathways and supporting protocols and guidelines.

- Reduction in hospital acquired infections through reduced or no inpatient episode.
- Development of an effective clinical network across the community/hospital interface
- Need for appropriate infrastructure to support effective management of patients
- Development of new roles and responsibilities to both support and facilitate the change process

Patient Need

- Improve the quality of life for patients requiring intravenous (IV) antibiotic therapy
- Clear communication about their care.
- Opportunity for greater involvement in actual care delivery for both patients and carers.
- Avoidance of prolonged hospital stay or hospital admission and associated risks.
- Support at home when discharged for both social as well as health care needs.

Organisational Need

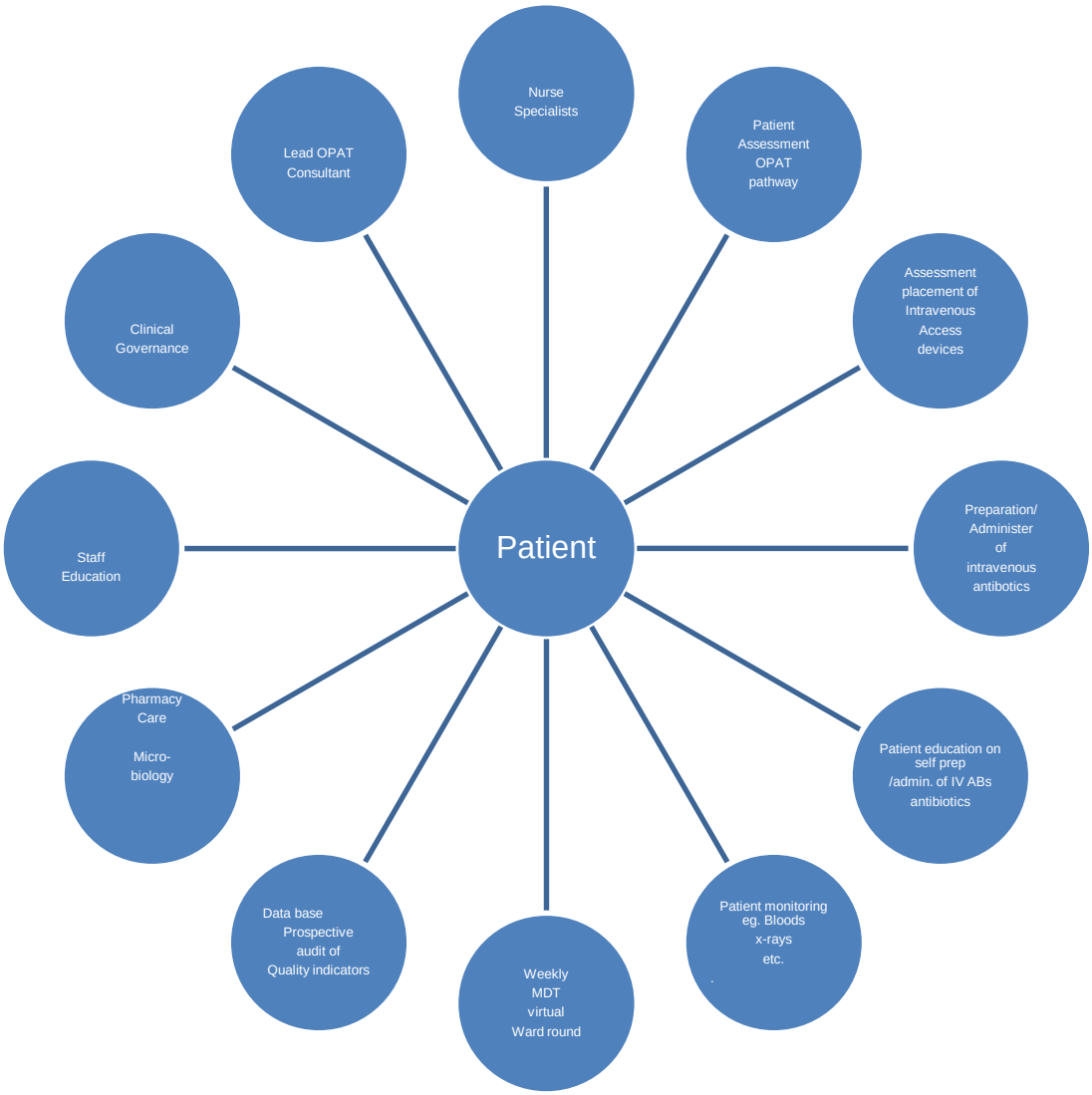
- Reduce average length of stay to allow more efficient use of acute hospital resources.
- Reduce risk/opportunities of hospital acquired infection
- Structure patient journey through secondary and primary care with support of a multi-disciplinary team.
- Facilitation and delivery, in part, of NHS Greater Glasgow service reconfiguration strategy
- Staff motivation through the development of extended roles.
- Creation of environment promoting continuous development.

The main thrust of this service development was to deliver care in the community where possible and hospital where necessary for a broad range of patients currently dispersed throughout Glasgow hospitals.

OPAT Pilot Project Set up

Following the feasibility study (appendix 1), an interdisciplinary group of key stakeholders was formed. This group was tasked with developing systems and pathways to enable the delivery of the new service. A visual service model (figure 1) was drawn up to identify key issues to enable the group to move forward with design and implementation of the development.

Fig. 1



The feasibility study, which included a consideration of the capacity available to support the project set up, also identified 2 groups of patients that would be targeted for this redesign.

- Patients with skin and soft tissue infections, where it was felt hospital admission was usually short and treatment uniform
- Patients with bone and joint infections where patients were more complex and treatment was prolonged

Sessions mapping the patient journey revealed the complex nature of the patient pathway (appendix 2). Patients were managed in a wide variety of different clinical areas with much variation in clinical practice. There was a great deal of repetition of investigations, ward contacts and patients were frequently transferred multiple times between wards. It was clear that there was a need for an alternative to in-patient care for suitable patients, and a choice of where that care took place.

The redesign of services for these patients thought to address these issues by streamlining the patient journey (appendix 3). Also to provide a standardised, high quality, efficient, clinically effective service not previously available in Glasgow and offer suitable patients an alternative to prolonged hospital stay or to avoid hospital admission altogether.

Initial OPAT set up

The OPAT project was originally funded by the Scottish Executive as a Designed Health Care Initiative for 18 months since April 2001 until September 2002. The Scottish Executive provided 75% of the funding and the organisation provided 25% of the total cost.

Set up Costs

The original budget fund was **£100,000** (with inflationary uprate of 2.5% per annum, compounded, the equivalent of approximately £125,000 in 2011/2012)
The funding covered the direct cost as outlined below. The resources for the indirect inputs were already available within the department.

Direct cost		**Indirect cost**
Band 7	**1 x WTE**	**Office/Clinic space**
Band 6	**1 x WTE**	**Administration**
Pharmacist	**0.2 WTE**	**Infectious Disease Physician**
Clinical Supplies		**Ward Medical Team**
Office Supplies		**Out of Hours Help Line(Ward Staff)**
Travel		

This pilot project ended in September 2002 and successfully employed redesign methodology to design and provide a service that was previously unavailable in Glasgow and served to inform the organisation the importance of providing an alternative to in-patient care for its service users.

Service structure post pilot

Following the success of the pilot, OPAT is now a recurrently funded service within NHS Greater Glasgow and Clyde(GG&C). The pilot served as a model (PtO Model-appendix 4) for a more comprehensive Glasgow wide service. OPAT is based at **The Infection, Tropical Medicine and Counselling Service,** Brownlee Centre, Gartnavel General Hospital and operates Monday to Friday 8am – 4pm. The original target group has now expanded to accept any suitable person suitable to be treated as an out patient from any area within GG&C. The Clinical Lead for OPAT is a Consultant in Infectious Diseases and General Medicine. Three clinical Nurse Specialists provide clinical care and co-ordination of the service. Pharmaceutical care is by the Antimicrobial Pharmacist. The Lead Nurse of the Emergency Care and Medical Services (ECMS) Directorate provides managerial support.

The OPAT service provides:-

- Expert advice on infections and their treatment
- Suitable patients with a choice in locus of treatment e.g. inpatient or outpatient
- Expert nursing care, support and advice for patients/carers using the service
- Out of Hours help/advice line facilities for patients/carers by Infectious Diseases(ID) Ward Nursing Staff
- Education for patients/carers on preparation and self administration of IV antibiotics and care of IV devices
- Placement, care and maintenance of Peripherally Inserted Central Catheters and other IV Access devices as appropriate
- Nurse led Skin and Soft Tissue Infection Service

Service Activity & Outcomes – April 2011 to March 2012

At the outset of the OPAT Service, a prospectively maintained electronic database has been employed to monitor clinical outcomes and to assure quality of care. Among the data recorded are the figures shown in the tables shown below e.g number referred and included, cure/improvement, avoided admissions, readmissions, length of therapy, bed days saved etc. The outcomes are reviewed monthly and an annual report is compiled detailing the outcomes.

Patients using the OPAT service are treated for a wide range of conditions and are referred from acute inpatient areas and Primary care settings e.g. GPs

There are two referral pathways:-

- Patients with Skin and Soft Tissue Infections(SSTIs) to Nurse Led Service
- In-patients – referred to OPAT Lead Consultant

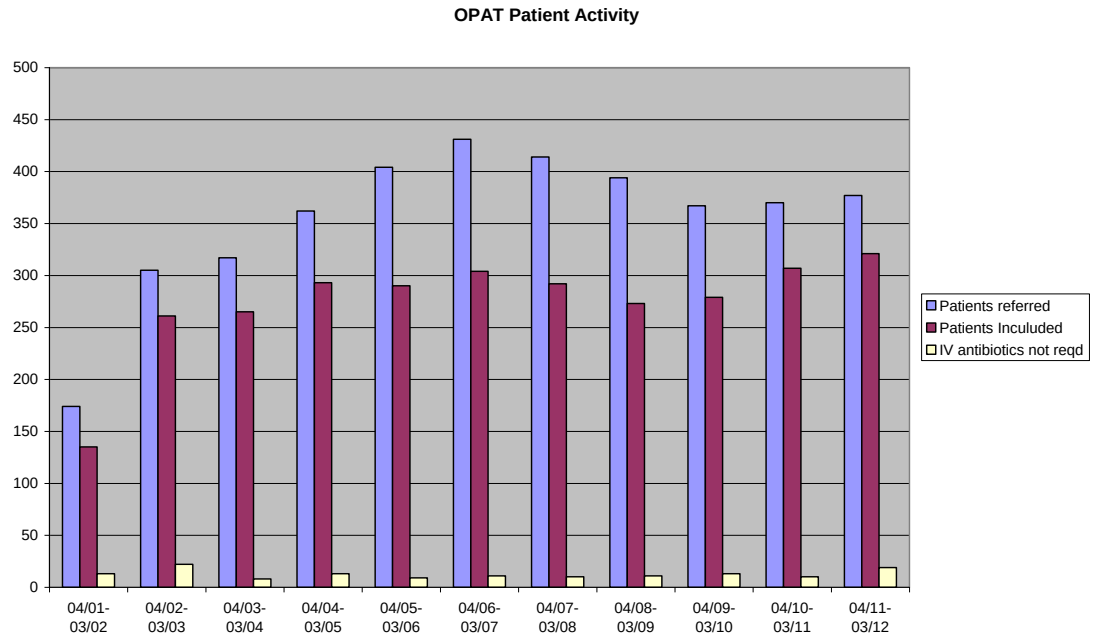
There were **377** patients referred in total, **363** of them were referred for outpatient intravenous antibiotics. Of this number **321** were included in the service for administration of intravenous antibiotics in the community and **42** were assessed as not suitable e.g. IV antibiotics not required (**19**) or other medical reasons for admission.(**22).** Another patient was withdrawn**(1)**The remaining **14** were inpatient requests for IV access.
These figures suggest the vast majority of patients are appropriately referred to the service.

Patient Referrals

Referrals	**Number**
Total referred	**377**
Total included	**321**
Total not included	**56**

The table below (Fig. 2) demonstrates the referral trends since 2001. The numbers referred have been fairly consistent. This reflects the static staffing levels (3 x WTE RNs) since early 2003, and, as a service operating 5 days a week, the requirement to take on patients who can manage a degree of self care to avoid creating demand for weekend support from other health services. The service is therefore running at capacity hence the reason the number of referrals have remained relatively unchanged. However, the proportion of patients included in OPAT has increased since 2010, reflecting a team increase in capacity (see figure 2).

Fig. 2.



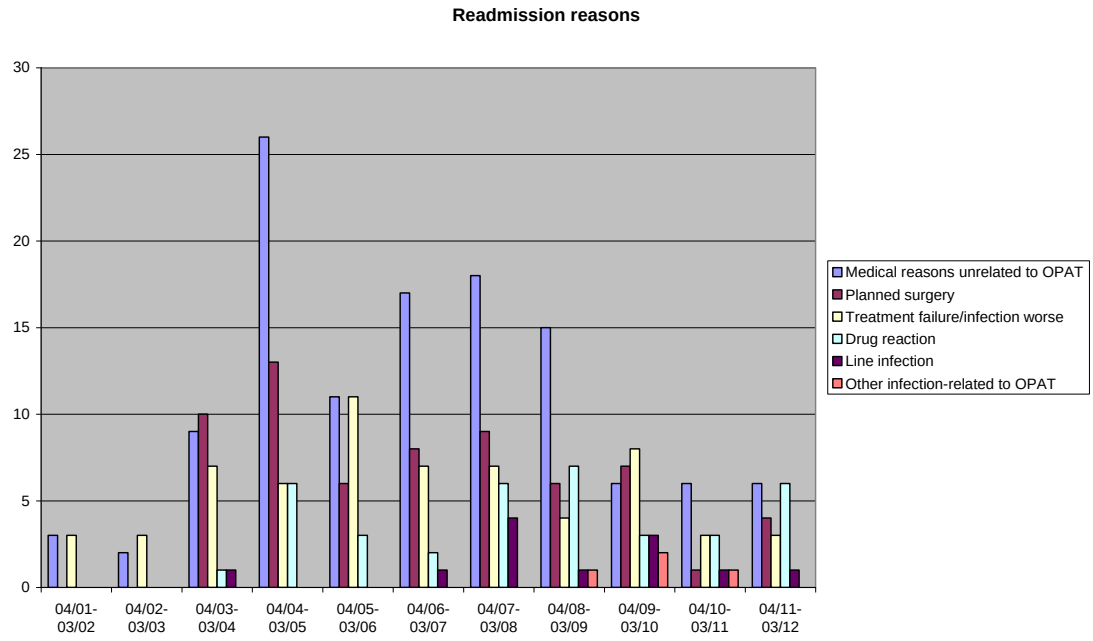
Readmissions
Patients are readmitted for various reasons and the rate is generally low. The table below shows the number for year 2011/2012. The overall percentage of readmission for this year is **6.85%(22pts).** The table below outlines the various reasons for readmission.

Readmissions

Medical reasons unrelated to OPAT	**1.86%(6pts)**
Planned surgery eg.- 2nd stage revisions	**1.24%(4pts)**
Treatment failure/Infection worse	**1.55%(5pts)**
Drug reaction	**1.86%(6pts)**
Line infection	**0.31%(1pt)**
Other infection-related to OPAT	**0**
Total	**22**

Patients on OPAT developing intravenous line infection remains at a relatively low rate of just over **0.31%(1pt**). No patients developed any other infections related to OPAT care. Therefore these figures suggest that patients are treated safely and appropriately via the service. The table below (Fig 3) reveals the trend data for readmissions since OPAT started. There are some peaks in relation to readmissions for patients with medical issues unrelated to OPAT therapy, however, overall the readmission rate remains fairly stable, suggesting that OPAT is an appropriate and safe option for suitable patients.

Fig. 3.



Project user satisfaction

At the inception of OPAT the patient view of the service was very important. Since there was no service like this in place in GG&C, we have no information around patient satisfaction prior to set up.
The patient view of the service continues to be an important part of outcomes monitoring. This takes the form of a patient satisfaction survey.

For year 2011/2012 there has been a **78.46 %** return rate of survey forms.

- **100%** state they would use this service again
- **100%** state that standards are as they would expect
- **100%** state that overall they are satisfied with the service provided

This service offers suitable patients an alternative to inpatient care and gives greater involvement in decisions about their own care and treatment. The high levels of patient satisfaction demonstrate that if support is given, patients are happy to be cared for on an ambulatory basis in the community rather than an often prolonged hospital stay with the risks of health care associated infections and loss of independence.

Effect on use of inpatient resources and patient outcomes year 2011/2012

- Admission was avoided for **39.25%(126pts)** of patients using OPAT*
- Supported discharge was provided for **60.75%(195pts)** inpatients
- Clinical improvement or cure for **93%(299pts)** of patients
- There was a **7%(22pts)** readmission rate during OPAT
- **0** deaths occurred while receiving treatment via OPAT.
- **461 MRSA** inpatient bed days were prevented**
- A total of **4,767 occupied bed days** were avoided**

*Without OPAT all patients would have to be admitted and remain in-patients to complete their IV antibiotic treatment. Therefore by recording on the database those patients coming to OPAT directly from A&E Depts., GP surgeries or Clinics thereby avoiding admission, we can calculate the numbers of patients that avoid being admitted to hospital altogether. It is possible that the introduction of the Medical assessment unit (in the past 2 years) has diverted some patients who may have been referred to OPAT for treatment potentially reducing the admissions avoided as a result of OPAT. Further investigation would be necessary to confirm or refute this.

**Similarly, the database records the total length of IV antibiotic treatment, what infection patients are being treated for (i.e. MRSA) and discharge date. This means we can calculate the number of days of treatment for patients with MRSA infections from discharge until the end of treatment. This figure assumes days of OPAT treatment post discharge until the infection is dealt with/ treatment is ended are equivalent to occupied bed days saved.

The number of occupied bed days saved for year2011/2012 is equivalent to **13 beds per day** freed up for use by other patients.

Inputs/Costs

The OPAT budget for 2011/2012 was **£123,307**

Direct Costs

1 x WTE Clinical Nurse Specialist Band 7	**£48,907**
2 x WTE Clinical Nurse Specialist Band 6	**£64,954**
Clinical Supplies	**£5,680**
Travel Expenses	**£1,602**
TOTAL(NHS Cost)	**£121,143**
***Database Maintenance**	**£2,164**
TOTAL Cost	**£123,307**

*Cost of database maintenance is not included in the NHS annual budget. This is financed from a separate research account held by the Consultant

Indirect Inputs

- ID Physician
- Out of Hours cover by ID Ward Nurses
- Clinic/Office space
- Pharmacy Support
- Office Supplies
- Ward Medical Team
- Administration support

As the OPAT Service is part of **The Infection, Tropical Medicine and Counselling Service** within NHS Greater Glasgow and Clyde(GG&C), there are no additional costs applied to the OPAT budget for the indirect inputs as the personnel, facilities and supplies resource would be in place if the OPAT Service did not exist.

Costs Avoided

The OPAT service has a dedicated database which allows service monitoring of activity and outcomes which are listed above. Not all OPAT outcomes are easy to monetise, however, the occupied bed days saved can be estimated and compared to inpatient bed day cost. The tables below outline these costs. Each occupied bed day saved via OPAT represents the equivalent of one occupied in-patient bed day therefore, with more efficient use of resources the figures reveal real savings.

If we compare the average cost(Figures from 2012)) of an inpatient occupied bed day in GG&C and apply that to the occupied bed days saved via OPAT, the efficiencies are significant.

Number of occupied bed days saved via OPAT	**4,767 bed days**	**Total bed day cost x 4,767**
Average bed day cost for NHS GG&C(2012)	**£741.00**	**£3,532,347.00**
Average OPAT day cost for NHS GG&C(2012)*	**£26.00**	**£ 123,942.00**
Costs avoided via OPAT(2012)		**£3, 408,405.00**

*Total staff and sundries cost, including travel. This figure does not include antibiotics, as medicines are not an additional cost of OPAT. Antibiotic costs would have been incurred regardless of the setting of care in hospital or the community.

Patients come to OPAT from a variety of directorates within NHS GG&C. By taking an average bed day cost from all areas that use OPAT a more accurate reflection of costs is demonstrated below.

Number of occupied bed days Saved via OPAT	**4,767 bed days**	**Total bed day Cost x 4,767**
Average bed day cost of all Directorates using OPAT(2012)	**£714.00**	**£3,403,638.00**
Average OPAT day cost for NHS GG&C(2012)	**£ 26.00**	**£ 123,942.00**
Costs avoided via OPAT(2012)		**£3,279.696.00**

The OPAT service is part of the Infection, Tropical Medicine and Counselling service which includes the Infectious Diseases (ID) in-patient facility. A large proportion of patients referred to OPAT come from the ID Unit. The cost of an occupied bed day in this unit is at the lower end of the bed day cost scale for GG&C. However, even if all bed days saved are at this lower cost – which they are not - this still results in significant cost avoidance.

Number of occupied bed days Saved via OPAT	**4,767 bed days**	**Total bed day cost x 4,767**
Average bed day cost for(2012) Infectious Disease Unit NHS GG&C	**£398.00**	**£1,897,266.00**
Average OPAT day cost for NHS GG&C(2012)	**£26.00**	**£ 123.942.00**
Costs avoided via OPAT(2012)		**£1,773,324.00**

By far, the biggest users of the OPAT Service are the Orthopaedic (Ortho) and Emergency Care and Medical Services (ECMS) directorates within GG&C.
If we take an average of the bed day cost of these directorates and apply them to the occupied bed days saved, an efficiencies achieved per directorate can be demonstrated.

No. of directorate occupied bed days saved via OPAT		**Total cost**
ORTHOPAEDICS – 2063 bed days (2012)	**Average NHS GG&C Ortho bed day cost - £889**	**£1,834,007.00**
ORTHOPAEDICS – 2063 bed days saved via OPAT(2012)	**Average NHS OPAT day cost- £26.00**	**£53,638.00**
Total ORTHOPAEDICS OPAT cost avoided(2012)		**£1,780,369.00**
Emergency Care & Medical Services (ECMS) -Excl. A&E – 1055 bed days(2012)	**Average NHS GG&C ECMS bed day cost - £514**	**£542,270.00**
ECMS -Excl. A&E - 1055 bed days saved via OPAT(2012)	**Average NHS OPAT Day cost – £26.00**	**£27,430.00**
Total ECMS OPAT save(2012)		**£514,840.00**

The above figures do not include the cost of the intravenous antibiotics or investigations etc. The acute sector bears the responsibility for these costs as, if not for OPAT, these patients would remain in hospital incurring the relevant cost of antibiotics, investigations etc. as part of their normal treatment course.

Conclusion

OPAT is the design of a new service rather than the redesign of a previous service, as there was no facility like this available in Glasgow prior to this development.
The primary driver of the initiative was to improve quality, not to save cost. However, the development has identified some economic benefits for the organisation as shown in the tables above. Other benefits have been demonstrated for both patient and the organisation, for example –

- Offering patients a choice by providing an alternative to inpatient care.
- Patients have greater involvement in how their care is delivered.
- Provision of a clinically effective, innovative, quality service.
- More efficient use of resources.
- Assists with reducing pressure on hospital beds e.g. boarding of patients, delayed discharge etc.
- Reduces length of hospital stay or removes the need for admission altogether.
- Early discharge or admission avoidance results in reduced opportunities for cross infection with healthcare associated infections.

Currently the service runs Monday – Friday 8am-4pm, and is at capacity but with the knowledge that we do not reach all our target population. The service is constrained by the shortened week, by expanding to a seven day service this would enable patients to be seen and discharged more quickly, therefore freeing up more beds. However, service expansion would require further investment in resources. For example, based on 2011/2012 figures, 3 clinical nurse specialists(CNS) cared for approximately 100 patients per nurse per year = 300 patients per year. On average, each patient saved 15 hospital in-patient bed days equalling 4,500 bed days saved per year. Using the lowest bed day cost quoted in this report of £398, minus the OPAT annual budget, this constitutes a saving of £1,667,693.00.

By increasing investment by, for example £250,000.00, resources could be increased by -

- Clinical N.Sp. x 4 WTE = £122,000
- Consultant x 1 WTE = £110,000
- Band 3 x 1 WTE = £ 18,000
- = £ 250,000

Service expansion to 7 days would be achieved and potentially, a further 400 patients could be included in the service, saving an average of 15 in-patient bed days/patient = 6,000 bed days saved at a cost of £398. This equates to an estimated potential cost avoidance of £2,138,000 for the organisation. We can express this in another way: every additional pound invested in OPAT can potentially save a further £8.55 while providing an efficient, clinically effective, safe alternative to in-patient care for a suitable group of patients.

Bed day costs provided by Finance Department. NHS Greater Glasgow and Clyde

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