

Cost Savings: Home Versus Inpatient Infusion Therapy, A Review of the Literature

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ABSTRACT

Introduction

Home infusion is a site of care (SOC) option for patients requiring intravenous (IV) or subcutaneous (SC) medications for treatment of acute and chronic medical conditions. Patients and payors have become aware of the sizeable cost savings associated with home infusion compared to other SOCs. There is a need to understand the amount of savings associated with home infusion compared to other SOCs such as the hospital. The literature review objective is to provide a critical evaluation of the current evidence of the cost savings associated with home and outpatient infusion therapy when compared to inpatient therapy.

Methods

The literature search was conducted between July 1, 2023, and August 2, 2023, and focused on terms related to home infusion, home-based, homecare, outpatient, or infusion followed by cost, cost comparison, cost savings, or SOC optimization. PubMed through the National Library of Medicine was searched. After reviewing the articles, it was determined that it is not feasible to compare U.S. health care cost results to other countries due to significant differences in health care systems, financial resources, and co-payment systems, thus studies conducted outside of the U.S. were excluded.

Results

Six articles met the review inclusion criteria. The first article was a cost analysis of a home infusion antibiotic program and showed that the savings per home infusion patient was \$40,460 when compared to inpatient costs. Another article investigated the cost of home and inpatient antibiotic infusion and determined that the cost per day for home infusion was \$122 while the cost for inpatient was \$798. The third article calculated the cost difference of home infusion enzyme replacement with inpatient therapy and concluded a significant difference ($p \leq .0001$) existed between the SOC costs. One study focused on developing a cost model using patient care information that included Medicare data. The model showed a cumulative 5-year savings of over \$3 billion in 2023 health care dollars. The last article compared the home and inpatient infusion cost of inotropic therapy for patients awaiting heart transplant and concluded that the home infusion savings was \$71,300 to \$120,500 per patient.

Discussion

The reviewed studies demonstrate significant cost savings when the home is the SOC for infusion therapy, especially for IV antimicrobial treatment. This is significant as IV antibiotic therapies comprise nearly half of all treatments done at home today. One study provides evidence for savings associated with enzyme replacement; a therapy analogous to the growing number of specialty biologics being used today to manage chronic diseases. Despite evidence of cost savings, Medicare has not developed a home infusion benefit comparable to what is available in the private sector.

Conclusions

The literature review provides evidence of consistent cost savings associated with home and outpatient infusion therapy compared to the inpatient SOC for a range of infused drugs. The study with the most rigorous methodology involved a model that showed a 5-year Medicare savings of \$3 billion in today's dollars with the implementation of a home infusion antibiotic therapy Medicare benefit.

Keywords: Home Infusion, Site of Care, Cost, Medicare, Homecare

Introduction

Home infusion is a site of care (SOC) option for patients requiring intravenous (IV) or subcutaneous (SC) medications for treatment of acute and chronic medical conditions, ranging from bacterial infections to heart failure, nutrition support, cancer, and autoimmune diseases. Home infusion is well established, having been in place for more than 4 decades spurred primarily by commercial insurance plans that capitalize on the cost savings of administering IV and SC infused treatments at home rather than in facility-based settings. The increased number of infused therapies, improved access devices, patient preference for home-based care, coupled with a well-established commercial reimbursement pathway has prompted consistent growth of home infusion within the context of the health care market. In 2010, the National Home Infusion Association (NHIA) reported that infusion providers served 829,000 unique patients, whereas in 2019, this number grew to more than 3.2 million, representing a growth of 310%.¹

The popularity of home infusion is due to many factors. It includes the growing confidence that physicians have in the home infusion process, comparable clinical outcomes, and improved quality of life reported in the literature.² Additionally, patients and payors have become aware of the sizeable cost savings associated with home infusion when compared to other SOCs. This concept is often referred to as a SOC optimization strategy. With costs related to a growing class of infused specialty drugs continuing to increase, there is a need to understand the savings associated with home infusion compared to other SOCs, such as the hospital where these drugs and biologics tend to be infused. In addition to research studies, many companies have published reports demonstrating cost-savings and improved outcomes associated with SOC optimization programs. For example, United Health Care and Cigna have touted the savings achieved through SOC programs. Medicare aims to divert some therapies to the home by designating drugs as “usually self-administered”.^{3,4} To meet this need, this review summarizes the research on the cost savings associated with home and outpatient infusion when compared to the inpatient SOC.

The last known review of the literature on the inpatient-outpatient infusion cost comparison was reported in 2017, conducted in Brazil, and focused only on anti-infective therapy.⁵ In the U.S., the same

type of review was reported in 1989, and concluded that all studies in the review showed cost savings in the outpatient SOC.⁶ There is a plethora of reported research in other countries on the cost differences of outpatient and inpatient infusion, with the home and outpatient SOC showing significant savings.⁷⁻¹¹

The objective of this literature review is to provide critical evaluation of the current evidence of the cost savings associated with home and outpatient infusion therapy when compared to inpatient therapy. SOC optimization applied to home infusion involves patients moving away from high-cost health facilities, such as hospitals, to lower-cost settings, such as home infusion. As stated by Tsai and Doherty, “Effectively, the success of population health management has hinged on SOC optimization in an effort to provide the highest quality care at the lowest cost SOC.”¹² This review will evaluate published studies that examine whether home infusion as a SOC optimization strategy is associated with cost savings in the U.S., and whether implementing such a benefit for Medicare would be likely to generate cost savings for the government.

Methods

The literature search was conducted between July 1, 2023, and August 2, 2023, and focused on terms related to home infusion, home-based, homecare, outpatient, or infusion followed by cost, cost comparison, cost savings, or SOC optimization. PubMed through the National Library of Medicine was searched. This search engine comprises more than 35 million citations for biomedical literature from MEDLINE, life science journals, and online books. This search produced 18 journal articles of which 14 included cost data from studies conducted outside of the U.S. After reviewing the articles, it was determined that it is not feasible to compare U.S. health care cost results to other countries due to significant differences in health care systems, financial resources, and co-payment systems, thus studies conducted outside of the U.S. became an exclusion criterion. The number of journal articles meeting the inclusion criteria was reduced to 4, thus reference lists from the original 18 articles were reviewed to determine if other U.S. home infusion cost comparison studies existed. Two additional reported studies were located and considered appropriate for the review.

TABLE 1 | Literature on Home/Outpatient and Inpatient Infusion Cost Comparison

First Author	Year	Therapy & Study Type	Site Comparison	Results
Chamberlain TM ¹³	1988	Anti-infective retrospective chart and billing review	Inpatient vs home infusion	Home infusion mean total cost savings per patient = \$40,460
Dalovisio JR ¹⁴	2000	Anti-infective retrospective chart review of home infusion pts vs theoretical cost of inpatient	Inpatient vs home infusion	Home infusion mean cost per day = \$122 Inpatient mean cost per day = \$798
Stewart A ¹⁵	2017	Enzyme replacement retrospective chart review	Inpatient vs home infusion	There was a significant difference ($p \leq .0001$) in cost between inpatient and home infusion. Home infusion mean cost per day = \$225.10, hospital mean cost per day = \$586.50.
Ruh CA ¹⁶	2015	Anti-infective retrospective chart review	Inpatient vs rehab care vs home infusion	Mean total cost savings for home infusion patients was \$81,559 when compared to inpatient cost.
Tice A ¹⁷	1998	Anti-infective cost model to determine a Medicare 5-year cost savings if home infusion coverage was implemented		The model shows cumulative 5-year savings of nearly \$1.5 billion.
Upadya S ¹⁹	2004	Inotrope comparative cost study (patients awaiting transplantation)	Inpatient vs home infusion	Outpatient strategy saved a total of \$71,300 to \$120,500 per patient

Results

As shown in Table 1, 6 articles met the inclusion criteria for this review and differed in terms of methods used, types of costs, SOC, and patient populations of interest. Most of the articles use the term "outpatient" which is a broad term that includes SOCs that do not require a hospital admission while inpatient includes a hospital admission. The articles are discussed in the order presented in Table 1.

The first article is a cost analysis of a home infusion anti-infective program for patients with osteomyelitis and was conducted by Chamberlain, et al. using patients' billing records and charts. The cost savings per home infusion patient was \$40,460 when compared to inpatient costs.¹³ Dalovisio, et al., also investigated the cost of home and inpatient anti-infective infusion.¹⁴ A retrospective chart review compared home infusion cost to an inpatient theoretical cost. The aim of the study was to show the financial impact of a home infusion anti-infective program on a Medicare managed care program. It was determined that the cost per day for home infusion was \$122 while the cost for inpatient was \$798. The total cost of the 66 courses of anti-infective therapy,

encompassing 1,542 patient days was \$188,663. The estimated savings ranged from \$646,000 to \$871,000 when the home was the SOC.

Stewart et al. investigated the cost difference of home infusion enzyme replacement with inpatient therapy and concluded that there was a significant difference ($p \leq .0001$) between the home and inpatient cost.¹⁵ Home infusion and inpatient mean cost per day were \$225.10 and \$586.50, respectively. Another antibiotic pharmacoeconomic analysis was conducted by Ruh, et al. using billing records.¹⁶ The study concluded that home infusion is an efficient and cost-effective method of treating patients who require long-term antimicrobial therapy. Furthermore, it was reported that the mean total cost savings for each home infusion patient was \$81,559 when compared to inpatient cost.

Tice, et al. aimed to develop a cost model using patient care information that included Medicare data, to determine the 5-year savings associated with a home infusion antibiotic therapy Medicare benefit.¹⁷ The investigators were meticulous in their study design and approach. They determined that the

model shows a cumulative 5-year savings of nearly \$1.5 billion, which in 2023's health care dollars would equate to more than double the amount and be over \$3 billion.¹⁸ Finally, Upadya, et al. compared the home and inpatient infusion cost of inotropic infusion therapy for patients waiting for cardiac transplantation and concluded that home infusion realized an average savings of \$71,300 to \$120,500 per patient compared to inpatient infusion therapy.¹⁹

Study Limitations

The article with the most robust methodology and analytical precision was conducted by Tice, et al. and involved a model that showed a 5-year Medicare savings of \$3 billion in today's dollars with the implementation of a home infusion antibiotic therapy Medicare benefit. Although the other studies demonstrate cost savings when the home is the SOC for infusion therapy, the ability to extrapolate the savings to the wide range of therapies provided today is compromised by mediocre research methodological quality. Additional economic assessments of the cost of infusion therapy are needed using more rigorous methodologies that include a broad range of perspectives to identify the real magnitude of the economic savings when the home is the SOC instead of the hospital, particularly for modern treatments that involve specialty drugs. Even so, all reviewed studies showed considerable cost savings when the home is the SOC.

Discussion

The objective of this literature review was to provide critical evaluation of the current evidence of the cost savings associated with home and outpatient infusion therapy compared to inpatient therapy. The reviewed studies, although limited, demonstrate significant cost savings when the home is the SOC for infusion therapy, especially for IV anti-infective treatment. This is significant as IV anti-infective therapies comprise nearly half of all treatments done at home today.¹ The study by Stewart, et al. provides evidence for savings associated with enzyme replacement, a therapy analogous to the growing number of specialty biologics being used today to manage

chronic diseases.¹⁵ Numerous studies have examined the clinical benefits of home infusion as a driver for increased utilization, however few have analyzed the cost savings associated with shifting care to the home.

Over the past decade, the growth in home infusion has been impacted by commercial payors seeking to lower the overall costs associated with administering IV treatments. Broader provider experience and patient preferences for more convenient treatment options are also contributing factors. Despite evidence of cost savings and increased patient satisfaction, Medicare has not developed a home infusion benefit comparable to what is available in the U.S. private sector. In December 2016, the 21st Century Cures Act was enacted into law to establish a new Medicare home infusion benefit.²⁰ However, the Centers for Medicare and Medicaid Services (CMS) limited reimbursement to services "only on days when a nurse is present in the patient's home," which is typically once a week, leaving significant gaps in coverage for essential pharmacy-related professional services that take place remotely.²¹ SOC choices for Medicare beneficiaries are generally limited to Part A and Part B facility-based settings. Patients who elect home infusion over other SOC settings (i.e., hospital, skilled facility, physician office, hospital outpatient department) must bear the financial burden of paying out of pocket for the costs of supplies and professional pharmacy services (IV drugs are often covered by Part D). This review suggests that Medicare could achieve as much as \$3 billion in savings by providing more comprehensive access to home infusion.

Conclusions

The literature review provides evidence of consistent cost savings associated with home and outpatient infusion therapy when compared to the inpatient SOC for a range of infused drugs. The study with the most rigorous methodology was conducted by Tice, et al. and involved a model that showed a 5-year Medicare savings of over \$3 billion in today's dollars with the implementation of a home infusion anti-infective therapy Medicare benefit.¹⁷

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