Revenue Potential for Inpatient IR Consultation Services: A Financial Model

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ABSTRACT

Purpose: Interventional radiology (IR) has historically failed to fully capture the value of evaluation and management services in the inpatient setting. Understanding financial benefits of a formally incorporated billing discipline may yield meaningful insights for interventional practices.

Materials and Methods: A revenue modeling tool was created deploying standard financial modeling techniques, including sensitivity and scenario analyses. Sensitivity analysis calculates revenue fluctuation related to dynamic adjustment of discrete variables. In scenario analysis, possible future scenarios as well as revenue potential of different-size clinical practices are modeled.

Results: Assuming a hypothetical inpatient IR consultation service with a daily patient census of 35 patients and two new consults per day, the model estimates annual charges of $2.3 million and collected revenue of $390,000. Revenues are most sensitive to provider billing documentation rates and patient volume. A range of realistic scenarios—from cautious to optimistic—results in a range of annual charges of $1.8 million to $2.7 million and a collected revenue range of $241,000 to $601,000. Even a small practice with a daily patient census of 5 and 0.20 new consults per day may expect annual charges of $320,000 and collected revenue of $55,000.

Conclusions: A financial revenue modeling tool is a powerful adjunct in understanding economics of an inpatient IR consultation service. Sensitivity and scenario analyses demonstrate a wide range of revenue potential and uncover levers for financial optimization.

ABBREVIATIONS

APC = advanced practice clinician, E&M = evaluation and management, FTE = full-time equivalent

Interventional radiology (IR) brings added value to radiology practices. Traditionally, it has done so by demonstrating improved procedural morbidity and mortality compared with surgery, often in conjunction with decreased costs and enhanced patient outcomes (1–4). More recently, the IR community has stressed the value of becoming more "clinical" by seeing patients with a primary physician in inpatient and outpatient settings (5–10).

Inpatient IR consultation services represent one such effort, undoubtedly providing clinical benefits and signaling the transition of IR to a more traditional clinical care delivery model. An inpatient IR consultation service may provide full consultations for patients in whom an IR intervention may be warranted, as well as follow patients longitudinally during the course of their hospital stay following IR procedures. Although IR physicians increasingly recognize the clinical importance of nonprocedural services, there is a paucity of literature regarding the financial impact of these activities. From a practice perspective, inpatient IR practices are potential sources of revenue diversification when faced with declining reimbursements for procedural services (11). Additionally, with many interventional radiologists already providing

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clinical services without explicitly billing for all of them, an understanding of the financial implications may be important such that fair reimbursement can be obtained.

Existing literature is limited. Duszak and Borst (12) showed that Medicare IR claims for nonprocedural clinical encounters increased by 1,200% from 1993 to 2008, with 1,112% growth attributed to the inpatient setting. Recently, White et al (13) demonstrated that a structured approach to increasing relative value unit capture in the inpatient setting resulted in significant gains for their practice. In their analysis, a team approach was implemented to improve revenue capture over a 3-year period, resulting in 722% growth in evaluation and management (E&M) billing charges and 831% growth in collected revenues. These studies —while encouraging for those interested in growing such service lines—are limited because they describe single-institutional experiences in a retrospective manner. We are aware of no published literature describing dynamic analyses capable of predicting future financial potential in a plethora of settings.

The present study describes a financial model capable of predicting revenues of an inpatient IR consultation service. The financial model not only projects future revenues of a service but also conducts sensitivity and scenario analyses to understand revenue potential under varying circumstances. Radiology practices may use this model to justify and even design a new inpatient IR consultation service with maximum clinical and economic rewards.

MATERIALS AND METHODS

Model Mechanics

Financial modeling is the process by which one can construct a financial representation of everything ranging from an individual product to an entire organization (14,15). Models are built on a series of simple calculations and are used widely in financial services firms on Wall Street (eg investment banks, investment management, or venture capital/private equity), management consulting firms, and finance operations within companies. Models mimic financial statements but earn their name as "models" because of their dynamic quality. Similar techniques have been rarely deployed in the medical literature, although financial modeling has previously been used to estimate cost savings of rehabilitation programs in the intensive care unit and viability of a specialty orthopedics hospital (16,17).

The financial model described here was developed in Excel (Microsoft, Redmond, Washington) with the use of standard modeling techniques, building on the basic concept of revenue reflecting the product of quantity and price. Health Insurance Portability and Accountability Act compliance and institutional review board approval were not applicable because no patient data were reviewed in the development of this theoretical predictive model. The model reflects a full-fledged inpatient IR consultation service. Clinicians staffing the service are assumed to see patients for whom new consultations are requested by primary teams (eg, evaluation for intra-abdominal abscess drainage catheter placement or arterial angiography and embolization for gastrointestinal bleeding). Clinicians are also assumed to longitudinally follow existing patients known to the service on a daily basis until IR input is no longer required. In this model, revenue is calculated as a product of the following: average patient volume × E&M case mix × staffing mix × documentation compliance × charges × collection rate. All inputs to the model are purposefully made to be flexible, such that any set of assumptions can be entered and altered with ease. The **Appendix** and **Table E1** (available online at *www.jvir.org*) include further details on model mechanics, including a step-by-step illustration of model calculations and results.

Model Assumptions

Average patient volume reflects the hypothetical number of patients on the census, which is derived from the dual sources of recent procedures as well as ongoing new inpatient IR consultation. E&M case mix estimates the breakdown of cases from levels 1 through 5 (new consults) or levels 1 through 3 (existing consults) based on complexity of care delivered. Staffing mix includes the percentage of patients seen by attending physicians versus advanced practice clinicians (APCs) alone. Staffing mix also reflects variance in billing revenue, as independent APCs have the ability to bill at 85% of the rate of attending physicians. Documentation compliance indicates the rate at which providers complete required paperwork for billing (eg complete notes and filling out computerized billing paperwork to actually charge for the visit). Although global period reduction was initially hypothesized to be a significant driver, analysis of case mix at the authors' institution demonstrated this to be a negligible factor; hence, although this functionality was built into the model for purposes of future exercises, no specific assumptions were developed for the present manuscript. Charges reflect the amount that practitioners charge for patient visits and vary depending on visit type. Finally, collection rate includes an estimated gross collection rate on those same charges.

Baseline assumptions were built from experiences at the authors' institution, with ranges assigned for purposes of simplicity as well as confidentiality. Review of the literature reveals no comparable studies in developing assumptions necessary for this model, likely because of the inherently proprietary nature of many of these assumptions. Additionally, final assumptions were pressure-tested with clinical and financial staff, including the director of finance, two financial analysts, and three IR physicians, to ensure they reflect realistic, albeit