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Trends in hospital-SNF relationships in the care of Medicare beneficiaries

Joshua M. Liao[a,b,*], R. Tamara Konetzka[c], Rachel M. Werner[b,d]

[a] Department of Medicine, University of Washington, Seattle, WA, United States
[b] Leonard Davis Institute of Health Economics, University of Pennsylvania, Philadelphia, PA, United States
[c] Department of Public Health Services, University of Chicago, Chicago, IL, United States
[d] Department of Medicine, University of Pennsylvania, Philadelphia, PA, United States

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ABSTRACT

Improving the value of post-acute care at skilled nursing facilities (SNFs) has become a Medicare policy priority. Anecdotally, hospitals have responded by formally acquiring or pursuing tighter informal connections with SNFs. We evaluated the trend in connections between US acute care hospitals and Medicare-certified SNFs between 2000 and 2013 using vertical integration and two novel network-based measures (number of SNF partners, and discharge concentration). Among 4441 hospitals and 17,215 SNFs, hospitals with weaker connections with SNFs were more often non-profit, major teaching hospitals with a larger number of discharges and beds. We found an apparent weakening of hospital-SNF connections over time for all three measures. Over one-third (39%) of hospitals were vertically integrated in 2000 compared to 8.2% in 2013. The number of SNF partners increased between 2000 and 2013, while hospitals' discharge concentration declined steadily. Additional work is needed to understand the implications of these trends.

1. Introduction

Improving the value of post-acute care at skilled nursing facilities (SNFs) has become a policy priority given the frequency, expense, and variability of SNF use.[1–5] SNFs represent one of the fastest growing spending categories for Medicare and SNF care is associated with high rates of hospital readmissions.[1,6]

Because care fragmentation likely contributes to these utilization and cost burdens, health care payment policies are increasingly holding hospitals accountable for quality and costs in the post-acute period. For example, Medicare's Accountable Care Organization program[7] incentivizes providers to address post-acute utilization as part of minimizing global costs. New bundled payment initiatives encourage or mandate hospital accountability for the costs and quality in the post-acute period.[8–10] Together with imperatives to avoid penalties under the Hospital Readmission Reduction Program,[11] these pressures are compelling hospitals to focus attention across the care continuum, shift task and resource allocation downstream to SNFs,[12] and work to exert greater control over the care provided to Medicare beneficiaries there.

Anecdote and emerging evidence suggests that some hospitals have responded by pursuing strategies to increase their connections with SNFs, which may increase care coordination, improve quality and reduce costs. Hospitals may do this and influence discharge decisions[13] through formal channels, such as acquisition and ownership of SNFs. Hospitals may also pursue tighter connections with SNFs by developing informal relationships or "preferred networks", in which SNFs receive greater discharge referral volume in exchange for working with hospitals to increase quality and reduce costs.[14–16] Despite the importance of these connections to current Medicare policies, surprisingly little is known about how widely these strategies are deployed across US hospitals—that is, to what extent hospitals and SNFs have established formal and informal connections leading into the era of value-based payment policies, and how these connections have evolved over time.

Our objective was to measure national trends over time in hospital-SNF connections in the care of Medicare beneficiaries, using both established and novel measures to reflect different aspects of these relationships. First, we describe trends in formal ownership-based vertical integration between hospitals and SNFs. Second, we utilize two novel measures derived from network analysis methodology to evaluate the nature and extent of informal, preferred relationships between hospital and SNFs.

2. Methods

2.1. Data and study sample

We identified all US acute care hospitals and Medicare-certified SNFs over 14 years (2000–2013) using the Medicare Provider of Service

* Corresponding author at: Department of Medicine, University of Washington, UWMC Health Sciences, BB 1240, 1959 NE Pacific Street, Seattle, WA 98195, United States.
E-mail address: joshliao@uw.edu (J.M. Liao).

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(POS) File, a hospital-level file containing hospital characteristics.

Within these hospitals, we used the 100% MedPAR files (with claims for all acute inpatient hospitalizations and SNF stays) to identify all Medicare fee-for-service beneficiaries who were discharged from acute care hospital to SNF during our study period, defined as those hospital discharges having a SNF claim within 3 days of hospital discharge. These data were supplemented with the Medicare Beneficiary Summary File, which contains information on beneficiary enrollment in Medicare Part A and Medicare Advantage. We exclude all beneficiaries enrolled in Medicare Advantage, as these beneficiaries have incomplete data in the Medicare claims. Finally, we determined if a hospital was vertically integrated with any SNFs using the Medicare Cost Reports to identify hospitals that report that they own one or more SNFs.

2.2. Market definition

We defined markets using Hospital Referral Region (HRR),[17] each of which represents a regional health care market for tertiary medical care. Patients discharged to a SNF outside of the hospital's HRR were not included in our analyses as they do not reflect typical patterns of care and only represent a small fraction of all hospital-SNF discharges. Within each market, we report hospital-SNF connections for hospitals and SNFs with at least 5 discharge connections per year between them as those sharing only a few patients are less likely to have meaningful connections.

2.3. Three measures of hospital-SNF connections

We used three measures of hospital-SNF connections. The first was a hospital-level measure of whether the hospital was vertically integrated with any SNFs.

We also used network methods to develop two additional measures of non-ownership-based connections between hospitals and SNFs from patient-level data. In particular, we applied the conceptual framework of networks - which are comprised of entities (termed “nodes”) and connections (termed “edges”) - by defining hospitals and SNFs in our sample as nodes and discharges between them as edges. This process allowed us to evaluate hospital-SNF connections that occur when hospitals discharge patients to SNFs within their markets for post-acute care.

The first measure is a hospital's *number of SNF partners*, which describes the connectedness of a hospital as a node and is equivalent to *hospital outdegree* in network terminology. A hospital's number of SNF partners is the total number of SNFs to which a hospital discharges its patients in a given year (Fig. 1, Panel A). For example, if hospital A discharges all of its patients in a given year to a total of 5 different SNFs, it has 5 partners; if hospital B discharges all of its patients to a total of 9 different SNFs in a given year, it has 9 partners. In markets where hospitals are entering into more informal connections with certain SNFs over time, the mean *number of SNF partners* would decrease as discharge connections between hospitals and non-preferred SNFs disappear.

The second measure, a hospital's *discharge concentration*, reflects how concentrated a hospital's discharges to SNFs are (Fig. 1, Panel B). It is based on the Herfindahl-Hirschman Index, a common measure of market concentration, and is calculated by squaring the share of discharges to each SNF and summing across all SNFs to which that hospital discharges patients. Values range from 0 to 1, with those closer to 0 representing a more diffuse pattern of SNF use by the hospital and those closer to 1 representing a discharge pattern that is more concentrated among specific SNFs.

Building on the example above, assume hospital A discharges a total of 100 patients across 5 SNFs in a given year. If 96 of those discharges are to a single SNF, and 1 to each of the other 4 SNFs, then its discharges are highly concentrated in 1 of 5 SNFs. In turn, its *discharge concentration* $= (96/100)^2 + (1/100)^2 + (1/100)^2 + (1/100)^2 + (1/100)^2 = 0.92$. In contrast, if hospital A discharges 20 patients to each of the 5 SNFs, then its 100 discharges are spread evenly across SNFs and therefore less concentrated. In this situation, its *discharge concentration* $= (20/100)^2 + (20/100)^2 + (20/100)^2 + (20/100)^2 + (20/100)^2 = 0.20$. If a market shifts towards sending patients to a smaller number of preferred SNFs, the mean *discharge concentration* would be expected to increase.

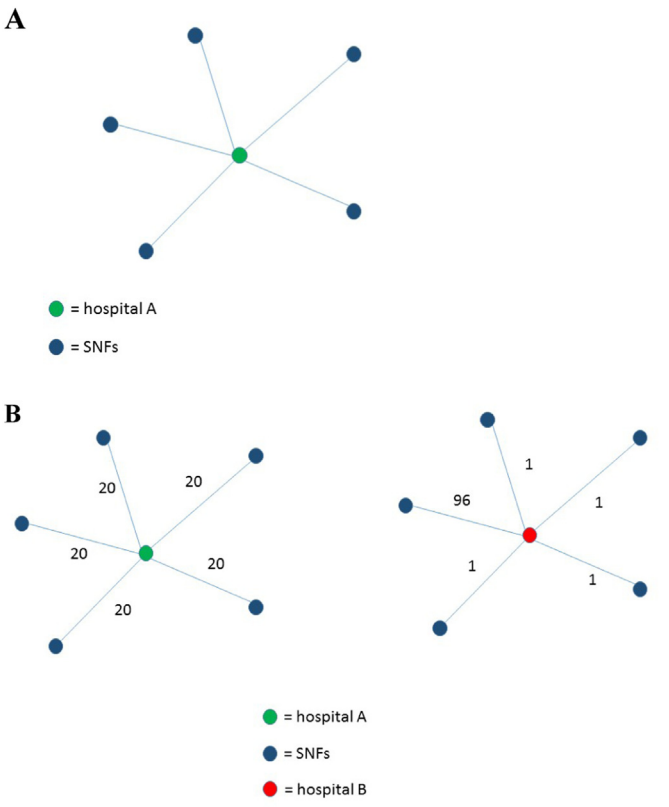

Fig. 1. Two measures of hospital-SNF connections based on network methods: *Number of SNF Partners* and *Discharge Concentration* Notes: This figure illustrates the concepts of a hospital's *number of SNF partners* and *discharge concentration* as network measures. The two fundamental components of networks are entities (termed “nodes”) and connections (termed “edges”). (A) *Number of SNF partners* describes the connectedness of a given node, and in this study quantifies the number of connections between hospitals and SNFs. For example, hospital A (the green node) is connected to 5 SNFs (blue nodes). (B) *Discharge concentration* is based on the Herfindahl-Hirschman Index, a common measure of market concentration. For a given hospital, its discharge concentration captures how concentrated a hospital's discharges are among the SNFs to which it sends any patients. For example, hospital A and hospital B both discharge 100 patients to 5 different SNFs. For hospital A, however, 96 of those discharges are to a single SNF, and 1 to each of the other 4 SNFs, while hospital B discharges 20 patients to each of the 5 SNFs. As described above, hospital A has a higher discharge concentration (discharge connection = 0.92) than hospital B (discharge concentration = 0.20).

2.4. Statistical analysis

We describe hospital characteristics using simple statistics including percentages, means and standard errors. The proportions of vertically integrated hospitals were described annually using percentages.

In our primary analyses, we used medians and interquartile ranges (IQR) to report values for *number of SNF partners* and *discharge concentration* at the market level rather than the hospital level. The number of SNF partners is correlated among hospitals within a HRR, so that hospitals in large markets on average have more SNF partners. If we were to report this measure at the hospital level, it would overweight large markets. Similarly, we described the *mean discharge concentration*