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Physician Influence: Assessing the impact of physician relationships on the adoption of pharmaceutical products

How do physician peer networks impact patient care and the adoption of new treatments?

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Executive Summary

The pace of drug innovation is expected to increase in the upcoming decade, a notion supported by the growing number of FDA approvals for next-generation therapies. In 2022, the FDA's Center for Drug Evaluation and Research approved 37 new drugs, more than half of which were used to treat rare conditions with few or no existing treatment options[1].

With the rise in novel therapies, attention is being paid to how quickly these drugs are being disseminated to patients. Increasingly, physicians are presented with the opportunity to explore new treatment methods and become early adopters, radically shifting the care they provide to patients. Influencing early adopters of medications is only part of the picture. It is also useful to identify early adopters that are more prone to network linkages so that these prescribers can be targeted to influence their networks. In other words, these HCPs may be considered "high potential" since they are likely to influence their networks, thereby impacting drug adoption among their peers.

Analyzing a physician's clinical network to better understand drivers of treatment patterns is a relatively new area of research. Traditional approaches examining shifts in diagnosis and treatment patterns rely largely on two-dimensional segmentations, e.g., geography, affiliated hospitals, or specializations.

For example, Bruce Landon et al.[2] examined how professional networks among physicians vary across geographic regions to identify factors associated with physician connections. They found that network characteristics do indeed vary across geographic areas and that physicians tend to share patients with similar patient-panel characteristics with other physicians. Similarly, Ronnie Zipkin et al. found that oncologists linked to surgeon early adopters through co-locations were more likely to adopt best practices in cancer treatment.[3] While these investigations identify the importance of networks in evaluating clinical outcomes, they remain limited to geographic proximity.

But physician networks run much deeper and broader than geography-based linkages. Physicians can be linked based on managing or treating the same patients, by working in the same healthcare organization, by following each other on social media, by being on committees or co-authoring papers together, by participating in the same clinical trials, and more). Recently, there has been increasing research into physician networks that extend beyond geographical boundaries. For example, Jason Rotter et al. found that peer connectedness, regardless of geography or co-working relationships, to an early-adopting physician correlated with the use of cutting-edge genomic assays in both physician and patient-level analyses [4].

Our research seeks to understand how physician networks, both geographic and social, impact the treatment and care received by patients. In particular, how do connections between and among physicians affect patient treatment patterns or regimens, including the uptake of new drug therapies? This paper focuses on the Medicare population specifically

[1] https://www.fda.gov/media/164429/download

[2] Landon, Bruce E., et al. "Variation in patient-sharing networks of physicians across the United States." Jama 308.3 (2012): 265-273.

[3] Zipkin, Ronnie, et al. "Surgeon and medical oncologist peer network effects on the uptake of the 21-gene breast cancer recurrence score assay." Cancer medicine 10.4 (2021): 1253-1263.

[4] Rotter, Jason, et al. "Shared-patient physician networks and their impact on the uptake of genomic testing in breast cancer." Breast cancer research and treatment 176.2 (2019): 445-451

Study Design

This study was designed to assess whether physician networks influence adoption rates for novel therapies. The analysis was based on prescriptions for a novel treatment (Product N) used to treat wet age-related macular degeneration (wAMD) using Medicare patient claims data.

Why Medicare?

The population of citizens aged 65 and older continues to grow and the elder care services market is projected to top $779 billion by 2030[5]. With more than half of senior citizens reportedly taking four or more prescription drugs[6], Medicare claims, sourced directly from CMS, account for a plurality of provider interactions. Due to their closed nature, the claims provide a near-complete view of a patient's medical activity, capturing their longitudinal journeys across different diagnoses and physician networks.

Why Product N?

Usually seen in patients aged 55+, wAMD is a chronic eye disorder affecting 20 million people worldwide. Its symptoms include blurriness, wavy lines, dull colors, and blind spots.

Existing therapies for wAMD rely on multiple injections into the eye every month to preserve vision. Product N, a novel therapy launched in 2019, addressed these therapeutic challenges by introducing a longer-lasting treatment. After initial treatments, continued doses of Product N are given every 2-3 months.

Product N demonstrated greater efficacy (initial and maintained improvements in vision) and ease of use (fewer injections into the eye) over the existing standard of care. The vast majority of users are in the 65+ age group – thus the utility of using Medicare data.

Analysis

We analyzed claims from ophthalmologists and optometrists during the first six months after the launch of Product N. We then filtered the data to determine co-worker connections and affiliation networks in order to construct networks based on links between providers.

Health care providers (HCPs) were defined as networked/connected as follows:

- **Claim-linked:** Shared at least two claims with a Product N writer (i.e., prescriber) within a span of 30 days. For shared patients, we filtered by both referring and treating providers based on National Provider Identifiers (NPIs) codes.
- **Health care organization (HCO)-linked:** Shared at least two same-day visits with a Product N writer within a common HCO within 30 days. (This definition considers interactions that go beyond traditional approaches, i.e, HCPs that are linked solely by working together).

[5] Grandview Research. Free Market Insights. U.S. Elder Care Market Summary, 2022. San Francisco, CA, Grandview Research.

[6] Ashley Kirzinger, et al. Data note: Prescription drugs and older adults. KFF

The 30 day time frame is defined as follows:

- 30 days immediately preceding the first prescription for Product N
- Any 30-day timeframe within the six months post launch for non-writers

For connected HCPs, the linked interactions should occur post the first prescription date of the influencing HCP (prior prescriber).

Results

In the first 6 months post-launch of Product N, HCPs connected through a network had an adoption rate that was over four times higher than HCPs that are not connected.

HCPs linked to prior prescribers have higher adoption rate

Ophthalmology + Optometry	Writers	Non-Writers	% Writers
Connected / Network HCPs	4,058	36,905	9.91%
Non-Connected / Individual HCPs	735	31,051	2.31%
	4,793	**67,956**	**4.28x**

Writers vs Non-writers

- **Writers:** HCPs that wrote at least one Product N prescription in first six months post launch
- **Non-writers:** HCPs that did not prescribe Product N in the first six months post launch

HCP networks (whether linked by shared patients or shared HCOs) are essential for influencing the uptake of new drugs and best practices surrounding their dissemination.

Conclusions

In the first few months post launch of a new product, pharmaceutical manufacturers generally focus on increasing new prescribers. However, for pharmaceutical manufacturers and sellers, resources should be allocated toward **HCPs that have demonstrated connections with other prescribers** in order to influence product adoption. This may differ from existing approaches that focus efforts on a wider set of providers (including mid- or late-adopters) in a less strategic manner without recognizing the impact early adopters could have on product uptake.

It is generally difficult to measure networks/connections between HCPs. The disadvantages of traditional approaches are: 1) relationships are based on the assumption that HCPs employed by the same hospital/physician group interact, even if they don't share patients, 2) current methods, such as manually scanning account directories for hospitals and physician groups and conducting surveys, are incomplete and time-consuming, and 3) they do not account for interactions with HCPs outside a particular hospital/physician group, nor do they account for informal relationships (education, clinical trials, article collaboration, etc.).

Given the proliferation of rich data, however, it is possible to identify and even measure meaningful networks and connections across HCPs using commercially and publicly available data.

The following sources of data can be incorporated to make network determinations more robust:

- Claims data can be analyzed for same-patient interactions, showing a relationship in treating patients
- Publicly available data (e.g., CMS data) provides a view into HCPs that interact for studies or research purposes, such as PubMed articles and clinical trials.
- Social networks, including Twitter, LinkedIn, and more, reveal informal network linkages.
- Schools attended, degrees earned, and year of degree issuance can indicate ongoing relationships, as educational relationships can have an impact on later professional interactions between HCPs.

As drug manufacturers and sellers look to capitalize on the growth of novel therapies, they must identify physician networks and affiliations for better targeting. By understanding the degree of influence affiliations have on a physician's willingness to prescribe novel drugs and therapies, pharmaceutical manufacturers can improve their physician and HCO targeting to accelerate the adoption of new innovations that can extend and improve patients' lives.