



## Abstract

*In this paper the author provides a literature review of available articles on provider directory accuracy and its potential impact. The author provides some potential solutions to the current problem of provider record inaccuracy as well as a solution for "ghost providers" in a network. This review includes a combination of regulatory and technical solution concepts to move the state of provider record accuracy forward.*

## Keywords:

*Provider Directory Accuracy, Machine Learning, Big Data,*

# Improving Provider Directories: What Works?

## Introduction

While many innovations have been made in modern health care with the application of big data and machine learning, some areas still lag in performance. One specific area of interest in recent published studies is around provider data, specifically provider directory accuracy. This paper will discuss the current state of provider data accuracy, the impacts of inaccurate records, and lastly a review of potentials for improving provider directory accuracy. The provider records may seem to be a unimportant item, one of the least concerns when it comes to health data. But, this research will show that the provider directory is a critical foundation for multiple components of modern health systems. "Accurate information of provider directory data is vital in health care" (Cook et al., 2018, p. 99).

## Defining the Problem

Recent studies into the accuracy of provider directories are surprising in their result of just how bad the results are. Stein et al. showed that CMS found an accuracy rate of only 45 percent in Medicare Advantage plans (Stein et al., 2017). "The most concise and mean-

ingful measure for accuracy is whether the correct contact information is listed for a provider, the provider answers the phone, and the provider accepts the insurance listed in the directory" (Burman & Haeder et al., 2022, p.604). Burman & Haeder et al. found provider accuracy of only 46% in the first year of their study.

## **The results are consistent across multiple states and in various plan types.**

When you look at an expanded view of health care roles the problems are not limited to typical health providers, and primary care physicians. "Audit and "mystery shopper" studies indicate that there are significant errors in information related to psychiatrists in private plan directories" (Busch & Kyanko et al., 2020, p.975). "We found widespread inaccuracy in provider information across directory types" (Adelberg et al., 2019, p.245).

Ndumele et al. also found significant inaccuracies in provider directories but



their research went a step further to show a source and some depth to the problem "There was a significant amount of turnover among primary care physicians" observing only a 88% retention rate of physicians in the network after 1 year (Ndumele et al., 2018, p.932). They show that the problem increases with time finding that after 4 years "only 68% of primary care physicians, on average, remained associated with a particular plan's network (Ndumele et al., 2018, p.932). "Provider directory misinformation remains prevalent in large part for two reasons. First, they find that a "lack of protection, which leaves little incentive for consumers to report misinformation" (Kleban et al., 2020). Second the author shows that a "lack of enforcements, which limits any incentive plans would have to invest in action plans to periodically and effectively update directory systems" (Kleban et al., 2020).

# Impact of Inaccurate Provider Directories

The provider directory is not only a critical component to finding and accessing care, this research shows that it is a critical foundation for multiple other stakeholders and actions. "For enrollees, provider networks serve as the crucial pathway between insurance coverage and access to medical care." (Burman & Haeder et al., 2022, p.598). Haeder et al. found that in both ACA Marketplace and commercial plans they were unable to set up an appointment with the original provider in over 70% of their calls. Due to inaccurate provider directories they show "very low prospects-less than 30 percent- of securing an appointment with any randomly chosen

provider" (Haeder et al., 2016, p. 1164). This leads patients to be frustrated and has also shown to develop patients into health impacting decisions. "Low accuracy rates as well as the need to repeatedly contact providers to schedule appointments – even when successful – impose significant challenges for enrollees' health because they may delay or forgo care or seek care in more expensive settings" (Burman & Haeder et al., 2022, p.609). Burman, Ludomirsky, Ndumele, Bell, Adelberg et al. each have findings that concur with Cook et al. "Inaccurate provider directories can create a barrier to care and raise questions regarding the adequacy and validity of the

health care as a whole" (Cook et al., 2018, p. 99). The provider directory is at the center of the patient's selection of not just a provider, but of a health insurance plan as a whole. As Kleban et al. finds "much of the information via provider directories, which consumers rely on to understand available and affordable care, is incorrect, outdated, or misleading" (Kleban et al., 2020, p.1188). This leads patients to purchase plans that are not in their interest, utilizing providers that show on the provider directory but may no longer be in network leading to surprise out of network bills (Kleban et al., 2020). Busch et al. agrees that accurate directory information is fundamental.



Figure 1.

The impact of these terrible provider directory accuracy results goes well beyond the patient. The entire network and health payers plans are impacted by these issues. The provider directories are used by providers, health payer plans, researchers, and even regulators (Tyndall et al., 2018, P.181). Haeder et al. shows that inaccurate listings make it difficult for regulators to measure and evaluate network adequacy. The attached figure from Cook et al. provides a simplified view of how a provider directory may interact with a variety of activities inside a health insurance or payer plan (See Figure 1). "The greater the number of interconnected systems, the greater benefit from Directory Services" (Tyndall et al., 2018, p.181).

One focus area of conversation in current research is on measurement of network adequacy. This is the measurement of a ratio of patients to providers in a specific health plan. Ludomirsky et al. show that just because a provider is listed in a network, it does not mean that they truly provide access to care in that health plan. "Our results suggest that all providers should not be counted equally when measuring access in Medicaid"

(Ludomirsky et al., 2022, p. 765). "Inaccurate provider directories can create a barrier to care and raise questions regarding the adequacy and validity of the health care as a whole" (Cook et al., 2018, p. 99). A term that is common in this space is "Ghost Physicians" or physicians in a plan that are not actively taking patients and making claims in the health plan. In a study of Medicaid plans the team found "Overall, 16.3 percent of physicians listed in Medicaid managed care plan provider network directories in a year qualified as ghost physicians, meaning they saw zero Medicaid beneficiaries over the course of the year in an outpatient setting" (Ludomirsky et al., 2022, p. 763). The problem is not narrow to one region or type of plan. "The share of ghost physicians ranged from 13.4 percent to 24.9 percent" across various states in the study (Ludomirsky et al., 2022, p. 763). They also found that of the physicians that stayed in that plan network a second year "94.6 percent remained ghost or peripheral physicians" Ludomirsky et al., 2022, p. 763).

Math and statistics are strange but very familiar across industries. The 80/20

Rule is an age old adage from statistics. Eighty percent of the outcomes are generated from 20% of the causes.

**"In this case 80% of the volume comes from 20% of the providers."**

In Ludomirsky et al. they find that 25 percent of physicians accounted for 28.2 percent of claims" (Ludomirsky et al., 2022, p. 764). This leads to the question, how can plans better engage and work with physicians to work on these issues. Pareto them out and move them into a winning category. Just having a provider in a network should not in itself count for adequacy, they are listing providers that may not be performing. As Ludomirsky et al. shows "taken together, our findings suggest that provider network directories may overstate the availability of physicians in the Medicaid program" (Ludomirsky et al., 2022, p. 765).

## Discuss Possible Solutions

There are two areas of focus on solutions moving forward. First there is the application of modern technology in the form of big data and machine learning. Additionally there is a heavy push for regulatory reform in the space.

First we discuss the Application of Technology Solutions to improve provider directory accuracy. "Data-based innovations can affect all areas of social development, especially in the healthcare sector" (Karatos et al., 2022, p.10). The recent development of machine learning and availability of big data provide a possible solution to the data accuracy problem. Machine learning should not be feared but leveraged. Dash, Guni, and Beam et al. all agree that machine learning is a natural

extension of statistical tools. Beam et al. showed that machine learning alone is not some panacea. "Instead, it is a natural extension to traditional statistical approaches" (Beam et al. 2018, p.1317). Beam et al. shows that "machine learning is a valuable and increasingly necessary tool for the modern health care system" (Beam et al., 2018, ). Stein and Cook et al. both show a directly relevant topic in health care in the provider data problem. They both show how common inaccurate provider directories are. This is surprising given where many other industries are, but both Stein and Cook et al. show some reasons for this. Cook et al. provided a roadmap to move forward to a solution utilizing machine learning and big data. Machine learning in

this form was the implementation of natural language processing, and the big data utilized disparate data sources across the industry including state licensing data bases as well as other existing directories.

One direct area where big data can be applied by the "use of external sources for validating provider practice locations has the potential to add real value" noting that providers do not routinely update changes of location and employment "in a timely manner" (Bell et al., 2018, p.8).

## Research shows

This area has a potential for improvement and possibly a cost saving and efficient solution. Tyndall & Tyndall et al. find that "standardized API's will create accessible directories from existing repositories without requiring the creation of directory-specific services" (Tyndall et al., p. 184). "The use of SQL for storage gives the advantage of relational database's query language and its strong integration into modern programming languages" (Tyndall et al., 2018, p. 183). "This creates opportunities for more organizations to deploy healthcare directories at a lower cost and without major expansion to their IT footprint" (Tyndall et al., 2018, p.183).

## Regulatory Implications

Along with the discussion of IT solutions, regulations are a topic of significant discussion in the available articles. Law makers and relevant agencies continue to work on regulations to improve provider directory accuracy. This push is at all levels, federal, state, and even work around additional regulations on private payer networks. The focus is on protecting patients and their affordable access to care. As the current accuracy results show, the status is unacceptable and causing significant disruption. Burman, Ludomirsky, Cook et al. all have a similar finding that "questions emerge whether current statutory standards and regulatory implementation and oversight are adequate and meaningful" (Burman & Haeder et al., 2022, p.609). Many researchers provide some potential solutions. Auditing and oversight are advocated by multiple authors. Ludomirsky et al. proposes "that states devote resources to regularly evaluating Medicaid managed care networks via a combination of more complex, yet effective, audit studies (for example, secret shoppers) and to use a broader administrative claims data to access which physicians are actively engaged in treating the Medicaid beneficiaries in each plan" (Ludomirsky et al., 2022, p. 767).

## Enforcement

Many of the authors also advocate for the implementation of penalties to punish health plans into compliance. "States should pair regular evaluation of managed care plan networks with strict penalties for non-compliance" (Ludomirsky et al., 2022, p. 767). Kleban et al. writes "the federal government should impose strict regulations and enforcement tactics to ensure that information disseminated to the public regarding provider in-network status is reliable" (Kleban et al. 2020, p.1198). Busch & Kyanko et al. suggest "federal standard for directory accuracy, stronger enforcement of existing laws with insurers liable for errors, and additional monitoring by regulators may be needed" (Busch & Kyanko et al., 2020, p.982).

Research by both Adleberg and Cook et al. agree "federal policy makers should consider benefits of federal leadership in correcting provider directory inaccuracy" (Adelberg et al., 2019, p. 244). But the federal listing may not be enough given the current inaccuracies in licensing and other government related databases. "Updating provider information via credentialing is too infrequent and ineffective" (Cook et al., 2018, p.100).

Research is consolidating around a possible set of solutions involving regulation and technical solutions. Cook et al. found "natural language processing is a feasible approach to combine disparate data sources (i.e. state, federal or industrial sources)

to obtain accurate provider directory information" (Cook et al., 2018, p.104). The combination of big data machine learning with regulations to protect the consumer are looking to be a strong solution. But it will take a large effort with multiple stakeholders as Guni et al. shows "governments and health care bodies must also act as key stakeholders to ensure laws are updated to allow ML to be harnessed for the benefit of patients while maintaining privacy and security" (Guni et al., 2021, p.6). As always privacy that needs to be considered and Karatos et al. reminds us "to fully implement and exploit BD (big data) processing algorithms' potential, policy makers must develop coherent policies to use that data safely" (Karatos et al., 2022, p.10)



## One Surprising Finding

One surprising finding from the research is the need to expand the scope beyond purely provider directory accuracy. To truly get a measure of the health and availability of the network we must look at adequacy. Ludomirsky et al. provided some leading research in this space. "By counting all physicians the same way, network adequacy standards only incentivize plans to include a sufficient number of physicians, instead of encouraging plans to contract with physicians who are both valued by Medicaid beneficiaries and are willing to treat them" (Ludomirsky et al., 2022, p. 767). So again it is not just about having the provider in the network but having them available and utilized by the plan. It is about patients accessing the care efficiently and "many states' reliance on directories to ensure network adequacy may be insufficient to ensure satisfactory access to physicians who are both valued by Medicaid managed care beneficiaries and willing to treat them" (Ludomirsky et al., 2022, p. 765).

Network adequacy must be measured differently to see patients access to care improve, "our results suggest that all providers should not be counted equally when measuring access in Medicaid" (Ludomirsky et al., 2022, p. 765). The suggestion from Bell et al. is for "regulations to ensure adequate network and access standard for enrollees for access to primary care as well as a host of specialist, hospital, and pharmacological services" (Bell et al., 2018, p.1). Ndumele et al. finds that "network breadth may be associated with continuity in ways that affect access to care" (Ndumele et al., 2018, p. 934). "Efforts to ensure access in Medicaid managed care by maintaining adequate physician networks need to move beyond measuring breadth; they must also measure physician continuity within the networks" (Ndumele et al., 2018, p. 934). Ndumele et al. takes the thought of regulations even further to look at limiting changes allowed in a given network during a plan period. "Policy makers could consider capping the al-

lowed amount of annual involuntary physician turnover in managed care plans to ensure that the potential benefits of network optimization aren't outweighed by the negative effects of discontinuity" (Ndumele et al., 2018, p. 934).

So we must look at accuracy and adequacy in combination when we are reviewing the usefulness of a provider network to its beneficiaries. "We propose that states devote resources to regularly evaluating Medicaid managed care networks via a combination of more complex, yet effective, audit studies (for example, secret shoppers) and to use a broader administrative claims data to access which physicians are actively engaged in treating the Medicaid beneficiaries in each plan" (Ludomirsky et al., 2022, p. 767). The authors go on to suggest "that all providers should not be counted equally when measuring access in Medicaid" (Ludomirsky et al., 2022, p. 765).

## Future Research

The research in this space is emerging but needs to be advanced quickly. Many of the studies are narrow in focus. Burman & Haeder et al. for example, "only have data for primary care providers" and the authors suggest future research into accuracy by specialty (Burman & Haeder et al., 2022, p. 609). Bell et al. suggests research into licesening data and its accuracy since it is a readily available data sources, specifically "whether publicly available state licensure board data accurately represents the distribution of the workforce" (Bell et al., 2018, p.2).

Busch et al. discusses the ability of a network provide to manage costs and steer to high-quality. A comprehensive view of provider accuracy, its volume of claims compared to peers, and the overall quality outcomes would be beneficial in this space. Research is available on the impact of quality scoring to a health plan network. "In the absence of "gold standards" and performance thresholds, the comparison with peer performance may be a good alternative" (Watts et al., 2012, p.858). "We believe the evidence suggests that provides changed their behavior when they were presented with performance reports that used administrative and claims data to compare them with their peers" (Watts et al., 2012, p.859). Research into the provider directory and the mediums it is provided to patients may provide some future improvements. Guni et al. shows that data generated can be used to find where and how patients are getting connected with health care. "The proliferation of web-based content and increase participation of patients in interacting with said content provides an opportunity to understand what features and content are engaging to people" (Guni et al. 2021, p. 6).

## Conclusions

Provider directories are a core component of modern health plans. "Inaccurate provider directories can create a barrier to care and raise questions regarding the adequacy and validity of the health care as a whole" (Cook et al., 2018, p. 99). The current performance on provider accuracy is a key concern for the industry. "Provider directory misinformation remains prevalent in large part for three reasons.

1. First we find that a "lack of protection, which leaves little incentive for consumers to report misinformation" (Kleban et al., 2020).
2. The author shows that a "lack of enforcements, which limits any incentive plans would have to invest in action plans to periodically and effectively update directory systems" (Kleban et al., 2020).
3. The research completed in my review finds a possible third underlying reason for the inaccuracy. Many plans are mandated to have a certain level of adequacy, or a number of providers given a specialty.

This research suggests that the current measure of adequacy is counterproductive and should be replaced. An integrated solution that provides accurate medical provider information, and measures that against actual claims and usage volume data is needed. As stated earlier accuracy should include "a provider, the provider answers the phone, and the provider accepts the insurance listed in the directory" (Burman & Haeder et al., 2022, p.604). The new measure needs to reflect a patients ability to get an appointment with a provider that is in-network.



## Harmony Technology is dedicated to Improving Value-based Care Provider Network Optimization

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