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Advancing integrated care for individuals experiencing homelessness: harnessing data partnerships and coordination

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ABSTRACT

Bridging gaps in care coordination for homeless populations is a complex task that requires addressing attitudinal and behavioral changes, as patients hold more control over chronic and preventive care. Despite these challenges, organizations like the Patient Care Intervention Center (PCIC) have made significant strides in improving health equity for vulnerable populations in Houston. PCIC integrates data, fosters collaboration between social services and medical providers, and provides comprehensive and targeted services, positively impacting the health and social outcomes of 98,838 individuals. By addressing diverse needs and integrating medical and social care, PCIC offers a model for developing comprehensive solutions to prevent and reduce homelessness while improving health equity for socially and medically vulnerable populations.

PCIC's approach involves data sharing partnerships and care coordination initiatives with various agencies in Harris County and Houston. This cross-sector collaboration, integrating data from multiple sources such as hospital systems, managed care organizations, and government agencies, enables the development of more effective interventions.

PCIC demonstrates the limits of fragmented interventions and the importance of integrating medical and social care. PCIC's model serves as an example of how collaboration, targeted services, and data integration can improve health equity and contribute to the prevention and reduction of homelessness.

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Overcoming fragmented interventions and addressing diverse needs

The impact of social factors on health is particularly severe among individuals experiencing homelessness. The current approach of addressing health access barriers for persons experiencing homelessness (PEH) on an agency-by-agency basis has resulted in fragmented and ineffective interventions. Coordinating resources without proper collaboration rarely leads to positive outcomes for those with chronic homelessness (Buck et al., 2012; Hamilton et al., 2021). Treating all PEH as having the same needs is also a tragic mistake, as a one-size-fits-all approach fails to meet the diverse requirements of this population. Isolated funding and delivery of social and medical services for PEH often result in each service line competing for the patient's attention, reinforcing their sense of helplessness and undermining trust (Hewlett et al., 2022; Luchenski et al., 2018; O'Connell et al., 2023). To address the needs of populations with multiple and competing risks or illnesses, there is a need for integration between medical and social care (Rochon et al., 2006). Unfortunately, a cohesive and coherent safety net to address the needs of complex patients is rarely available. In this article, we propose an

alternative to the piecemeal approach and discuss how the non-profit sector is tackling the complex needs of PEH and comorbidities through data partnerships, integration, and braiding for more effective individual and population-based care, using the Patient Care Intervention Center (PCIC) as a model.

Development of PCIC system

In early 2012, a data sharing partnership was established with the County Hospital system in Houston, known as the Harris Health System. The initial focus of this partnership was to address the needs of high-needs, high-cost populations and complex individuals who frequently visited the emergency department. As the partnership progressed, it expanded to include the city EMS services. Analyzing the overlap between the data from these two systems revealed that individuals were not limited to accessing just one agency or hospital, such as the Harris Health System, but were also seeking care at other hospitals based on EMS drop-offs.

This realization highlighted the importance of considering broader utilization of services and social factors that were not adequately captured in the existing

data sharing efforts. Building successful data sharing partnerships required establishing trust with agency partners through transparent communication about data usage and demonstrating the proof of concept from initial data sharing initiatives with the county. Clear use cases for applying the overlap analysis were identified, contributing to trust building and gaining buy-in from additional partners. The non-profit organization Patient Care Intervention Center (PCIC) was thus established with the mission of improving healthcare quality and reducing costs for vulnerable individuals with complex care needs through data sharing, integration, and care coordination.

PCIC's approach to data sharing involved maintaining a focused use case for the overlapped data and ensuring that data ownership resided with the patients and the agencies sharing it. As the ecosystem expanded, additional service utilization datasets from partnering agencies, including government service data from the state, were incorporated. The ecosystem was further enriched by integrating public datasets. Collaboration with large community-based organization (CBO) partners, who shared a similar culture of data sharing and collaboration, played a strategic role in enhancing the data sharing ecosystem and involving the social services sector.

Overall, the evolution of the data sharing partnership involved iterative steps to broaden the scope, establish trust, identify clear use cases, and incorporate additional datasets from various agencies and public sources. This comprehensive approach aimed to leverage data to improve care coordination and address the holistic needs of vulnerable populations.

Strengthening partnerships and consolidating interventions for vulnerable populations

PCIC was founded on the principle that addressing the medical, behavioral, and social needs independently, agency by agency, leads to fragmented and subpar services. To effectively address multiple interrelated causes of vulnerability, these needs must be addressed simultaneously and collectively. Cross-sector data integration plays a crucial role in achieving care coordination for socially and medically vulnerable individuals. PCIC initiated data and care coordination partnerships with various agencies in Harris County, Houston, integrating data from 750 different agencies. These partnerships included hospital systems, managed care organizations, social care partners (homeless and others), and governmental partners (city and county public health, Health and Human Services, and the Center for Medicare and Medicaid Services). The data from these sources was combined with other health datasets to create a comprehensive

profile of each individual, their journey, and their living environment. Furthermore, by aggregating and deidentifying the braided data, population-level interventions can be informed.

Partners interested in targeted social and healthcare interventions for vulnerable populations can utilize this integrated data to develop more effective and consolidated interventions. The ability to combine different datasets based on specific interventions and needs, and to create care coordination dashboards between agencies through these partnerships, has not only improved care coordination for vulnerable populations within sectors and communities, but also facilitated the measurement and assessment of collective efforts in improving health equity. In other words, agencies can work together to address various inter-related health and social barriers. The comprehensive dataset enables partners to track multiple independent and interrelated outcomes.

To illustrate the concept fully, the following examples demonstrate how a braided data platform and coordinated services can improve care and health outcomes for vulnerable populations.

Example 1: Harris Health System (HHS) HHS is the largest indigent health system in Harris County, serving economically disadvantaged Houstonians. However, the sharing and application of critical social data from other agencies within HHS have been limited. By implementing a data-driven solution, HHS can stratify patients based on identified social needs and target specific patient demographics for additional care. Strategic partnerships can be formed to meet logistic and care-based needs, leading to improved care, community health outcomes, and reduced cost per patient.

Example 2: Houston Food Bank (HFB) HFB serves Houston's food-insecure population and offers referral services to social and health services. However, the current process for tracking additional services and referrals lacks a unified solution, limiting the program's impact. By using a braided data platform, HFB can integrate data from different systems to identify the optimal referral agency for each patient's unique needs. Real-time connections to resources can be facilitated, and medical and social service histories can be shared with relevant stakeholders.

In applying these examples broadly to population health interventions, several steps can be followed:

1. Identify the target population based on comorbidities and conditions.
2. Analyze utilization data to determine the most used services and vital agencies for intervention success.
3. Create dashboards to track impacts in terms of costs, volume, and morbidities.

4. Determine the patients/clients within the target population that can have the greatest impact.
5. Seek feedback from the target population, particularly those experiencing homelessness, to ensure their needs are considered.
6. Identify necessary changes to develop more effective care pathways, such as reducing ER utilization and improving social infrastructure.

Development of the braided system

The braided system operates through three main branches to ensure comprehensive data integration and analysis. The first branch involves identifying data that is linked using natural key identifiers from various data sharing partners' datasets, facilitated by a Master Client Index (MCI) data infrastructure. This includes community-based organizations (CBOs), government services partners such as Health and Human Services, hospitals, clinics, and behavioral health facilities. To establish these linkages, matching algorithms were developed and customized to account for variations in data quality across sectors.

Since data structures differ significantly between sectors (e.g. housing, criminal justice, healthcare), a common set of data points and tables that overlapped among partners were identified as core tables within the MCI. From these core tables, linkages are made to sector-specific detailed tables. To ensure data accuracy and integrity, a sophisticated audit layer tracks changes, merges, and updates occurring in both the core MCI tables and the extended tables that receive ongoing data feeds. Logic is incorporated to establish rules for determining the "final/one version of truth" when inconsistencies or contradictory data exist for the same client.

API interfaces are implemented to access the braided data, enabling the consumption of linked longitudinal data (with integrated consent logic) for case management at the individual level. These APIs typically provide a timeline view on the user interface and are utilized for agency-level overlap analysis and community-level overlap analysis. This analysis helps identify the need for agency-level partnerships based on overlapping data, understand utilization patterns, determine stakeholders involved in cross-sector multi-disciplinary interventions (at both the patient and agency levels), and assess the cross-sector impact of programs and interventions.

The second branch of the braided system involves the aggregation of public data sourced from public datasets. This data is linked at the data layer, usually through geographic linkage such as census tract, zip code, county, or state. At the visual layer, the data is braided through layers on visualizations to provide a comprehensive view.

The third branch encompasses community resources data. PCIC's resource database is linked through geographic linkage, allowing for need-resource mapping. This data is aggregated for hotspot analysis, which identifies areas of high need and informs targeted interventions. Additionally, at the individual level, the braided system facilitates referrals by leveraging the aggregated data to connect individuals with appropriate resources and services.

Overall, the braided system enhances data integration and analysis for improved decision-making and care coordination. It ensures the seamless linkage of data from various partners, incorporates quality control measures, and enables the utilization of longitudinal data for case management and program evaluation. Additionally, the system leverages public data and community resources to provide a comprehensive understanding of individual and population-level needs, leading to more targeted and effective interventions.

Conclusion

Bridging gaps in care coordination for homeless populations is a complex task that requires addressing attitudinal and behavioral changes, as patients hold more control over chronic and preventive care. Establishing trust through shared decision-making and understanding the patient's values and priorities is crucial, while ensuring that clinician-patient relationships align with desired outcomes in chronic care. Despite these challenges, organizations like PCIC have made significant strides in improving health equity for vulnerable populations in Houston through enhanced care coordination and community referrals across multiple agencies. PCIC's efforts have positively impacted the health and social outcomes of 98,838 individuals working with social and healthcare partner agencies (2 safety net hospitals, 2 non-profit hospitals, 5 clinics, 1 food bank system, and 1 community health worker program), by integrating data, coordinating care, and fostering collaboration between social services and medical providers. 90,163 individuals received direct care coordination services from partner agencies, and 8,675 individuals had 24,898 social referral needs coordinated through the platform, to 1,063 community-based organizations. The top social needs coordinated include food or food stamps (25%); energy and rent assistance (23%), and the remainder (29%) assistance with Medicaid, Medicare, and social security income, etc. Further research is needed on this unfunded mandate to design strategies to impact the continuum of social needs, from the biggest gaps in care to the best outcomes for the least cost.

This article highlights the limitations of fragmented interventions and the importance of addressing diverse needs among individuals experiencing homelessness.

The current agency-by-agency approach has proven ineffective, reinforcing a sense of helplessness, and failing to recognize the unique requirements of this population. To overcome these challenges, the integration of medical and social care is necessary, and PCIC serves as a model for achieving comprehensive solutions that can prevent and reduce homelessness while improving health equity for socially and medically vulnerable populations.

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Disclosure statement

No potential conflict of interest was reported by the author(s).

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