



Discharge to medical home: A new care delivery model to treat non-urgent cases in a rural emergency department



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ABSTRACT

Emergency department visits for non-urgent reasons contribute to overcrowding and higher healthcare costs. Routing patients to lower cost care settings may improve outcomes. The Discharge to Medical Home model is a new care delivery model that routes low-acuity, ambulatory, emergency department (ED) patients to an adjacent primary care clinic, which provides the opportunity for patients to establish a medical home. During clinic hours, walk-in patients presenting to the ED are screened and, if appropriate, scheduled for a same-day appointment with a primary care provider. Over the first year of operation, the model reached 38% of all ED encounters and over 90% of daytime ED encounters. Over a third (36%) of daytime ED patients were discharged to primary care. Future steps include examining primary care follow up after initial discharge and examining models to best leverage the capacity of the primary care clinic to care for both walk-in and established patients.

1. Background

Hospital emergency departments (EDs) are an essential component of the healthcare delivery system, functioning both as a provider of care for life-threatening conditions needing immediate treatment and as a safety net when other sources of care are not accessible.¹ In the United States, about a third of ED visits can be classified as non-urgent, meaning that these cases could be treated in the primary care setting.² However, classifying ED visits as urgent or non-urgent is both complex and controversial.³ What remains is consensus regarding a need to improve access to lower cost care options that promote continuity for patients needing care for minor ailments and chronic disease management.⁴ This need may be greater in rural areas where limited sources of primary care, high poverty rates and high rates of uninsurance contribute to higher rates of non-urgent ED visits compared to non-rural areas.⁵

2. Organizational context

Anson is a rural county in southeast North Carolina, with a population of 26,309. Nearly 49% of residents are African American, 46% are Caucasian, and nearly a quarter of residents (24.2%) live below the poverty level (Fig. 1). The most recent Community Health Assessment, conducted in 2012, described significant barriers to accessing care, lack

of specialty care, and low confidence in the ability to get quality care close to home as major concerns for Anson County residents.⁶ The assessment also found high rates of chronic disease and poor health behaviors among survey respondents. Healthcare options in the county are extremely limited. There are no urgent care clinics or retail-based care options. If a patient wants to access care outside of normal business hours, they must visit the ED.

Carolinas HealthCare System Anson is the primary provider of health care in the county. The facility is a part of Atrium Health, a large, vertically integrated healthcare system with facilities in North and South Carolina. It opened in July 2014 through an overhaul of Anson Community Hospital, a 1950's era 52-bed community hospital that had excess capacity, was costly to run, and no longer met community needs. The 45,000-square foot facility, contains a primary care clinic, pharmacy, imaging center, emergency department, surgery, community space, and a 15-bed inpatient unit. The redesign of Carolinas HealthCare System Anson and the primary care clinic, Carolinas Primary Care, provided an opportunity to implement multiple strategies to address avoidable ED visits that could be treated in the primary care setting at lower cost.⁷ In addition to structural changes, the adjoining primary care clinic was redesigned so that it operates similar to a patient centered medical home (PCMH). The primary care clinic takes a team-based approach to health, and patients have access to additional services such as patient navigation and educational classes. Carolinas

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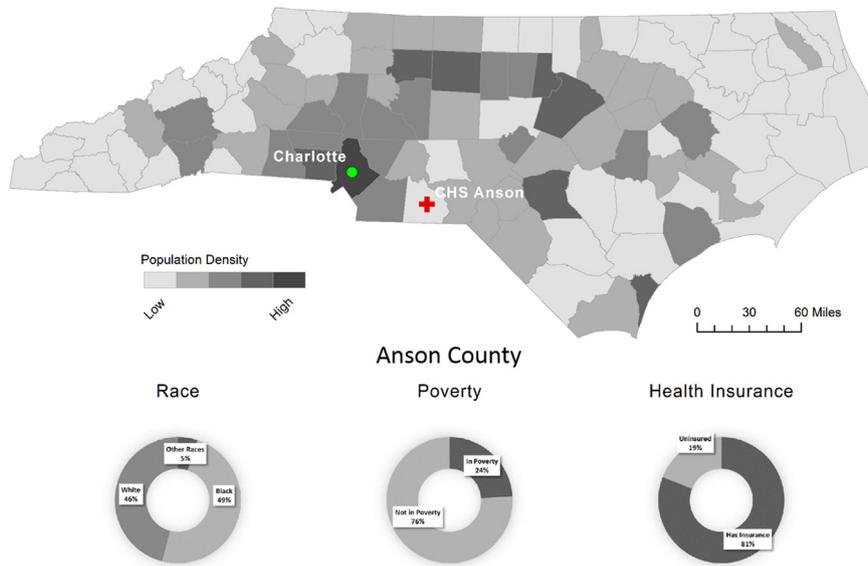


Fig. 1. Map of North Carolina showing Anson County and select population characteristics.

HealthCare System Anson is a community focused healthcare provider, whose mission is to “improve the health of Anson County.”

3. Problem

As part of its mission, Carolinas HealthCare System Anson sought to decrease avoidable ED visits and increase access to primary care among Anson county residents. The high rates of chronic disease in the community, combined with few healthcare options, contributed to a high rate of ED visits that were either: (a) primary care treatable; or (b) preventable if the patient accessed primary care earlier. While strategies to address both types of visits are available in the literature, few studies have applied these strategies in a rural setting.

One set of strategies to address non-urgent ED visits in international settings focuses on screening and referral. Same day scheduling, increased hours at primary care clinics, patient navigation and referral services, patient education, and chronic disease management are some promising approaches.⁸ Other studies have found that directing ambulatory patients to a hospital-integrated general practice uses less time, fewer diagnostic resources than the ED, and that hospital based screening reduces the burden of inappropriate ED use.^{9,10} Hospital-based screening interventions have shown higher rates of primary care follow up for ED patients who do not have a regular source of care.¹¹ However, limited research describes the efficacy or implementation of moving patients from the ED to a primary care clinic, with no interventions aimed at a rural population in the United States.

Most strategies to manage non-urgent ED visits in the United States take a different approach. Interventions include financial incentives and use of external care management organizations and payor-led ‘gate-keeping’ to keep patients out of the ED.¹² These interventions have had mixed results and require the management of complex relationships between hospitals, primary care providers, specialists, and insurance companies.¹³ In rural areas, the market for these types of relationships is small or non-existent. Therefore, it is necessary for rural hospitals to implement processes to reduce the burden of unnecessary ED visits.

4. Solution

Carolinas HealthCare System Anson addressed this challenge by implementing a process called “Discharge to Medical Home,” a novel care delivery model wherein walk-in would-be ED patients with non-urgent complaints are booked a same-day appointment at the adjoining

primary care clinic. The Discharge to Medical Home process was designed to address two main goals: (1) to ensure that patients were getting the appropriate care in the appropriate setting; and (2) to address issues of overall health by connecting patients to a primary care provider. The program launched in July 2014.

Discharge to Medical Home is a multi-step process that begins with patient registration (Fig. 2). Ambulatory patients arriving at the facility check in at a shared registration desk that services both the ED and the primary care clinic. Patients with an appointment are directed to the primary care waiting room. For those without an appointment, the registrar will ask the chief complaint. The registrars apply the Emergency Severity Index (ESI)¹⁴ to determine which patients need to be seen immediately and which patients do not need immediate attention, a process known as rapid triage. Generally, patients with ESI levels 1 (life threatening) or 2 (high risk) are admitted directly to the ED, while patients presenting with symptoms typical of ESI levels 3 (requires in-depth evaluation), 4 (few resources needed) or 5 (no resources needed), undergo a medical screening exam to determine if the patient should be

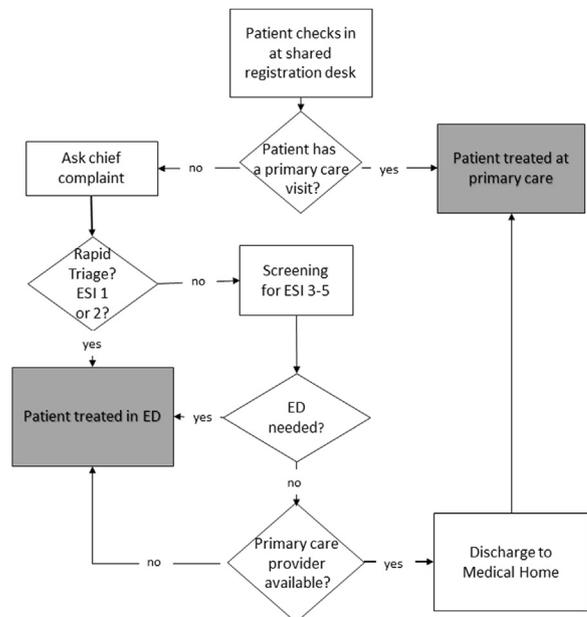


Fig. 2. Diagram of patient flow through Discharge to Medical Home model.

admitted to the ED.

The medical screening exam is conducted by an ED registered nurse and an advanced care practitioner. The nurse will take vital signs, while the patient describes their reason for visit. The advanced care practitioner decides on the appropriate location for care, based on the information provided by the patient and results of the screening examination. The screening is documented in the electronic medical record. The entire screening process takes 3–7 min on average. To comply with the Emergency Treatment and Labor Act (EMTALA), patients then sign a form acknowledging that a qualified practitioner in the ED had seen them. Patients have the right to refuse to sign the waiver and be admitted to the ED. In the first year of operation, all patients for whom ED admission was unnecessary opted to sign the waiver.

For patients admitted to the ED, the nurse will gather additional information needed to complete standing orders. Patients who do not need ED care are discharged to the medical home and scheduled for a same day (next available) appointment at the primary care clinic, which blocks appointments specifically for patients being discharged from the ED. Patients are then asked to sign a consent form, affirming that they were screened in ED and agree to be seen in the primary care clinic. The primary care clinic schedules patients regardless of insurance status. The Discharge to Medical Home intervention is typically in effect on weekdays from 8 a.m. until 4 p.m. and offers extended hours (until 7 p.m.) depending on staff availability.

5. Initial program evaluation and overall outcomes

Outcomes assessed included the number of ED visits, the percent of visits ED visits occurring during hours when the discharge to medical home process was in effect, percent of visits discharged to the primary care clinic, readmissions to the ED, time spent in the ED, and the top diagnoses for ED visits.

Overall, ED visits declined by 5% from 14,753 visits one year prior to the intervention to 14,017 visits one year after intervention. Daytime ED visits decreased by 27% (data not shown). The intervention reached 38% of all ED visits in the 12-month period following implementation and 90% of all daytime ED visits (5385/5996). In the first 12 months of operation, 36% of patients who presented to the emergency department as walk-ins were discharged to the medical home, and a total of 2201 potential emergency department visits were avoided. Less than 300 of the daytime visits to the ED were classified as ESI level 1 or 2; these

visits resulted in an ED admission (Fig. 3). Only 20 of 2125 daytime visits classified as ESI level 3 (urgent) resulted in a discharge to medical home. Conversely, more than half (62%) of daytime visits classified as ESI level 4 or 5 were discharged to medical home (Fig. 3). Rates of discharge to medical home ranged from 16% in July 2014 when the intervention was implemented, to 47% seven months later (Fig. 4).

Patients who were discharged to medical home had lower rates of readmission than patients who were sent home after being seen in the ED. Odds of a return visit to the ED within 7, 14 and 30 days were 27–30% lower for patients discharged to medical home compared to those discharged to home care, when adjusting for age and ESI (Table 1). Time spent in the ED was also shorter for patients discharged to medical home. Among patients with an acuity level of 4 (less urgent), the average time from arrival through medical screening exam was 33 min for patients discharged to primary care compared to a stay of 135 min ($p < 0.001$) for those admitted to the ED (data not shown). For patients with an acuity level of 5 (non-urgent), the difference in time spent in the ED was 66 min ($p < 0.001$).

The effectiveness of the screening process requires the advanced care practitioner (a physician assistant or nurse practitioner) and ED nurse to correctly implement the screening protocol and make good clinical decisions regarding which visits should be treated in the ED. The top weekday diagnoses in the first year after implementation of the Discharge to Medical Home model were like those seen prior to the model implementation, except for a few new diagnosis categories (Table 2). Visit counts for the top 10 ED diagnoses show that the number of patients seen in the ED with upper respiratory infection declined, as did the number of patients with teeth diagnoses and other connective tissue diagnoses. Injuries, chest pain, and abdominal pain, all of which have symptoms that could be indicative of more serious conditions, remain among the top diagnosis in the ED.

6. Unresolved questions and lessons from the field

Both the ED and primary care clinic have delivered the Discharge to Medical Home model consistently. However, the implementation faced several challenges requiring adjustments along the way. For example, unlike the ED, the primary care clinic is not operational 24 h a day, 7 days a week. Therefore, the team had to consider different options for the clinic schedule. Originally, the clinic was open weekdays, from 8:00 a.m. to 5:00 p.m., while the Discharge to Medical Home process was in effect until 4:00 p.m. The first major improvement to the model

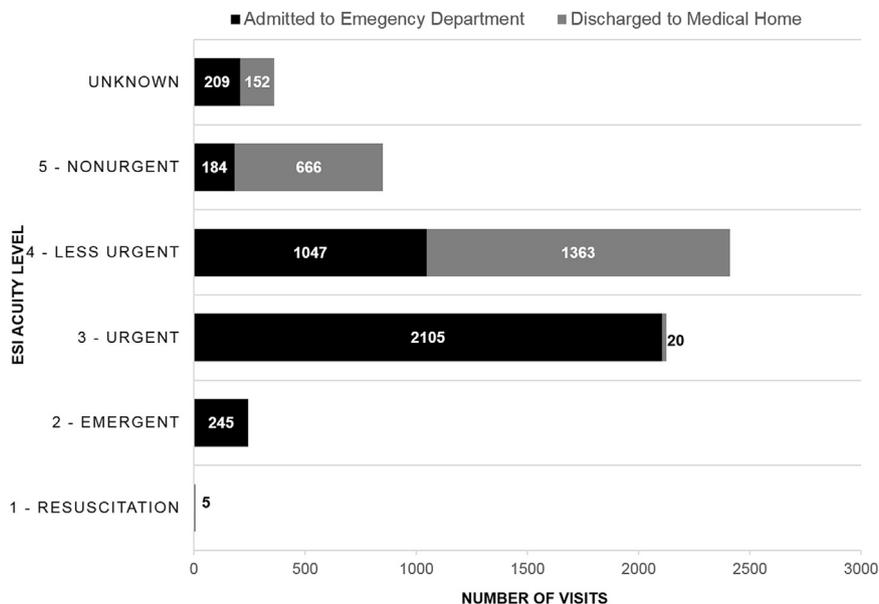


Fig. 3. Number of daytime emergency department visits resulting in an admission or discharge to medical home by acuity level, July 2014-June 2015.

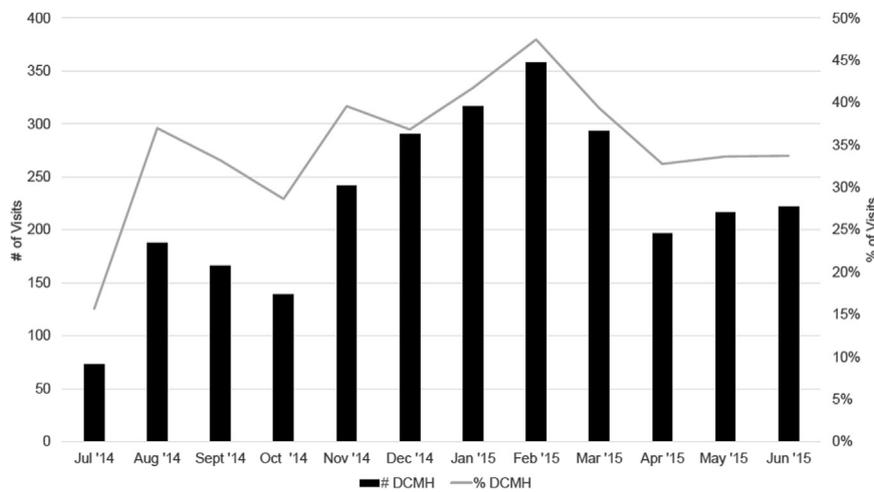


Fig. 4. Monthly volume of emergency department visits discharged to the medical home (DCMH), July 2014–June 2015.

Table 1

Percent of Visits with Readmissions to the Emergency Department by Discharge Disposition, July 2014–June 2015.

Time to ED readmission	Discharged to Medical Home ^a (n = 2251)	Discharged to Home Care ^b (n = 11,923)	AOR (95% CI) ^c	p-value
7-day	7.5%	10.0%	0.70 (0.54–0.93)	0.012
14-day	12.3%	15.0%	0.73 (0.58–0.92)	0.008
30-day	18.6%	23.4%	0.71 (0.58–0.86)	< 0.001

ED, emergency department; CI, confidence interval.

^a Patients discharged to medical home were scheduled a same-day appointment at the adjacent primary care clinic after a brief medical screening exam.

^b Patients discharged to home care were sent home after being seen in the emergency department.

^c Adjusted odds ratio comparing readmission rates by discharge disposition from logistic generalized estimating equation model adjusted for age and emergency severity index (reference = discharged to home care).

Table 2

Top 10 diagnosis categories for Emergency Department Visits during weekdays (8 a.m.–4 p.m.) 12 months before and after discharge to medical home implementation.

Primary Diagnosis Category ^a	Before		After	
Sprain	336	4.26%	157	1.82%
Upper Respiratory Infection ^b	337	3.92%	80	0.93%
Superficial Injury	247	2.87%	197	2.29%
Back Problem	207	2.41%	89	1.04%
Teeth Diagnosis ^b	201	2.34%	34	0.40%
Abdominal Pain	178	2.07%	189	2.20%
Headache/Migraine	172	2.00%	100	1.16%
Other Connective Tissue ^b	147	1.71%	60	0.70%
Chest Pain	139	1.62%	150	1.75%
Skin Infection	137	1.59%	101	1.18%
Other injury	–	–	105	1.22%
Other lower respiratory	–	–	104	1.21%
Open Wound-extremities	–	–	82	0.95%

Results presented as number of visits and percent of total daytime weekday visits to the ED during the study period.

^a Primary diagnosis category determined from clinical classification software.

^b Diagnosis not among the top 10 after discharge to medical home implementation.

was extending primary care hours. Five months after the new facility opened, it became apparent that there was a need for primary care outside of 8:00 a.m. to 5:00 p.m. The clinic then extended its hours until 8:00 p.m., with the Discharge to Medical Home process in effect until 7:00 p.m. The extended hours apply to regular primary care patients as well, giving them opportunity to schedule appointments that work with their own schedules. Only 29% of U.S. primary care physicians offer after-hours care.¹⁵ A 2013 study using nationally representative survey data found significant differences in hospitalizations and inappropriate ED use for patients who had difficulty getting care outside of normal hours, and those who did not.¹⁵ Therefore, the availability of physicians and appointments may also contribute to the ED volumes observed in this study.

A second implementation challenge was balancing scheduling needs for established versus walk-in patients. The primary care clinic at Carolinas HealthCare System Anson is not an urgent care clinic, and must balance the care of a large volume of walk-in patients alongside their established patients. As in many rural communities, Anson County has experienced the closure of several private primary care practices in the area, increasing the burden on the primary care clinic and Carolinas HealthCare System Anson as a safety net hospital. The practice must optimize the number and schedule of appointments set aside for Discharge to Medical Home patients. Subsequently, established patients may sometimes have to wait several weeks to see their primary care provider. Operational data such as appointment utilization, and patient volume by time/day were used to adjust the schedule and prevent appointment bottlenecks. Currently, approximately 13% of primary care visits are held for Discharge to Medical Home patients. Other rural and non-rural facilities may face a similar challenge. Additional data such as time to see a provider could help with schedule management; however, that data was not available for this evaluation.

Several improvements have made the Discharge to Medical Home process more efficient. The first was the development of a triage protocol by the Medical Director at the primary care clinic, which outlined the complaints clinic staff are not comfortable treating. The protocol explicitly states that the ED should admit patients suffering from chest pain or abdominal pain, as well as patients with acute injuries, high blood pressure, abscess, or complaining of post-op issues. Simple suture removal would be performed as part of the screening. Future work will evaluate the impact of this approach on avoidable ED visits and add to our understanding of the poor correspondence between ED discharge diagnosis and chief complaint,¹⁶ which makes it difficult to measure avoidable ED visits in a clinical setting.

In the ED, Carolinas HealthCare System Anson has also worked to optimize staffing. Typically, there are three nurses working in the ED. The management team determined that having the charge nurse doing

the medical screenings was the best solution, because that role is already responsible for ED admissions and staff assignments. Having both the nurse and the advanced care practitioner conducting the screening exams should assist in ED operations as time allows. Other staff are shared between the primary care clinic and the ED, including a social worker and behavioral health specialist. Due to the close integration of the ED and primary care practice, providers can make referrals for additional services offered by the clinic, such as patient navigation, directly from the ED.

Finally, although not a part of the standard protocol, patient education is a critical component of the Discharge to Medical Home model. During the screening, the nurse explains why the patient is being sent to the primary care clinic, some of the services the clinic offers, and that the patient has the option of returning to the clinic for regular health-care. The education may assist patients in better utilizing the embedded primary care clinic or another primary care provider in the future.

The Discharge to Medical Home model has been successful in part one of its mission—increasing access to primary care. However, more research is needed to determine how non-urgent or avoidable ED visits are best defined in this setting, and the effect of the Discharge to Medical Home model on reducing such visits. There is also opportunity to evaluate individual primary care provider follow-up. While the problem of ED “frequent-flyers” are well documented,¹⁷ Carolinas HealthCare System Anson has observed patients making frequent use of the medical screening exam rather than scheduling directly with a primary care provider. Overall, we observed a modest decrease in total ED visits; however, changes in top diagnoses and the acuity levels of daytime visits seen in the ED suggest improvements in ensuring that patients receive care in the most appropriate setting.

7. Limitations

Our evaluation had some limitations. The use of different registration systems by the clinic and the emergency department limited our ability to capture other useful measures. For example, while all patients were granted a same day clinic appointment, we were unable to determine the wait time to see a provider. Next steps in the process would be to develop an algorithm that would allow us to track patients across the two systems. The Discharge to Medical Home model is appropriate for healthcare systems that encompass both primary care and hospital settings. However, it might prove most effective in settings where healthcare options are limited. Many of the patients discharged to medical home have diagnoses that could be treated in an urgent care or retail clinic. Therefore, the Discharge to Medical Home model might have limited value in areas with many healthcare options.

8. Conclusion

The Discharge to Medical Home model is a promising intervention with potential to be cost effective, collaborative, adaptable, and able to target health services to patients that need them. While the Carolinas HealthCare System Anson facility was designed with this model in mind, elements can be implemented in a variety of healthcare settings. This model takes advantage of the integration of a rural practice within a larger healthcare system, creating a close relationship between the system owned ED and system owned primary care practice.

Overall, there are several challenges and opportunities that come with the Discharge to Medical Home model. The model gives patients the mechanism by which to educate themselves and establish primary care, while also streamlining operations in the ED. On the other hand, the primary care clinic is operating in a unique space, providing different types of care to different types of patients. They must balance treating walk-in patients discharged from the ED while also maintaining, and expanding, their own patient panel. The collaboration between the primary care clinic and the ED to accomplish a shared goal of increasing access to quality healthcare is central to the success of this

and similar interventions.

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Disclosure

The authors declare no conflicts of interest.

Conflict of interest

The authors declare no conflicts of interest.

Author declaration

Kathryn Zager has made contributions in (1) the conception and design of the study, acquisition of data, and analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

Dr. Yheneko J. Taylor has made contributions in (1) the conception and design of the study, acquisition of data, and analysis and interpretation of data, (2) drafting the article or revising it critically for important intellectual content, (3) final approval of the version to be submitted.

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