Readmission Prevention Management Program

A reliable solution for managing the problems and costs associated with hospital readmissions

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Compiled and edited by:
Mehrdad Shafa, MD, MMM, DFACMQ

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Introduction

I first realized the magnitude and impact of readmissions on healthcare delivery systems in 1982 when I served as the physician advisor for utilization review at a small community hospital in Michigan. I attended weekly meetings with the Social Services staff, VNA nurse and the charge nurse to safely discharge patients. There was not much support from the medical staff, as the activity was perceived as unnecessary, but in retrospect this practice was ahead of its time.

In 1983, I assisted the hospital with implementation of a new program named Inpatient Prospective Payment System (also known as the DRGs), which at that time was regarded as nebulous and a nuisance by many practicing physicians. The DRGs were thought to be bad for both the patients and their physicians because it allowed the government to dictate how much patient care was to be delivered and the means of doing so. The DRG program was the first major change in Medicare since its inception 18 years before but it had almost no provisions for readmissions. Growth of the managed care industry in the early 1990s brought attention to readmissions in terms of managing costs. In the last decade, readmission rates have become a performance measure and with healthcare reform, it has now become a part of the law.

I have followed the trends and issues associated with readmissions over the past 30 years. This whitepaper document is a compilation of some of the best articles available that are related to readmissions, and has been regularly updated through the years. It is intended to provide an accurate and comprehensive picture that represents different perspectives, examines policy issues, identifies best practices and offers possible solutions to manage readmissions. The last part describes a new groundbreaking and innovative approach to readmissions by avixena Population Health Solutions, LLC.

National Landscape

Reducing hospital readmission rates has captured the imagination of US policymakers because readmissions are common, costly and (at least in theory) a reasonable fraction of them should be preventable. Policymakers therefore believe that reducing readmission rates represents a unique opportunity to simultaneously improve quality of care and reduce costs. As part of the Affordable Care Act (ACA), Congress directed the Centers for Medicare and Medicaid Services (CMS) to penalize hospitals with “worse than expected” 30-day readmission rates. This part of the ACA has motivated hospitals, health systems, professional societies and independent organizations to invest substantial resources into finding and implementing solutions for the “readmissions problem.”

Background

Nearly one-fifth of all Medicare beneficiaries - roughly 2 million per year - who are discharged from a hospital are readmitted within 30 days, according to the Medicare Payment Advisory commission (MedPAC). The issue of avoidable, preventable or unnecessary (APU) hospital readmissions is now front and center in the national conversation about the quality of health care. The APU readmissions are a strong indicator of a fragmented health care system that too often leaves discharged patients confused about how to care for themselves at home, follow their physician's instructions and get the necessary follow-up care.

Definitions:

- Readmission - An all-cause admission to an acute care hospital within 30 days of a discharge from the same or another hospital for the same or a different diagnosis.
- Planned Readmission - An intentional readmission within 30 days of discharge from an acute care hospital that is scheduled as part of the patient's plan of care (e.g., staged interventions, multiple surgeries).

Classification of Readmissions:

	Unplanned Readmission	Planned Readmission
Unrelated to the Initial Admission	An **unplanned** readmission for which the reason for readmission is not related to the reason for the initial admission.	A **planned** readmission for which the reason for readmission is not related to the reason for the initial admission.
Related to the Initial Admission	An **unplanned** readmission for which the reason for readmission is related to the reason for the initial admission.	A **planned** readmission for which the reason for readmission is related to the reason for the initial admission.

- 90% of readmissions within 30 days appear to be unplanned, the result of clinical deterioration (AHRQ)
- 75% of readmissions are preventable (MedPAC)

Not all readmissions are included; CMS excludes the following categories:

- Patients who are not enrolled in Medicare FFS 30-days post-discharge
- Patients who expire in the hospital
- Patients who leave against medical advice
- Patients younger than age 65
- Planned readmissions and transfers to other facilities

It is emphasized that it is not logical to expect a readmission rate of zero because planned or elective readmissions are an integral part of care. However, efforts should be directed at unplanned readmissions that are related to the initial stay which likely will offer the best opportunity for savings and care improvements.

Financial Impact

Readmissions come with a hefty price tag in a world where health systems often do not have resources to spare:

- Inpatient care accounts for 37% of Medicare spending and readmissions contribute significantly to that cost.
- In 2013, there were approximately more than 4 million admissions and 730,000 30-day all-cause hospital readmissions in the US and they were associated with about $41.3 billion in hospital costs. CMS readmission costs in 2015 were $26 Billion.
- Medicare's average national hospital readmissions rate has remained steady over time at approximately 18%.
- 4% of Medicare beneficiaries have two or more readmissions within 30 days.
- Readmissions cost more than the initial (index) admissions. In 2013, the average cost was $2,800 higher for private insurance, $3400 more for Medicaid, $1,000 more for the uninsured and $700 more for Medicare readmissions.
- About 6% of all discharged patients are treated in an emergency department (ED) within 30 days of a hospital discharge at an average cost of more than $1,900.
- Average readmission penalty in 2014 was $169,000 which is usually three to four times higher than what CMS paid the hospitals for quality improvement incentives.
- The problem cuts across all lines of business: Medicare, Medicaid, Commercial payers and the Uninsured.
- Readmission rate for inpatient psychiatric facilities is 15% within 30 days, 18.4% within 60 days, and 31% within the same calendar year.
- Readmission rate for Pediatric population (≤20 years) is around 12%.

It should also be noted that State Medicaid Agencies are now required by CMS to implement payment reform initiatives and as such, many State Medicaid Agencies are now mandating their managed Medicaid contractors to implement risk-based programs. Readmission prevention is the most widely used of these initiatives.

Commercial payers have also begun implementation of readmission programs and the major national carriers' contracts now routinely include provisions for readmission prevention.

Accountable Care Organizations (ACOs) and large self-funded employer coalitions are increasingly using readmission prevention as a primary cost containment tool.

Finally, there has been a recent wave of Pediatric ACOs and Clinically Integrated Organizations (CIOs) that have implemented or are in the process of implementing readmission prevention in their most recent contracts with Children's hospitals.

Table-1 Rate of 30-day All-cause Readmissions by Expected Payer and Patient Age Group, 2009 and 2013 (Source AHRQ)

Expected payer and age group[a]	Readmission rate			Number of readmissions (thousands)		
	2009	2013	Percentage change, 2009–2013	2009	2013	Percentage change, 2009–2013
Medicare						
Total[b]	18.1	17.3	–4.8	2,581	2,427	–6.0
Aged 21–64 years	21.5	21.2	–1.4	608	614	1.0
Aged 65 years and above	17.3	16.2	–6.1	1,970	1,810	–8.1
Medicaid						
Total	13.3	13.7	2.6	784	769	–1.9
Nonmaternal pediatric, aged 1–20 years	11.1	11.9	8.1	111	105	–5.3
Nonmaternal adults, aged 21–44 years	18.9	19.2	1.7	233	232	–0.4
Nonmaternal adults, aged 45–64 years	21.8	21.6	–0.9	334	341	2.1
Maternal, any age	5.0	4.6	–8.5	106	90	–15.4
Private						
Total	8.7	8.6	–1.2	765	643	–15.9
Nonmaternal pediatric, aged 1–20 years	9.4	10.8	14.9	68	63	-6.0
Nonmaternal adults, aged 21–44 years	9.4	9.9	6.2	182	151	–16.8
Nonmaternal adults, aged 45–64 years	10.9	10.8	–1.0	445	372	–16.4
Maternal, any age	3.5	3.0	–15.3	72	57	–20.5
Uninsured						
Total	10.2	11.1	8.9	167	185	10.6
Nonmaternal pediatric, aged 1–20 years	6.1	7.4	22.0	6	5	–11.6
Nonmaternal adults, aged 21–44 years	9.8	11.1	13.9	74	83	12.9
Nonmaternal adults, aged 45–64 years	11.9	12.2	2.1	83	93	11.0
Maternal, any age	4.7	4.2	–9.3	4	3	–9.7

Table 2- Average Costs of 30-day Admissions and All-cause Readmissions by Expected Payer and Age Group, 2013 (Source AHRQ)

Expected payer and age group[a]	2013			
	Average cost of index admission, $	Average cost of readmission, $	Marginal difference in cost of readmission, $	Change in cost of readmission, %
Medicare				
Total[b]	13,100	13,800	700	5.3
Aged 21–64 years	12,900	13,600	700	5.4
Aged 65 years and above	13,100	13,800	700	5.3
Medicaid				
Total	9,500	12,300	2,800	29.5
Nonmaternal pediatric, aged 1–20 years	11,300	15,600	4,300	38.1
Nonmaternal adults, aged 21–44 years	11,000	11,500	500	4.5
Nonmaternal adults, aged 45–64 years	13,400	13,300	–100	–0.7
Maternal, any age	4,700	6,400	1,700	36.2
Private				
Total	10,800	14,200	3,400	31.5
Nonmaternal pediatric, aged 1–20 years	10,600	14,700	4,100	38.7
Nonmaternal adults, aged 21–44 years	11,100	13,200	2,100	18.9
Nonmaternal adults, aged 45–64 years	14,100	15,700	1,600	11.3
Maternal, any age	4,700	6,900	2,200	46.8
Uninsured				
Total	9,100	10,100	1,000	11.0
Nonmaternal pediatric, aged 1–20 years	7,500	9,200	1,700	22.7
Nonmaternal adults, aged 21–44 years	8,100	8,600	500	6.2
Nonmaternal adults, aged 45–64 years	10,800	11,700	900	8.3
Maternal, any age	4,200	6,100	1,900	45.2

Table-3 Admission Costs by Payer-2014

The National average cost/admission	**$9,700**
Medicare costs for aggregate inpatient care	**$375.9 Billion**
Average Pediatric (≤20 years) cost/admission	**$9,800**
Average cost of inpatient mental health admission	**$7,114**

Table -4 Average Dollar Cost per Inpatient Day Across the US – 2014

State	State/Local Government Hospitals	Nonprofit Hospitals	For-profit Hospitals	State	State/Local Government Hospitals	Nonprofit Hospitals	For-profit Hospitals
United States	1974	2346	1798	Missouri	1603	2363	1975
Alabama	1448	1671	1349	Montana	645	1379	2439
Alaska	1317	2581	2735	Nebraska	741	1984	1582
Arizona	2134	2581	1965	Nevada	2036	2311	1665
Arkansas	1558	1694	1498	New Hampshire	NA	2535	1939
California	2774	3533	2060	New Jersey	4656	2553	1453
Colorado	2119	2896	2631	New Mexico	1514	2076	1982
Connecticut	3558	2394	2373	New York	2478	2324	NA
Delaware	NA	2761	1400	North Carolina	1854	1976	1606
District of	NA	2781	2111	North Dakota	NA	1717	4023
Florida	2055	2265	1612	Ohio	2469	2521	2363
Georgia	818	1858	1612	Oklahoma	1325	1806	1861
Hawaii	1328	2563	NA	Oregon	3271	3381	2652
Idaho	1642	2230	2183	Pennsylvania	686	2306	1742
Illinois	3128	2373	1567	Rhode Island	NA	2725	1808
Indiana	1778	2385	2240	South Carolina	2048	2047	1657
Iowa	1401	1469	1561	South Dakota	434	1321	2806
Kansas	1157	1764	1896	Tennessee	1371	1900	1633
Kentucky	1922	1793	1487	Texas	2773	2401	1816
Louisiana	1715	1799	1767	Utah	2989	2856	2295
Maine	1514	2371	825	Vermont	NA	2033	NA
Maryland	NA	2512	1024	Virginia	2819	1753	1879
Massachusetts	1821	2862	1812	Washington	3003	3317	2642
Michigan	1372	2190	2070	West Virginia	760	1685	1194
Minnesota	1250	2298	NA	Wisconsin	2108	2138	2309
Mississippi	1153	1408	1942	Wyoming	1227	1595	2158

Table 5- The Increase in Hospital Cost of Care per Day from 2013 - 2014

US Hospitals	2013	2014	Increase
State/local government hospitals	$1,878	$1974	5.1%
Nonprofit hospitals	$2,289	$2346	2.5%
For-profit hospitals	$1,791	$1798	0 %

These figures indicate progress in cost containment: In 2014 nonprofit hospitals saw an increase of 2.5% compared to 8.8% in 2013, and State/local government hospitals saw an increase of 5.1% compared to 11.2% in 2013.

According to 2014 Health Care Cost and Utilization Report, costs of inpatient care from 2012 to 2014 increased 4.4% to 6.8% each year, and this resulted in the average price paid per inpatient care to increase from $16,946 in 2012 to $18,728 in 2014.

Accountable Care Act and Readmissions

Section 3025 of the ACA outlines the details of the hospital readmission reduction program (HRRP) which limits payments to hospitals with excessive Medicare readmissions. The HRRP provides a financial incentive to hospitals to lower readmission rates. Effective Oct. 1, 2012, CMS began penalizing hospitals for what it determined to be excessive avoidable readmissions. The penalties are grounded in the belief that clinicians should improve transition of care and ensure that patients and families are educated about their care before they leave the hospital. Hospitals will also be held accountable for working with patients, vendors and community providers to improve patient care after patients have left the hospital.

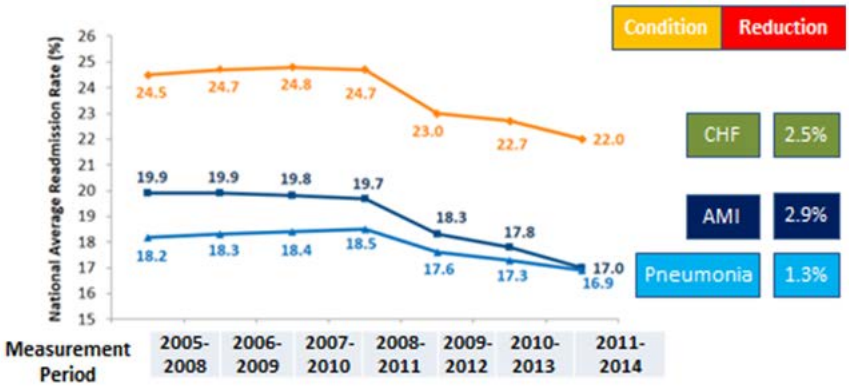
The HRRP does not apply to all conditions but rather focuses on specific disease conditions cited in the 2007 "Report to Congress: Promoting Better Efficiency in Medicare." MedPAC identified seven conditions and procedures that accounted for 30% of potentially preventable readmissions: Acute Myocardial Infarction (MI), Coronary Artery Bypass Grafting (CABG) surgery, Chronic Heart Failure (CHF), percutaneous transluminal coronary angioplasty (PTCA) and other vascular procedures, Chronic Obstructive Pulmonary Disease (COPD) and pneumonia.

CMS decided that in FY 2012, the readmission penalties would apply only to patients discharged with a primary diagnosis code for acute MI, CHF and pneumonia. In FY 2015, the penalties were expanded to also include COPD and elective total hip arthroplasty/total knee arthroplasty. Beginning in 2015 CMS expanded the readmissions program to include (CABG), (PTCA) and other vascular procedures. It should be noted that the MedPAC report discussed only 30% of potentially preventable readmissions, thereby creating the possibility of addressing the remaining 70% in the future.

Evidence of Improvement

MedPAC's June 2013 Report to Congress indicated that, at a national level, all-cause readmissions for the three reported conditions had a larger decrease in readmissions over the three-year measurement period than for all conditions, suggesting a strong connection between public reporting and implementation of the HRRP. The results tell a compelling story that underlies the adage that, "what gets measured gets attention." But nonetheless, despite the decrease, the readmission rates remain stubbornly high.

Table 6 - Readmission Rates for the Top Three Conditions



It is clear that linking financial incentives to public reporting and standardized quality metrics has driven, and will continue to drive, significant improvement in patient outcomes and reduce unnecessary costs to the system.

Latest figures from CMS indicate that from 2010 to 2015 readmission rate dropped from 19.5% to 17.7% across the US. It should be noted that this 1.8% actual reduction (19.5% - 17.7% = 1.8%) has been inappropriately reported as a 10% reduction (1.8% / 19.5% = 9.2%), and a success. **Again, this clearly indicates that many of the interventions currently in place to curb readmissions are ineffective.**

Unfortunately, too much of the conversation of late has turned to whether the penalties for excessive readmissions treat hospitals fairly, whether hospitals should be held accountable for issues patients face after discharge, and whether the readmission rate is even a valid measure of quality. The debate has grown particularly loud as the readmissions penalties increased from 1% to 2% and now to a maximum of 3%, as directed by the ACA.

While the news about the increased penalties had drawn a great deal of attention, the fact is the average hospital was fined less in the second year of the program than in the first and that overall the national total was $53 million less despite the 2% maximum penalty. This means hospitals were making progress. It is also evident that patients are getting better care and as a result, fewer of them are revolving back through the hospital door. This is as it should be; going to the hospital should be a last resort. Hospitals are a costly, and at times even dangerous, venue for care.

Table 10- 7 Cities with the Highest Readmission Rates in 2012

- **Chicago:** 19 hospitals, including Northwestern Memorial Hospital, Rush University Medical Center and the University of Chicago Medical Center.
- **Brooklyn:** 11 hospitals, including Brookdale Hospital and Medical Center, Kingsbrook Jewish Medical Center and New York Methodist Hospital.
- **Philadelphia:** 10 hospitals, including Einstein Medical Center, the Hospital of the University of Pennsylvania and Thomas Jefferson University Hospital.
- **Baltimore**: Seven hospitals, including The Johns Hopkins Hospital and Johns Hopkins Bayview Medical Center, MedStar Good Samaritan Hospital and the University of Maryland's Medical Center and Midtown Medical Center.
- **Manhattan:** Seven hospitals including Beth Israel Medical Center in Manhattan, Lenox Hill Hospital, New York-Presbyterian Hospital and NYU Langone Medical Center.
- **Boston:** Five hospitals, including Beth Israel Deaconess Medical Center, Boston Medical Center, Brigham and Women's Hospital and the Brigham's Faulkner Hospital, and Tufts Medical Center.
- **Los Angeles:** Four hospitals, including California Hospital Medical Center, Hollywood Presbyterian Medical Center, Olympia Medical Center and Ronald Reagan UCLA Medical Center.
- **Miami:** Four hospitals: Jackson Memorial Hospital, Kendall Regional Medical Center, University of Miami Hospital and Westchester General Hospital.
- Out of all cities, **Oklahoma City** had the most hospitals with lower than average readmissions rates, with four scoring better than average.

Readmission Penalty Expansion in 2017

The CMS recently released a slew of revisions how it will pay hospitals in its fiscal 2017 (which began in October 2016). The rule applies to about 3,348 acute-care hospitals and 430 long-term acute-care hospitals. Under those changes, thousands of hospitals will see an increase in penalties for 30-day readmissions. Those penalties are estimated around $538 million or an increase of about $108 million over the previous year. The CMS estimated that it would penalize 2,588 (69%) hospitals in 2017. It does so by reducing Medicare payments to hospitals whose readmission ratios exceeded the national average, although it limits those penalties to 3%.

Driving the anticipated increase in penalties for fiscal 2017 were changes in how the CMS calculated readmissions for pneumonia, as well as its addition of CABG to the list of procedures for which hospitals can be penalized for readmissions within 30 days. That list already included treatments for acute myocardial infarction, heart failure, pneumonia, COPD, and hip and knee joint replacements.

For fiscal 2017, penalties for hospitals were calculated using readmission rates for those six episodes over three years, from July 1, 2012, through June 30, 2015. According to an analysis by Kaiser Health News, 49 hospitals will receive the maximum penalty (3%). The average fine is 0.73% of base payment rate. To further compound the matter, CMS announced that beginning in 2016 the new methodology to calculate the readmission rates will be the average score over the past three fiscal years. This means many institutions will continue to face the penalties for at least one or two more years even if their readmission rate were to be corrected today.

CMS Penalty Calculations

CMS publishes a readmissions adjustment factor for each affected hospital to indicate the level of its penalty, which ranges from 0.9700 (reflecting the maximum 3% penalty for FY 2016) to 1.0000 (indicating no penalty). The penalty is assessed against Medicare base operating DRG payments for all discharges at a penalized hospital. However, CMS does not publish an estimated penalty for individual hospitals, but the avixena website (www.avixena.com) will allow individual hospital's rates to be calculated if CMS Certification Number (CCN) is known. Below is a sample calculations based on the formulas laid out by CMS at: https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/AcuteInpatientPPS/Readmissions-Reduction-Program.html

- **Base Operating DRG Payment Amount:**
  [[case mix index × (labor share × wage index) + (non-labor share x COLA))] + new technology payments, if applicable] × total Medicare cases
  [[1.3656 × (3,804.40 × 1.0537) + (1,661.69 x 1)] + 0] × 5,433 = 41,852,953

  To estimate a hospital's total readmission penalty, the Medicare case-mix index can be used in place of the DRG weights for each case

- **Readmissions Payment Adjustment Amount:**
  (base operating DRG amount for all admissions × readmissions adjustment factor) – base operating DRG amount for all admissions
  (41,852,953 × .9765) – 41,852,953 = 983,544

For FY 2016, 2,620 facilities were penalized. The highest penalty for a single facility was over $3.6M. 49 hospitals were penalized at least $1M in FY 2015. 38 hospitals received the maximum 3% penalty, but only two hospitals are members of both groups. In fact, eight of the hospitals experiencing over $1M in penalties had a readmissions adjustment factor of 99% or greater, indicating a penalty of less than or equal to 1%. This demonstrates that the penalty percentage played only a small part in the total impact for a given hospital. More important drivers were the total volume of Medicare patients and the case-mix index of the provider.

The total penalty for the hospitals which received the maximum 3% penalty was approximately $11.6M, or an average of about $305K per hospital. The minimum and maximum penalties for this group were $20K and $1.2M, respectively.

Due to a flaw in the language describing the calculation of the excess readmission penalty in the ACA, measures with a low overall readmission rate will cause a penalty to increase by a factor that is the inverse of the Medicare-wide readmission rate.

For example, for Total Hip and/or Knee Arthroscopy, this measure has an overall readmission rate of only about 5%. Therefore the calculation of the penalty imposes a reduction in Medicare reimbursement of approximately twenty times the payments hospitals receive for excess readmissions. It is believed this was the greatest driver of the increase in the overall FY 2015 HRRP penalty by almost $200M. This higher overall penalty has continued in FY 2017.

It's very interesting to examine the calculation behind the HRRP. While it follows the letter of the law (Section 3025 of the Affordable Care Act (ACA) as amended by section 10309 of the ACA), many feel that the impact is unfair.

Table-8 The MedPAC provided a simplified example of how the calculation overly penalizes providers in their June 2013 Report to Congress.

Number of admissions in Measure	**100**
National average readmission rate for the Measure	**20%**
Expected hospital readmissions	**20**
Actual hospital readmissions	**24**
Adjusted hospital readmissions	**22**
Excess readmissions	**2**
Excess readmissions ratio	**1.1**
Average base operating DRG payment for Measure	**$10,000**

In this example, the base operating DRG payments for the two excess readmissions would be $20,000 ($10,000 x 2).

However, the definition of "aggregate payments for excess readmissions" in the ACA, section 3025(4)(A), is "the product, for each applicable condition, of (i) the base operating DRG payment amount for such hospital for such applicable period for such condition; (ii) the number of admissions for such condition for such hospital for such applicable period; and (iii) the excess readmission ratio…minus 1." Based on this definition the excess readmissions ratio is multiplied by the operating DRG payments for total admissions for the measure, not the operating DRG payments related to the expected readmissions. **The result in the example above is $100,000 (100 x $10,000) x (1.1000 – 1), five times the actual payments received for the excess readmissions.**

The "aggregate payments for excess readmissions", $100,000 in the above example, flows into the calculation of the readmission adjustment factor. Therefore the hospital is penalized at a much higher rate.

Lack of Consideration for Social Determinants of Health

Although CMS makes adjustments for clinical risk factors (including patients' age, gender, and comorbidities), it does not adjust for socioeconomic factors, which often play a significant role in access to home and community support services aiding a patient's recovery after hospitalizations. For example, lower-income communities and families may have limited resources for reliable transportation to take patients to follow-up medical appointments, assistance with patient mobility and daily living needs during recovery, and access to foods that meet patients' special dietary needs. Further examination of ways to address patient and community needs in lower income areas has offered insights into ways to lower hospital readmissions among patients in hospitals with higher shares of low-income patients.

Potential Implications of Expanding the Hospital Readmissions Reduction Program to the Inpatient Psychiatric Facility Prospective Payment System

The potential for decreased costs and increased quality of care may make policymakers want to expand the HRRP to other inpatient settings. Of the total 470,399 psychiatric discharges in CY 2010, 147,443 were readmissions from either a freestanding Inpatient Psychiatric Facility (IPF) stay or psychiatric unit. Thus the overall readmission rate was 31.4%. Of the many reasons to implement a hospital readmission penalty program, one of them is to ensure and improve quality of care received by the patients. Maintaining the quality of care furnished to patients with serious mental illnesses may require looking beyond the IPF stay. CMS has developed various initiatives to ensure quality of care. For example, the ACA mandated the development of a quality reporting program for IPFs by 2014, which included a payment incentive. For rate year 2014 and beyond, annual Medicare payment updates were reduced by 2.0% for any freestanding IPF or psychiatric unit paid under the IPF Prospective Payment System (PPS) that did not comply with quality data submission requirements.

Readmission Rise in 2014 and 2015

Many health systems noticed a 1-2% increase in their readmission rates in 2014 and 2015. The increase affected all hospitals across the US, including many health systems with robust readmission management programs. The increase is attributed to several factors such as changing demographics (retiring baby boomers joining Medicare), expansion of Medicaid programs, and access to care for the previously insured. However, no solid data

are available to validate these assertions.

Medicare's bundled-payment Expansion

Bundled payment is a single payment to providers or health care facilities (or jointly to both) for all services to treat a given condition or provide a given treatment. In simple terms, the payer makes one single payment to multiple providers in the care. The idea is to create a financial incentive for providers to better coordinate care and keep costs down.

The CMS is planning to implement a five-year demonstration project on July 1, 2017 in 98 randomly selected metropolitan areas. The project would make hospitals in 98 markets financially accountable for the cost and quality of all care associated with coronary bypass surgery and heart attacks. The CMS also plans to expand its first and mandatory bundled-payment model which took effect in January 2016 and covers total hip and knee replacements to include surgeries repairing hip and femur fractures.

The change comes as part of a broader nationwide shift toward value-based payment systems that aim to reward physicians, hospitals and other providers for quality over quantity of care. The CMs aims by 2018 to have half of FFS Medicare payments in value based payment models.

Bundled payments usually cover all costs associated with a procedure or treatment up to 90 days post discharge and would include readmissions.

New Public Reporting Requirements

CMS expanded the publicly reported outcome measures to include 30-day readmissions in 2009. In addition, CMS requires hospitals to post their readmission rates for Medicare and all other payers on its website. CMS believes that publicly reporting these measures increases the transparency of hospital care, provides useful information for consumers choosing care, and assists hospitals in their quality improvement efforts. In addition to negative public relations impact, public reporting of readmission rate can be detrimental to hospitals' all other lines of business and services, and overall competitiveness.

Implementing a Readmission Prevention Program

There is no doubt that CMS will expand the readmissions reduction program. Therefore, it is highly recommended that hospitals and health systems develop a readmission reduction and/or prevention process. Readmission prevention is a complex task and it should become an ongoing effort, not a short-term project that ends after results improve.

Root Cause Analysis

The vast majority of APU readmissions result from a combination of healthcare delivery systematic issues and individual patient attributes.

System issues:

- Failure to accurately identify individuals who are at high or medium risk for readmission
- Lack of evidence-based assessment tools for Pediatric ad Behavioral Health populations
- Lack of system support to create and execute post discharge care plans
- Lack of information continuity
- Lack of interoperability amongst Electronic Health Record Systems
- Lack of analytic support needed for organizational learning

Individual patient attributes:

- Clinical factors that lead to readmissions:
    - Disease burden
    - Inability to adhere to and comply with a treatment plan
    - Lack of timely follow-up
    - Coexisting Behavioral Health diagnosis

- Non-clinical factors that lead to readmissions:
    - Poor access and availability of care
    - Low health literacy
    - Lack of adequate support structure
    - Lack of information continuity

Where to Start?

To reduce readmissions, hospitals should create a multidisciplinary team, including individuals who are committed to reducing readmissions and represent different stakeholders who can influence readmissions. Participants might include employees from partner entities outside the primary organization, such as skilled nursing facilities' staff, patients and their caregivers, physicians and providers, community stakeholders, payers, and Durable Medical Equipment (DME) and technology vendors.

Goals and Objectives

The process team should be tasked with clear goals and objectives. These include defining a plan for implementing change, reducing readmissions, and monitoring performance. The federal program currently focuses only on patients admitted with heart failure, acute myocardial infarction, pneumonia, COPD and elective total knee/hip arthroplasty. However, the inevitable expansion of the program will include additional conditions or diagnoses and this should motivate hospitals to begin work on all readmissions rather than on specific conditions or diagnoses.

Selection of Strategies

After the work group is established, the team might use several strategies to achieve its goals, such as:

- Developing a better understanding of the problems
- Identifying patients at increased risk for readmission
- Preparing standardized discharge education tools
- Implementing an effective Transitions-of-Care Program
- Coordinating care with community home care agencies, physician groups, skilled nursing facilities, other community hospitals and payers

Understanding the Problem

It is tempting to start implementing changes in multiple areas simultaneously but doing so might be a waste of resources. Consequently, the first task for the management team is to understand the scope of the hospital's problem. One critical task is to evaluate the financial impact of the hospital's current performance (the penalty for excessive readmissions). This analysis should not only measure the effect of the current year's penalty, but also consider the impact in future years.

Other outcomes such as negative publicity, impact on future growth, market competitiveness and staff retention should also be completely reviewed and analyzed.

Identifying Patients at High Risk for Readmission

Case Management departments should have processes in place to identify patients at high-or medium-risk for readmission and prioritize discharge planning for patients with increased risk factors which include, but are not limited to:

- Behavioral health diagnoses
- Substance use disorder
- Three or more ED visits in a two-month period
- High-risk medications (anticoagulants or diuretics)
- Polypharmacy (more than six medications)
- Multiple chronic diseases
- High or low body mass index
- Leaving against medical advice
- Social determinants of health

Interventions

After patients are identified to be at high or moderate risk for readmission, specific interventions should be included in these patients' discharge plans.

Standardizing Discharge Activities and Educational Tools

Reducing readmissions is not just a concern for case managers. Because patient education is a primary responsibility of the nursing staff, nurses should be educated on the high-risk factors as well as on actions that can be taken to avoid readmission. These actions include:

- Educating and re-educating patients and their caregivers
- Assessing patients' understanding of their care requirements
- Assessing patients' awareness of early warning signs that require immediate notification to their physicians
- Beginning discharge education as soon as the patient and caregiver can cooperate
- Providing a comprehensive plan prior to discharge, including the following components
    - medication reconciliation
    - Arranging for follow-up appointments and tests prior to discharge
    - Post-discharge services set-up
    - A written discharge plan; instructions on what to do if a problem arises
    - Disease specific education
    - A discharge summary sent to the patient's primary care provider and/or specialist.
- In many cases, providing ongoing education throughout the hospitalization and for 24 to 48 hours after discharge has proven to be beneficial for patients. Patients should be educated regarding the importance of keeping their own medical journals to include their medications, test results and hospitalizations.
- Ideally, a pharmacist should also be involved in patient education and medication reconciliation at discharge. Case managers need to verify that:
    - Patients have all their medications and that they understand why they are taking those medications
    - They grasp the importance of taking the medications as prescribed
    - They understand any potential side effects as well as the importance of family support
- While the patient is still in the facility, all care providers should ensure that patients and caregivers are educated about the disease process. Discharge instructions can also be offered on the hospital's website so that patients can access this information at home and more fully understand the instructions. Hospitals can also use their websites to promote ongoing communication with patients, to answer questions and to provide

more clinical education. Each of these steps will improve patient outcomes, increase customer and provider satisfaction, and reduce readmissions.

Transition-of-Care Programs

Hospitals must either collaborate with managed care organizations' Case Management Departments or develop a transition-of-care work group to include home health care agencies, skilled nursing facilities, long-term acute care hospitals, rehabilitation hospitals, DME vendors and community providers. Standardized intervention and education tools will result in hospital, physician, home health agency and skilled nursing facilities all using the same language and documents to educate and instruct the patients.

Additionally, hospitals should try to engage home health care agencies and skilled-nursing facilities in addressing some of the causes of readmissions and assist with managing patients to prevent APU readmissions. Activities intended to build collaboration and reduce or prevent APU readmissions could include:

- Working with home health care agencies to develop disease-specific programs that track data and create plans to reduce readmission rates;
- Working with skilled nursing facilities to inform of the moderate and high risk admissions prior to patient's transfers to skilled nursing facility;
- Working with skilled nursing facilities to identify reasons why patients are sent back to the hospital and the challenges they face;
- Working with the skilled nursing facilities to provide advanced cardiac life support training, tele-monitoring links, ECGs with quick reads and access to Hospitalists to answer clinical questions instead of sending the patient directly to the ED; and,
- Partnering with community agencies to assist with education and access to other healthcare professionals.

Although hospitals may not have influence over the clinical practices of other facilities, CMS believes that hospitals should communicate and collaborate effectively with post-acute care providers. Through better post-hospital care communication, discharging hospitals can influence where the patient is reassessed and readmitted.

Working with Post-Hospital Care Providers - Given the consequences of readmissions, hospitals should establish stronger working relationships with other providers to extend care beyond the hospitalization. Case Managers and Social Workers, who work with other care providers on a daily basis, need to redefine these relationships in order to establish better communication both preceding and following discharge. Working collaboratively with these other facilities is imperative when tracking patients who are subsequently admitted to other hospitals and when developing patient identifiers. This tracking can be used for a hospital's

internal quality improvement purposes as well as for validating readmission data.

In summary, readmissions are becoming an increasingly painful and public problem for hospitals in both financial, competitiveness and patient care related issues. While no easy fix exists to prevent readmissions, hospitals can take a proactive approach by accepting readmissions as a real problem and by allocating the appropriate resources needed to fully understand the problem at hand, as well as enlisting the involvement of the many different groups that can contribute to a successful readmission prevention initiative.

Impact of Technology

Medicine is an information-rich enterprise. Federal regulation has accelerated the need for adoption of Electronic Health Records (EHR). Health care providers and administrators have been scrambling to find ways to comply. Currently, a significant portion of data and information is still collected via standard paper-based records and then entered into EHR and legacy systems. Many health care providers are now using mobile tablet and laptop systems for the purposes of eliminating paperwork and making the collection process more efficient. This adoption of technology for EHR and the use of mobile devices and apps for gathering data have opened an opportunity for apps that will not only make the process of gathering data more efficient but more importantly, provide ready access to useful information and value-added solutions that will be available to hospitals, caregivers and payers.

The impact of technology via the use of apps will also be cost avoidance with significant savings to providers and payers. This will support the triple aim of better care outcomes, reducing costs, and improved patient and provider experience with care delivery.

avixena Population Health Solutions, LLC

Mission Statement: avixena Population Health Solutions provides real-time state of the art Population Health Management support systems via Cloud-based mobile devices for Health Systems, Payers and Physicians.

Vision Statement: avixena Population Health Solutions will be the unique provider of a complete suite of applications covering the entire spectrum of cloud-based Population Health Management initiatives via mobile devices.

Founders: avixena Population Health Solutions (PHS) with offices in Tempe, Arizona was formed in 2014 by Mehrdad Shafa, MD, Mario Vassaux and Elisabeth Graf- Shafa, MD.

Products and Solutions

avixena PHS' first set of cloud-based products include the Readmission Assessment Survey Tool, Behavioral Health Readmission Assessment Survey Tool, Pediatric Readmission Assessment Survey Tool, High Risk Transfer to Extended Care Facility Tool and Readmission Root Cause Analysis Tool. These tools are designed for mobile platforms on the iOS and Android operating systems as well as traditional desktop and laptops running Windows, Apple OSX and Chrome OS. The system includes a program application (AKA app), HIPAA compliant data warehouse and real-time information availability.

These evidence-based products were developed by Dr. Shafa and Dr. Graf-Shafa based on their experience with reviewing more than 60,000 inpatient Medicare FFS, Medicare advantage, D-SNP, and Managed Medicaid admissions; 20,000 pediatric admissions; and 4,000 behavioral health admissions in Arizona, Arkansas, California, Georgia, Indiana, Maryland, Missouri, Oklahoma, South Carolina and Texas from 2007-2014. This total includes approximately 5,000 Adult, 500 Behavioral Health and 1,200 Pediatric readmissions.

- Readmission Risk Assessment Survey (RAS) Tool - This Tool is the most advanced assessment tool in its class and is designed to identify patient's readmission risk status, has a scoring system, and allows for automatic generation of options (such as a discharge plan).
- Pediatric RAS Tool - Pediatric RAS Tool has all the features described in the Adult RAS Tool but also incorporates and quantifies the effect of issues limited to pediatric population on readmissions (i.e., impact of pre-term birth, genetic conditions, congenital malformations, immunization status, impairment of growth and development, and caregiver's mental health status). The Pediatric RAS Tool was developed based on Dr. Shafa's experience with two of the largest Pediatric-only managed care organizations in the US.
- Behavioral Health RAS Tool – The Behavioral Health RAS Tool has all the features described in Adult RAS Tool and is the only tool of its kind that identifies and incorporates the impact of age, previously diagnosed behavioral health conditions, and discharge destination on readmissions.
- Extended Care Facility Transfer Readmission Risk Assessment (TRRA) Tool - This Tool is designed to alert and assist extended care facilities with managing moderate- and high- risk patients prior to transfer from the acute care setting. The same methodology was used to develop and validate its effectiveness as was used for the RAS Tools.
- Readmission Root Cause Assessment (RRCA) Tool - This Tool was designed to assess root causes and contributing factors that have resulted in readmissions and automatically creates an action plan to mitigate and manage the identified issues.

The avixena PHS apps were fully designed to work with Legacy IT systems. To validate the RAS and TRRA Tools, approximately 700 adult, 250 pediatric and 500 behavioral health readmissions were assessed. Each question was evaluated for validity, applicability, ease of assessment and up-to-date medical evidence. The results indicate that all Tools have a specificity, sensitivity and positive predicting value of >90% for identification of patients who are at high-risk for readmission.

Technical Specification of RAS and TRRA Tools - The apps and infrastructure to support these tools are built with the following attributes:

- Secure cloud-based application servers
- Web app support for modern desktop and mobile browsers including Chrome, Internet Explorer, Firefox and Safari
- Web app support for mobile and desktop devices including those operating on the iOS, Android, Windows, Mac OSX and Chrome OS platforms
- HIPAA-compliance
- Integration-capable with existing EHR/EMR and legacy systems
- RESTful HTTP API to integrate features into custom applications
- Feature rich reporting and analytics
- Simple web-based user administration

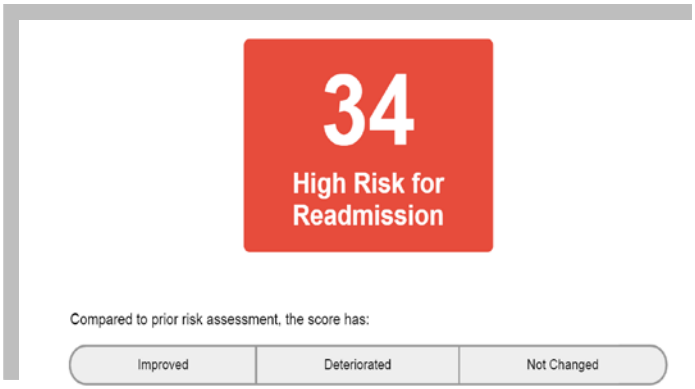
Examples of How Avixena PHS Tools Can Be Used to Prevent Readmissions

The following real-life examples demonstrate effectiveness and accuracy of avixena PHS Tools:

- **Sample Case for RAS Tool**

  85 year old patient with the diagnosis of dementia and chronic atrial fibrillation controlled on Coumadin was brought to ED from his assisted living facility. He was admitted with the diagnosis of aspiration pneumonia 8 days ago. He has had 2 previous admissions and 3 ED visits in the past year for the same reason. In addition to right lower lobe pneumonia, he is found to have mild anemia of 9 grams/dL and a serum albumin of 2.5 grams/dL. Hospital social worker is working with Special Need Plan (SNP) case manager to facilitate discharge to an Extended Care Facility (ECF) for one week to complete his IV antibiotics. His POA is his son who was contacted by phone and approved the transfer.

  It appears that this patient's problem is a simple and uncomplicated case of aspiration pneumonia, and all he needs is to complete one week of IV antibiotics. However, **if assessed with the RAS Tool this patient has a high score and is considered to be at high-risk for readmission.** A snapshot of the Tool is presented below:

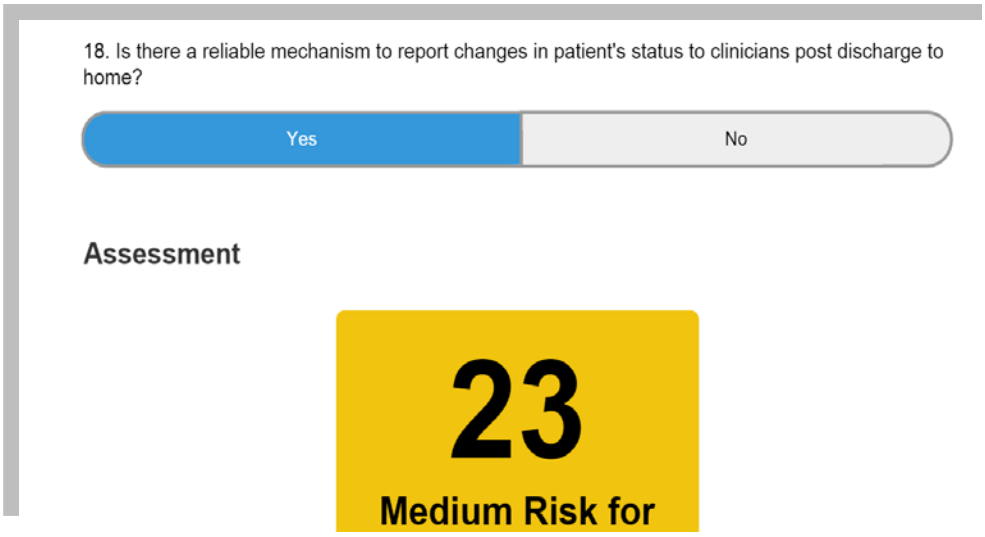


- **Sample Case for Extended Care Facility Transfer Readmission Risk Assessment (TRRA) Tool**

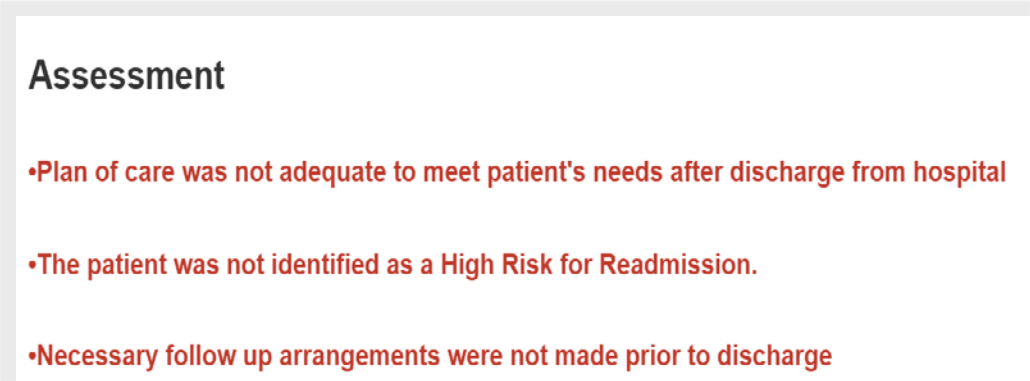
  The patient described in the RAS Tool was accepted by the ECF for one week of IV antibiotics. His discharge orders and antibiotics regimen were faxed to the ECF. Discharge summary was not available and was to be faxed to the ECF in 3 days after dictation by the hospitalist. Upon arrival to ECF the admitting physician verbally approved continuation of previous medications and the nurse practitioner was to perform a complete H&P on the third day of admission.

  On the second day of admission to ECF, patient was found to be very agitated and required constant supervision. He was later found to be very tachypneic with bedside oximetry of 82% on room air. EMS was activated and patient was transported back to the originating hospital ED.

  By using the TRRA Tool, this member would have been identified to be at very high risk for readmission from the ECF due to the fact that important factors (i.e., the need for complete discharge plan and medication reconciliation) had not been communicated to the ECF. A snapshot of the Tool for another case is presented below:

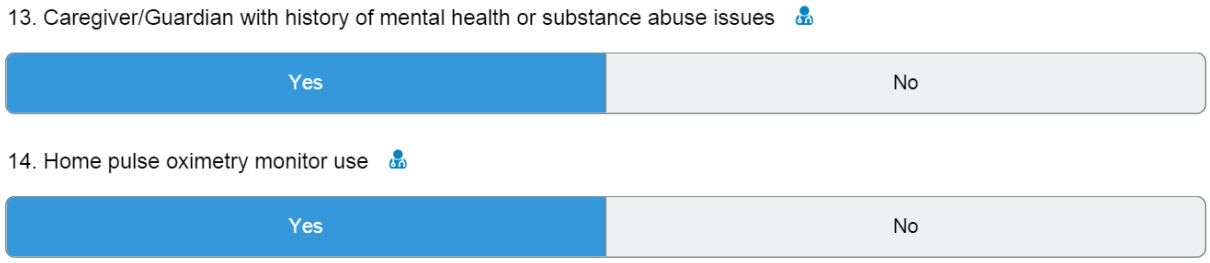


- **Sample Case for Readmission Root Cause Analysis (RRCA) Tool**
  Following readmission to the hospital, it was discovered that the patient had suffered another episode of aspiration pneumonia affecting RUL and LLL. The RRCA Tool should be completed for this patient in order to prevent another readmission. The RRCA Tool is capable of identifying the failed steps that resulted in readmission and also can provide a work plan that should be implemented to prevent avoidable future ED visits and inpatient readmissions. A snapshot of the Tool is presented below:



- **Sample Case for Pediatric RAS Tool**
  A 5 month old male infant was admitted to the hospital 5 days ago with fever and irritability. Full work-up revealed a urinary tract infection due to E. coli and was treated with IV ceftriaxone. A PICC line was placed and he is being discharged home with IV antibiotics for 9 more days. A urology appointment was made prior to discharge. He was born premature at 28 weeks and was in the NICU for 8 weeks. While in NICU he had three generalized seizures and was started on antiepileptic medication with good results. He also has a diagnosis of bronchopulmonary dysplasia and is currently on Lasix, Albuterol treatments and oral Iron supplementation. He has been taken to the ED on 3 different occasions since discharge for minor issues, and was later admitted for bronchiolitis 4 weeks after he was discharged from the NICU. He is currently in custody of his aunt after Child Protective Services (CPS) removed him due to neglect as a result of his mother's mental health and substance abuse issues. Despite a good appetite, his weight gain has dropped 5 percentile compared to his 4 month visit's weight measurement. He did not receive his 4 month immunizations due to family's unreliable transportation.

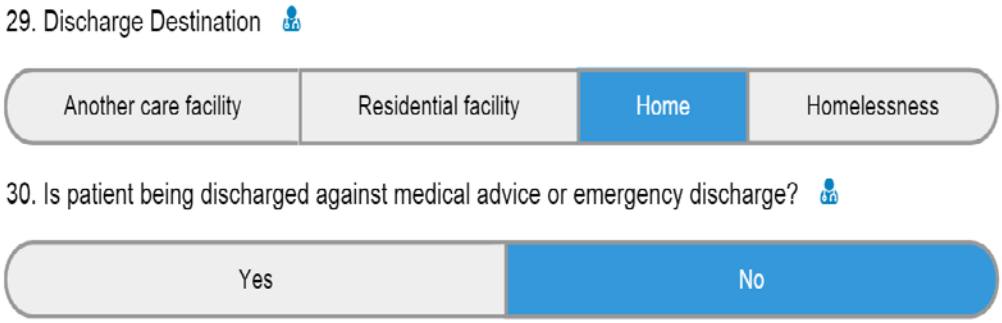
  It appears that this patient's problem is a simple and uncomplicated urinary tract infection and that there are no other issues beside the need for IV antibiotics. However, **if assessed with the Pediatric RAS Tool, this patient has a high score and is considered to be at high-risk for readmission.** A snapshot of the Pediatric RAS Tool is presented:



- **Sample Case for Behavioral Health RAS Tool**

  A 27 years old homeless man with history of uncontrolled mood disorder was brought to the ED by law enforcement after an altercation with another homeless person. He had been to the ED five times in the past three months. He was admitted to the inpatient setting six months before but he self-discharged against medical advice. He is now stabilized and is being discharged to a group home. The Social Worker is assisting him with arranging follow-up visits with a Community Health Center within 30 days of discharge and obtaining temporary supply of his medications.

  It appears that this patient's major issues such as medication treatment and homelessness have been adequately managed. However, **if assessed with the Behavioral health RAS Tool, this patient has a high score and is considered to be at high-risk for readmission.** A snapshot of the Tool is presented below:



The avixena PHS' Difference

The commonly used readmission assessment tools are unsophisticated, are not based on solid medical evidence, are highly dependent on post-service claims and risk adjustment data, are not very actionable, and are mainly designed for adult populations. The avixena PHS' RAS, Pediatric RAS, Behavioral Health RAS and TRRA Tools are the first in their class of service, providing a previously unexplored approach to readmission prevention by offering several unique features to successfully tackle the following issues:

- Identification of patients at high risk of readmission - The RAS Tools are cloud-based applications (proprietary technology) with the following features:
    - Real-time
    - HIPAA-compliant
    - Use of the most innovative and advanced technologies
    - Compatible with Legacy Systems
    - Engineered to be extremely user friendly

- Evidence-based medicine - Development of the Survey Tools involved exhaustive medical literature review and obtaining input from the leading clinicians and experts. It must be noted that each and every survey question has been rigorously tested and validated. The Tools are regularly updated to ensure accuracy and completeness.

- Differentiated products - avixena PHS has developed specific survey tools for Adult, Pediatric and Behavioral Health admissions.

- Information continuity - All avixena PHS Tools can be accessed by multiple authorized providers, at different care settings, who are in different organizations. Once the assessment is uploaded to the data warehouse, all Tool contents are updated in real time.

- Process reengineering - avixena tool development did not automate paper-based operation but rather involved an in-depth process evaluation using Porter's Value Chain Analysis, resulting in care transformation and creation of competitive advantage for clients.

- Lack of System Support to Create and Execute Post Discharge Care Plans – RAS, Pediatric RAS, Behavioral Health RAS, and TRRA Tools have created a paradigm shift from the current state of operations, which typically involves sending discharge orders to the receiving facility or provider, to an Actionable Care Plan which includes critical lab values, needed follow-ups, medication reconciliation and communication with other providers.

- Lack of Analytical Support to Induce Organizational Learning – RAS, Pediatric RAS, Behavioral Health RAS, and TRRA Tools have several other unique features that allow:
    - Continuous monitoring of patient's conditions and automatic identification of any changes that have occurred since the previous assessments
    - Simulation mode
    - Assessment of high utilizers and identification of those at risk of readmission
    - Enhanced reporting
    - Data mining capability

- Differentiated approach to readmissions - The RRCA Tool is the only available tool that has two separate modules for patients who are readmitted from the home setting and for patients who are readmitted from ECFs.

- Patient/caregiver access- avixena tools development is informed by the fact that patient and caregiver's involvement in the care delivery is critical for improving care outcomes. Therefore, the avixena assessment tools, when appropriate, can be simply used by lay persons with no clinical background.

- Proven Effectiveness - RAS Tools are currently in use by a Palliative Care Provider in Phoenix, Arizona; an Independent Physician Organization (IPA) in California; and, a large health plan with multiple lines of business in Phoenix, Arizona. Preliminary results have shown a dramatic reduction in preventable readmissions.

avixena Readmission Cost Reduction Projections (non-Medicare)

Table 9- The following assumptions are based on 10,000 annual adult discharges:

Line of Business	% of Total	Case Volume	Readmission Rate	Average Cost Per Admission ($)
Medicaid	20%	2000	20%	12,500
Commercial	10%	1000	10%	14,500
Uninsured	5%	500	12%	14,500

The following were not considered in cost reduction calculations:

- Medicaid, Commercial and the uninsured rates are based on the volume and no case-mix adjustment are to be applied.
- Patients with multiple readmissions within 30 days
- ED and Observation costs
- avixena fees

Table 10 - Projected cost reductions based on 10,000 annual discharges and national average readmission rates

Line of Business	% of Total	Volume	Excess Readmission Rate	Excess Readmission Volume	Average Cost per Admission ($)	Penalty or Lost Revenue ($)
Medicaid	20%	2000	5%	100	12,500	1,250,000
Commercial	10%	1000	4%	40	14,500	580,000
Uninsured	5%	500	11%	55	14,500	797,500
Total loses						2,627,500

Other Tools and Products

It is clear that a single tool will not resolve a complex issue such as readmission. Therefore, avixena PHS has designed multiple products that will manage patients across the post-discharge spectrum of care. These tools can also be used for mobile devices. They include:

- **Patient Engagement Assessment**: Designed to assess Patient and/or Caregiver's engagement is a very useful tool to initiate an effective care plan in pre- to post-discharge spectrum of care.
- **Transition of Care Tool**: Is intended to help with an effective discharge planning and to provide care information continuity after discharge from acute setting.
- **Health Risk Assessment:** A tool designed to be completed by the patient and Clinician and is HEDIS based.
- **Home Safety and Security Assessment Tool:** The only tool that automatically generates an action plan based on the assessment findings.
- **Activities of Daily Living Assessment Tool:** The only tool of its kind that assesses and scores patient's basic and industrious daily activities, and allows objective longitudinal comparisons.
- **PHQ-9 Depression Survey:** A standard tool for depression screening
- **Palliative Care Assessment Tool:** The only available tool that allows assessment and follow-up of Palliative Care. The tool also contains an action plan that allows documentation and communication for the planned interventions.
- **Home Healthcare Referral Tool:** A comprehensive tool that streamlines the process of ordering Home Healthcare services, documentation of provided services, and instructions how to inform the ordering providers of the patient's progress.
- **High-risk Pregnancy Assessment Tool:** Developed by Robert Johnson, MD, one of the most prominent and respected perinatalogists in the US.
- **In-Home Social Work Assessment:** This tool is designed to initiate intake and screening with careful documentation of the implemented steps and an up-to-date summary of relevant information.
- **Fall Risk Assessment:** This tool was designed to serve as a guide to assess the patient's fall risk factors through physical examination, observation and interaction with patient.
- **Clinical Practice Guidelines:** 25 one-page, evidence-based, Clinical Practice Guidelines for the most common and prevalent diagnoses and conditions.

In addition, the content for the following set of custom-designed tools have been completed:

- Medication Reconciliation Form
- Oasis Homecare Assessment
- Diabetic Check List
- High-risk drugs in the elderly
- Advance directives
- Post-op pain management

Moreover, several other tools have been identified for the next phase of development and they include:

- Action Plan to Manage High-risk Readmissions - A complimentary tool that is designed to create an action plan to manage risk factors identified in the RAS Tools.
- Individualized Care Plans - For patients that are referred to case management, this tool will serve as a ready-to-implement care plan based on the RAS Tool's findings.
- Medicare Annual Wellness Exam

Potential Business Expansion

avixena PHS' Tools can be used in a host of other healthcare initiatives and activities such as:

- Chronic Care Management
- Post-Discharge Care in ECFs (skilled nursing facility)
- Data Mining and Predictive Modeling
- Combination with HEDIS and Five-Star Rating
- Care provided in Long-term Residential and Assisted Living Facilities

Target Markets

avixena PHS' Tools and solutions can be used by:

- Health Systems: The hospital industry has the largest exposure to the negative financial impact of readmissions. However, the majority of health systems lack a well-articulated vision statement that focuses on improving patient care and describes how technology can help achieve this objective. As a result, there is very limited use of mobile devices other than those which only include communication and patient locations.
- Health Plans: Medicare Advantage health plans have the second largest financial exposure relative to readmissions but nonetheless, the use of smart phones and mobile devices for healthcare initiatives is almost non-existent in the health insurance industry. Several State Medicaid Agencies and Commercial payers have implemented readmission prevention

programs as part of payment reform initiatives included in the ACA.

- ACOs that participate in Medicare Shared Saving Program (MMSP). These ACOs have tremendous exposure to the financial impact of readmissions.
- Self-Funded Employers: Employee Health benefit is the second highest cost expenditure for US businesses. Escalating healthcare costs directly affect the competitiveness and financial health of all segments of US industries.

What is avixena PHS' Competitive Advantage?

In a nutshell, the suite of avixena PHS Tools combines the most effective and proven evidence-based Population Health Management Strategies with state of the art, cloud-based, mobile device applications that provide real-time information at the point of care delivery. Presently, there are no other comparable products or services on the market that provide these very complex solutions.

Call to Action

Reducing hospital readmissions is a substantial task given financial, regulatory, and systemic constraints. While challenging, the gains may be enormous. From a systemic level, preventing APU readmissions could reduce costs and promote patient-centered, high quality care. Given the current financial and demographic challenges facing the US Health Care Industry, elimination of waste and inefficiencies in the system are no longer an option but rather a business requirement or a necessity for business survival.

avixena

Avixena population health solutions

Please contact us:

Email: mehrdad@avixena.com
Tel. (602) 541-4547

Mario@avixena.com
Tel. (480) 231-5439

Visit our website at www.avixena.com

Executive Teams' Background and Expertise

- **Mehrdad Shafa, MD, MMM, DFACMQ, Chief Executive Officer** -Dr. Shafa is a Healthcare Consultant with significant expertise in all aspects of healthcare delivery. Over the past 15 years, Dr. Shafa has worked with twenty six health plans in seven states. He has served as Chief Executive Officer and Chief Medical Officer for fourteen health plans across the US and is a recognized authority in project execution, population health management, resource utilization and medical quality management and outcomes. He also has a successful record of nine consecutive turnaround operations resulting in net gains exceeding $1 Billion.
- **Mario Vassaux, Chief Innovation Officer**- Mr. Vassaux is a seasoned technology executive and entrepreneur with experience in the development and commercialization of intellectual property, technology and software in a variety of fields. Mr. Vassaux has advised companies developing medical applications and he developed the award-winning Track My Back App for PhDx Systems.
- **Kevin Fickenscher**, **MD, CPE, FACPE, FAAFP**- **Past Member of Board of Directors.** Dr. Fickenscher is a recognized physician executive and technology leader with extensive experience in strategic and operational development in complex healthcare organizations. He is a thought leader related to technology and information management with extensive experience in organizational transformation, physician management, health policy analysis, leadership development, clinical quality and resource/care management, among other areas.
- **Elisabeth Graf- Shafa, MD, MHA, FACMQ, Chief Operating Officer-** Dr. Graf-Shafa is a practicing anesthesiologist in Phoenix, Arizona and has extensive experience with Medicare, Special Needs Plans, Medicaid and Long-term Care Health Plans' utilization management in multiple states. Dr. Graf-Shafa has broad knowledge of CMS Oversight and Compliance rules and regulations.
- **Dave Balmer, Chief Technology Officer**- Mr. Dave Balmer is a 30-year veteran of software engineering who is equally at home with startups and large corporations like Wal-Mart, Yahoo, Palm, HP and BlackBerry. In addition to engineering management, his roles have included engineer, architect, mentor and speaker. Mr. Balmer's past medical software experience ranges from insurance claim management to leading mobile medical apps (Epocrates for Android and webOS).
- **Thomas Curzon, JD/Jonathan Ariano, JD, Osborn Maledon Law Firm, Chief Legal Counsel**- Mr. Curzon and Ariano are primarily focused on serving as outside general counsel to emerging, growth-oriented companies and on entrepreneurial transactions, including venture capital and other private placements of securities, entity formation and transaction structuring, mergers, acquisitions and divestitures, initial public offerings, corporate governance, licensing and distribution of software and other products, employee matters, and executive compensation.

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