ltqa
LONG-TERM QUALITY ALLIANCE

WHITE PAPER

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measurement of potentially preventable hospitalizations

PREPARED FOR THE LONG-TERM QUALITY ALLIANCE

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EXECUTIVE SUMMARY

Frail and chronically ill adults and older people often experience many hospitalizations. Expenditures for these hospitalizations add to the high cost of medical care. Hospitalization itself and complications that develop during hospital stays can cause additional morbidity, loss of functional abilities and death for these people, and some of the hospitalizations are preventable.

This white paper describes and analyzes quality measures that have been developed to identify potentially preventable hospitalizations. It is intended to provide information and recommendations to help the Long-Term Quality Alliance (LTQA) select quality measures and prioritize next steps to improve identification of potentially preventable hospitalizations for frail and chronically ill adults and older people and ultimately, to reduce these hospitalizations.

Hospitalization itself and complications that develop during hospital stays can cause additional morbidity, loss of functional abilities and death for these people, and some of the hospitalizations are preventable.

The term, *potentially preventable hospitalizations*, is used throughout the white paper to refer to hospitalizations that have been variously called preventable, avoidable, unnecessary, or discretionary. We adopted this terminology in order to simplify the text and emphasize the goal of preventing such hospitalizations whenever it is feasible and safe to do so.

The search for quality measures that was conducted for the white paper focused on U.S. sources and found 250 measures that are arguably relevant for the population that is the primary focus of the LTQA; that is, frail and chronically ill adults and older people who are receiving long-term services and supports. Most of the measures specify one or more medical conditions believed by the measure developers to be associated with potentially preventable hospitalizations. Examples are, "hospital admissions for diabetes" and "hospital admissions for chronic cardiac conditions, including hypertension, heart failure, and angina without procedure." Other measures refer to hospitalization generally and do not specify particular medical conditions, for example, "inpatient utilization-general hospital/acute care."

Surprisingly, the quality measures found through the search come from three largely separate literatures: a literature on hospitalizations from the community; a literature on hospitalizations from nursing homes; and a literature on hospital readmissions. All three literatures generally portray these hospitalizations as caused by failures in the care provided for the person prior to the hospitalization, but the place where the failures are understood to occur differs. Likewise, the quality measures from the three literatures specify many of the same medical conditions, for example, congestive heart failure, diabetes and pneumonia, but they were developed by different teams of clinicians, researchers, and policy analysts.

The white paper presents and discusses quality measures from these literatures in three sections in order to explain the context and concerns that led to development of the measures and track their evolution over time. Each section describes current use of the relevant measures for three purposes: quality monitoring, public reporting, and payment. The 2010 Affordable Care Act (ACA) mandated many new programs that require measurement of potentially preventable hospitalizations. Each section of the paper discusses the measures that are likely to be used and the implications of using these and other measures of potentially preventable hospitalizations for the frail and chronically ill adults and older people who constitute the LTQA population.

Findings about Measures of Potentially Preventable Hospitalizations from the Community

The researchers, clinicians and policy analysts who developed the first measures of potentially preventable hospitalizations from the community in the early 1990s were primarily concerned about economic and demographic factors, especially income and race/ethnicity, that were seen as limiting access to ambulatory medical care for people under age 65. They thought older people would not have problems accessing ambulatory medical care because older people had Medicare. Thus, the first measures of potentially preventable hospitalizations from the community were developed and intended for younger people. Within a few years, use of the measures was extended to include older people. To justify this extension, studies that used the measures for older people usually cited earlier studies that used the measures for younger people.

Recently, measures of hospitalizations from the community have been used for quality monitoring in Medicare home health care, Medicare Advantage, and other programs. The measures are also being used for public reporting in the CMS *Home Health Compare* program, and they will be required in several ACA-mandated programs, including the Accountable Care Organizations (ACOs) and the Independence at Home program.

Findings about Measures of Potentially Preventable Hospitalizations from Nursing Homes

The researchers, clinicians and policy analysts who developed the first measures of potentially preventable hospitalizations from nursing homes in the early 2000s were primarily concerned about the large number of hospitalizations, the apparent inappropriateness of some of the hospitalizations and longer-term negative health effects of hospitalization for some residents. They focused first on medical conditions believed to be associated with resident hospitalizations but soon turned to other factors, including problems with the medical, nursing, and other care provided in some nursing homes and Medicare and Medicaid regulations and reimbursement policies that were seen to encourage hospitalization and to result in the "ping-ponging" of residents between nursing homes and hospitals. Research on the relationship between these factors and potentially preventable hospitalizations generally used the same measures that were developed earlier for younger people and hospitalizations from the community.

Measures of potentially preventable hospitalizations from nursing homes have been used primarily for research, but they are being used now to determine payment in the Nursing Home Value-Based Purchasing Demonstration.

Findings about Measures of Potentially Preventable Hospital Readmissions

In the late 1970s and early 1980s, clinicians, researchers, and policy analysts were concerned about the large number and high cost of readmissions, particularly for Medicare beneficiaries. They studied a wide array of patient characteristics, medical conditions and pre-hospital, in-hospital and post-hospital factors thought to be associated with readmissions, with the goal of identifying people and situations for which better discharge planning and post-hospital services and supports could reduce unnecessary readmissions. The focus shifted in 1984, when many people expected that financial incentives created by the Medicare Prospective Payment System (PPS) would result in poorer quality inpatient care and premature discharges, and measurement of readmission rates was adopted as an easy way to monitor these problems. The focus has shifted again recently with growing awareness of the effectiveness of care transition programs in reducing hospital readmissions.

To define "readmissions," quality measures specify a maximum time period between the initial hospitalization and subsequent "readmission." The readmission measures included in this report specify an

array of time periods from 15 days to 6 months, but increasingly, programs that use readmission measures for quality monitoring, public reporting and payment purposes specify a 30-day time period. Thirty days is said to be the maximum period that hospitals can reasonably be held accountable for problems in the quality of inpatient care that lead to a readmission. Thus, the use of 30-day readmission measures implies, at least indirectly, that problems in inpatient care are the main cause of readmissions. This implication is generally inconsistent, however, with findings from studies of hospital readmissions for frail and chronically ill people and with clinician observations about what causes readmissions for these people.

Cross-Cutting Issues

Six cross-cutting issues emerge from this analysis of quality measures:

- **The overlapping and highly detailed nature of the measures.** Many of the available measures of potentially preventable hospitalizations are very detailed and specific and seem to be overlapping and duplicative. One wishes it were possible to combine at least those measures that address the same medical conditions and create a much smaller number of more general measures, but the detail and specificity are intended by the measure developers to define exactly which hospitalizations are potentially preventable. If highly detailed measures were combined into more general measures that retained all the specifications and coding from the original measures, the result would be easier to understand at a superficial level, but no less complex from the perspective of anyone who has to use the measures to determine which hospitalizations are considered to be potentially preventable. If the detailed specifications and coding from the original measures were dropped, the resulting, more general measures would no longer fulfill the objective of the measure developers to define exactly which hospitalizations are potentially preventable, an objective that is very important for measures that will be used for public reporting or payment purposes.
- **Failure of the measures to account for medical comorbidities and clinical complexity.** Each of the three literatures on potentially preventable hospitalizations includes studies showing that medical comorbidities and clinical complexity increase hospitalizations. Likewise, each literature includes commentaries about the need for quality measures that account for comorbidities and clinical complexity. Two approaches that have been used by some measure developers to try to account for these factors are risk adjustment and the highly detailed specification and coding noted above. It is not clear whether these approaches are effective, but it is clear that they make the measures less transparent for clinicians who make decisions about hospitalization and need to understand whether particular hospitalizations will be considered preventable.
- **Failure of the measures to account for differences in the available resources for care in particular facilities and other care settings.** This issue is addressed most often in the literature on potentially preventable hospitalizations from nursing homes but also comes up in the other two literatures. In a 1996 editorial, one clinician notes that the "right rate" of hospitalizations from nursing homes differs for particular facilities, depending on whether the facility has the staff and other resources needed to manage a resident's care safely and effectively without hospitalization.[116] Similarly, clinicians who participated in a study of the face validity of measures of potentially preventable hospitalizations from the community noted that a hospitalization could be considered potentially preventable in general but still constitute "high-quality care when

a patient does not have an adequate home support system to adhere to treatment recommendations."[63, p.683] Thus, the "right rate" of hospitalizations depends on the resources available in the person's care setting.

- **Lack of research to validate the measures for use with frail and chronically ill adults and older people who are receiving long-term services and supports.** The review conducted for this white paper did not find any published research that tests the validity of existing quality measures specifically for the population of concern to the LTQA. A forthcoming report from the Agency for Healthcare Research and Quality (AHRQ) will provide results from what seems to be the first such testing, conducted as part of a congressionally mandated initiative to identify measures for monitoring the quality of Medicaid home and community-based services programs.[66]
- **Lack of attention to how and where decisions about hospitalization are made for frail and chronically ill adults and older people who are receiving long-term services and supports.** Data are not available to determine how many potentially preventable hospitalizations of frail and chronically ill adults and older people begin in the emergency department (ED), but it is likely that ED clinicians make the final decisions for at least three-quarters of these hospitalizations. The chain of decisions that leads to hospitalization also involves other people, such as nursing home and other residential care facility staff members, community-based physicians, staff of community agencies that provide long-term services and supports, families and friends. The role of the ED is rarely mentioned in the three literatures about potentially preventable hospitalizations. The literature on hospitalizations from nursing homes contains valuable insights about the roles of staff, physicians and families but fails to address what happens when the person gets to the ED. The lack of attention to the process through which hospitalization decisions are made for frail and chronically ill adults and older people is puzzling. One could imagine an underlying assumption that hospitals somehow make these decisions, but that assumption is clearly false. Even for readmissions within 15 to 30 days of a previous hospitalization, the decisions that lead to hospitalization for frail and chronically ill adults and older people are made by non-hospital health care, residential care and community-service providers, families and friends.
- **The extent of current and future efforts to reduce potentially preventable hospitalizations.** Medicare and other public and private payers are already implementing programs intended to reduce potentially preventable hospitalizations. As ACA-mandated programs start up, pressure to reduce hospitalizations, especially readmissions, will grow. The federal government has a goal to reduce readmissions by 20% in the next three years. In the fall, 2012, the Medicare Hospital Readmissions Reduction Program will begin decreasing Medicare payments to hospitals with "excess readmissions," based on measures of 30-day readmission rates. The tie between 30-day readmissions rates and hospital payment is less direct and immediate for other ACA-mandated programs, for example, the Accountable Care Organization and Community-Based Care Transitions programs, but reducing 30-day readmissions is clearly tied to ongoing funding and therefore, the sustainability of these programs.

The impact on frail and chronically ill adults and older people of growing efforts to reduce hospitalizations cannot be known at present, but it is easy to imagine both positive and negative effects. On the positive side, reduced hospitalizations, and in particular, reduced 30-day readmissions, could mean fewer unnecessary hospitalizations, less

"ping-ponging" of these people between home, nursing home, hospital, and other care settings, and reduced hospital- and transition-related complications and resulting morbidity and mortality.

On the negative side, reduced hospitalizations could mean that some people will not receive hospital care that would benefit them. Decisions about hospitalization for frail and chronically ill individuals are inherently complex, resulting in uncertainty about the right decision in many cases. Despite the highly detailed nature of many measures of potentially preventable hospitalizations, they are not, and probably cannot be specific enough to dictate clinician decisions about hospitalization for individuals. In this context, strong pressure to reduce hospitalizations and the failure of existing measures to account for medical comorbidities, clinical complexity and differences in the available resources for care in particular settings could lead to reduction in necessary hospitalizations for some individuals.

In the longer term, assuming that programs to reduce hospitalizations are effective, some and perhaps many hospitals will have empty beds, and some hospitals will try to fill the beds. Many of the same factors noted above, i.e., the complexity of decisions about hospitalization for frail and chronically ill individuals, clinician uncertainty about these decisions and measure-related problems with respect to medical comorbidities and clinical complexity could make these people a likely source of increased admissions that might not be picked up by measures of potentially preventable hospitalizations.

Recommendations for the LTQA

The findings and measure-related issues discussed in this white paper and summarized above suggest seven interrelated recommendations for the LTQA. Some of these recommendations address the relatively long-standing need to develop measures or measure-related procedures that account for unique characteristics and care needs of the LTQA population. Other recommendations address the more immediate need to monitor, and respond if necessary, to negative effects of programs intended to reduce hospitalizations.

1. The LTQA should define the relevant measure domain as potentially preventable hospitalizations in general, as opposed to potentially preventable hospitalizations from a particular setting or potentially preventable readmissions within a particular time period. Clearly, the current focus on reducing 30-day readmissions creates attention, a favorable context and new funding opportunities for initiatives that match strategic priorities of the LTQA, including wide dissemination of effective care transition programs and the development of innovative partnerships of hospitals, community agencies, and other organizations to improve quality of care. On the other hand, hospitalizations of the frail and chronically ill people who constitute the LTQA population are generally better understood as intermittent acute events in a long span of chronic illness than as readmissions within 30 days or any other short time period after an initial hospitalization. Defining readmissions as one type of hospitalization fits better with the characteristics and care needs of this population and may allow the LTQA to see and respond more appropriately to problems that arise as programs intended to reduce 30-day admissions are widely implemented.
2. The LTQA should define as precisely as possible the population of frail and chronically ill adults and older people who are receiving long-term services and supports. A precise definition of this population is essential for developing appropriate quality measures, testing the validity of the measures and monitoring the effects on this population of programs intended to reduce potentially preventable hospitalizations.

3. The LTQA should begin a process to develop appropriate measures or measure-based procedures to identify potentially preventable hospitalizations in the LTQA population. The extensive review conducted for this white paper did not find any measure or set of measures that adequately define and differentiate potentially preventable hospitalizations for this population. The information and analysis in this white paper provide a starting point for thinking about new measures or measure-based procedures. Specific recommendations related to measure development are provided in the summary section of this paper.

   As noted earlier, failure to account for medical comorbidities and clinical complexity is a major problem with existing measures. The federal government, the National Quality Forum, and other groups are currently working on various measurement-related problems related to medical comorbidities and clinical complexity. The LTQA should prevail on these groups to prioritize the development of measures of potentially preventable hospitalizations that account for medical comorbidities and clinical complexity.

4. The LTQA should advocate with researchers and funders for rigorous studies to test the validity of existing and new measures of potentially preventable hospitalizations for frail and chronically ill adults and older people who are receiving long-term services and supports.

5. The LTQA should monitor and advocate with CMS to monitor the positive and negative effects on frail and chronically ill adults and older people of programs intended to reduce potentially preventable hospitalizations. If negative effects are identified, the LTQA should advocate with CMS to modify the programs that are causing the negative effects.

6. The LTQA should identify ways to help clinicians who make decisions about hospitalizations for frail and chronically ill adults and older people in various settings understand current and new programs intended to reduce potentially preventable hospitalizations, the rationales for these programs and the measures that are or will be used to evaluate their effectiveness.

7. Several interventions that involve staff members from individual nursing homes in trying to reduce hospitalizations from their own facility are described in the section of this paper on potentially preventable hospitalizations from nursing homes. The interventions include training and structured procedures that encourage and assist staff members to review in retrospect whether particular hospitalizations from the facility could have been prevented and to consider what could be done differently to avoid such hospitalizations in the future. These interventions have succeeded in reducing hospitalizations. The LTQA should advocate for wider implementation and testing of the interventions. The LTQA could also encourage the development of similar interventions in other kinds of residential care facilities, agencies that provide long-term services and supports in the community and EDs. Eventually, it may appropriate to use process measures to determine whether retrospective review and similar validated procedures for avoiding potentially preventable hospitalizations are being used in these settings.

Implementing these recommendations will require focused and sustained efforts. Such efforts will help to achieve the "triple aim" of improving quality of care and health for frail and chronically ill adults and older people who are receiving long-term services and supports and making care more affordable for these individuals and society as a whole. In addition, efforts to define, monitor and reduce potentially preventable hospitalizations will help to disseminate important ideas about the care needs of this population and the kinds of interventions that are likely to be effective in meeting those needs.

INTRODUCTION

Multiple federal and state health policy and payment reform initiatives are in various stages of development and implementation. A major focus of these initiatives is to reduce potentially preventable hospitalizations. These hospitalizations contribute substantially to total health care expenditures for hospital care in the U.S.[1] Complications associated with potentially preventable hospitalization, such as falls, injuries, infections, and deconditioning, can result in additional morbidity and mortality and additional expenditures for post-hospital medical and long-term care.[2,3,4,5,6,7] Thus, incentives to reduce potentially preventable hospitalizations could help achieve the triple aim. A fundamental requirement to achieve this goal is the development of measures of potentially preventable hospitalizations that are feasible, valid, fair to health care providers, and not associated with major unintended consequences.

A fundamental requirement to achieve the triple aim is the development of measures of potentially preventable hospitalizations that are feasible, valid, fair to health care providers, and not associated with major unintended consequences

The purposes of this paper are to review how potentially preventable hospitalizations have been defined in the research literature, quality improvement initiatives and federal law and regulations and to provide information, concepts, and recommendations to support LTQA decisions about quality measures that are appropriate for the population of concern to the LTQA. This population consists of frail and chronically ill adults and older people who receive long-term services and supports, including nursing home care, assisted living, and home and community-based services provided by paid caregivers or unpaid family members or friends. In the first phase of its work, the LTQA has prioritized Medicare beneficiaries who meet this definition, including dual eligibles.

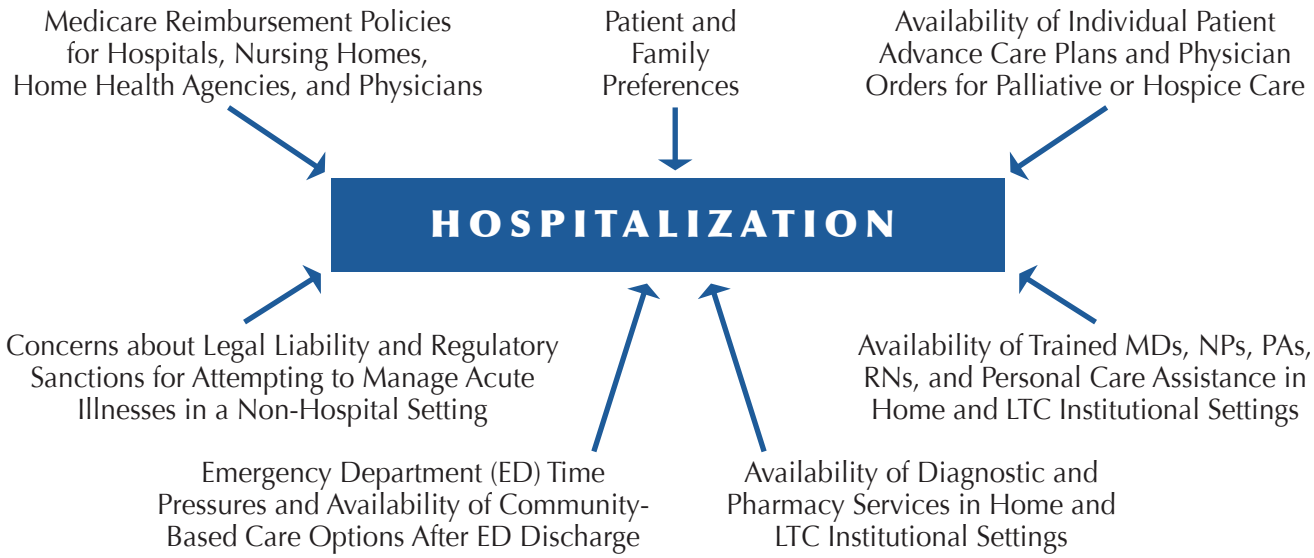
No published estimates are available for the number or cost of potentially preventable hospitalizations for people in the LTQA population, but national data suggest the numbers are high. Older people have proportionately more potentially preventable hospitalizations than younger people. In 2008, 2.4 million (60%) of the 4 million potentially preventable hospitalizations in the U.S. involved people age 65 and older, even though only 35% of all hospitalizations were for people in this age group.[8] Moreover, potentially preventable hospitalizations were three times more common among hospitalizations paid for by Medicare than among hospitalizations paid for by Medicaid or private insurance.

People with chronic illness are at greater risk for potentially preventable hospitalizations than people without chronic illness. In a nationally representative sample of Medicare beneficiaries age 65 and older, those with one chronic illness were seven times more likely than those with no chronic illnesses to have a potentially preventable hospitalization, and those with four or more chronic illnesses were 99 times more likely to have such a hospitalization.[9]

Dual eligibles are also more likely than other Medicare beneficiaries to have potentially preventable hospitalizations,[10] and dual eligibles who receive long-term services and supports are more likely than other dual eligibles have such hospitalizations. In 2005, 25% of hospitalizations for dual eligibles were potentially preventable,[11] and 39% of hospitalizations for dual eligibles who received long-term services and supports were potentially preventable.[12] The 39% included almost half (47%) of hospitalizations for dual eligibles who received Medicaid-funded nursing home care, and 25%–41% of hospitalizations for dual eligibles who received home and community-based services through Medicaid waiver programs, with the different proportions reflecting different criteria for measuring which hospitalizations are potentially preventable.

Developing quality measures of potentially preventable hospitalizations for the LTQA population is challenging because the decision to hospitalize an individual depends on multiple and varied factors, including financial incentives and disincentives in our current health care system (See Figure 1). Thus, quality measures must in some way account for these factors, which vary considerably for individual patients. Moreover, much of the data required to examine these important factors are not routinely available in current administrative files. Despite the challenges, such measures are critical if we are to improve quality of care for the LTQA population and at the same time make care more affordable for all payers.

Figure 1: Factors and Incentives that Influence the Decision to Hospitalize LTC Patients



METHODS

For this white paper, an extensive review was conducted to identify definitions of potentially preventable hospitalizations in the following sources:

- Research studies published in peer-reviewed journals.
- Quality measures identified by the Agency for Healthcare Research and Quality (AHRQ); the National Quality Forum (NQF); the National Committee on Quality Assurance (NCQA); the Center for Medicare & Medicaid Services (CMS) Physician Quality Reporting (PQR) System; the American Medical Association (AMA) Physician Consortium for Performance Improvement (PCPI); the National Core Indicators; the National Database of Nursing Quality Indicators (NDNQI); and Assessing Care of Vulnerable Elders (ACOVE) quality indicators.
- The Nursing Home Value Based Purchasing (NHVBP) and Home Health Pay for Performance (HHP4P) demonstrations.
- Numerous governmental (mostly contractor) reports, including reports with recent systematic reviews of the relevant literature (see, e.g., *Environmental Scan, 2010*[13] and *Review of the Current Literature on Outcome Measures Applicable to the Medicare Population for Use in a Quality Improvement Program,* 2011).[14]
- Recent Federal legislation, including the Affordable Care Act and regulations to operationalize its provisions.

To understand the origin of the identified measures ... sources were tracked and reviewed going back in time from June 2011 until the first use of the specific wording or criteria was located.

From these sources, measures with any specific wording to define potentially preventable hospitalizations were identified. To understand the origin of the identified measures, including the intent of those who developed the measures and how the measures were selected and tested, sources were tracked and reviewed going back in time from June 2011 until the first use of the specific wording or criteria was located.

Some measures refer to hospitalization in general and do not provide specific wording to define potentially preventable hospitalizations. An example is the National Committee on Quality Assurance (NCQA) measure, "Inpatient Utilization—General Hospital/ Acute Care."[15] These measures are not included in the tables in this white paper, but some of them are discussed in the text, in particular, measures that are currently being used or considered for use in quality monitoring, public reporting, and pay-for-performance programs.

The review conducted for the white paper focused primarily on measures from U.S. sources. A few measures from Canadian sources are included in the tables. Other non-U.S. sources of measures identified through the review are listed in the appendices.

Perhaps the most surprising finding from this review was the lack of attention to the role of the emergency department (ED) in potentially preventable hospitalizations. Almost half of all hospitalizations in the U.S. begin in the ED,[16] and the proportions are higher for older people[17] and people with the chronic illnesses.[18] Although there are no specific figures for the proportion of potentially preventable hospitalizations of people in the LTQA population that begin in the ED, it is likely that at least the proximate decision about the great majority of such hospitalizations is made in the ED. Yet very few of the sources reviewed for this white paper even

mentioned the ED. This finding and its implications for developing quality measures of potentially preventable hospitalizations that are appropriate for the LTQA population are discussed later in the white paper.

The review conducted for the white paper identified various risk adjustment strategies intended to increase the validity of the existing measures when comparing rates of potentially preventable hospitalizations across different provider organizations. Although valid risk adjustment strategies may be more critical in measures used to define potentially preventable hospitalizations for the frail and chronically ill adults and older people that make up the LTQA population than for younger, generally healthier populations, the review did not identify any risk adjustment methodologies that were specifically developed for or validated in the LTQA population. Thus, the available risk adjustment strategies are not described in any detail in this white paper.

From the LTQA perspective, it is important to note that many of the available risk adjustment methods are very complex and not easily understood by most clinicians and other providers who make or contribute to decisions about hospitalization. This complexity and lack of transparency is troubling because part of the solution to lowering rates of potentially preventable hospitalizations is to increase clinician and other provider understanding of what types of hospitalizations may be preventable in the patients they treat. Recommendations for the development of appropriate and valid risk adjustment strategies for the LTQA population are discussed at the end of the white paper.

DEFINITIONS OF POTENTIALLY PREVENTABLE HOSPITALIZATIONS

Many different medical conditions have been used to define which hospitalizations are potentially preventable. Measures that incorporate these conditions are now widely used in health services research and increasingly embedded in quality monitoring, public reporting, and pay-for-performance programs.

All the medical conditions that have been and are now being used to define which hospitalizations are potentially preventable were originally identified or at least approved by clinicians. Often these clinicians used structured criteria; they were frequently working with researchers; and over time, other clinicians, researchers, and policy analysts adopted and adapted previously developed lists of conditions. It is important to note, however, that the conditions were initially identified and approved by clinicians.

All the medical conditions that have been and are now being used to define which hospitalizations are potentially preventable were originally identified or at least approved by clinicians.

As noted earlier, the review conducted for this white paper found that the sources of specific wording to define potentially preventable hospitalizations came from three largely separate literatures. The text and tables below are presented in three sections to reflect these separate literatures. The sections address:

1. Medical conditions used to define potentially preventable hospitalizations from the community
2. Medical conditions used to define potentially preventable hospitalizations from nursing homes
3. Medical conditions used to define potentially preventable hospital readmissions

Each section reviews findings from early studies about the particular type of hospitalization to understand the context and concerns that led to the development of measures. Medical conditions that have been used to define potentially preventable hospitalizations are shown in a table and discussed in the text. Measures that do not specify particular medical conditions to define potentially preventable hospitalizations and measures that have been, are being, or will soon be used in quality monitoring, public reporting, and pay-for-performance programs are also discussed. Each section also discusses implications for the LTQA population.

The tables usually show the exact words used by each source to identify medical conditions because differences in wording affect which specific hospitalizations are determined to be potentially preventable — an important consideration when measures incorporating the conditions are used for public reporting and reimbursement purposes. Some sources report specific ICD-9 or DRG codes for the conditions they identify, and others do not. Information about whether codes are included is provided in the notes below each table.

Some sources listed in the tables state explicitly that the identified medical condition should only be included if it is the person's primary diagnosis or alternately, that it should be included if it is either a primary or secondary diagnosis. Other sources do not make these distinctions. Likewise, some sources identify an entity that should be held accountable for potentially preventable hospitalizations identified by the measure, and some do not. Where available, this information is provided in notes below the tables.

Medical conditions explicitly identified for children are not included in the text or tables.

1. Medical Conditions Used to Define Potentially Preventable Hospitalizations from the Community

Over the past 35 years, many research studies, reports, and quality improvement initiatives have addressed the topic of hospitalizations from the community, and many of these sources have identified one or more medical conditions to define potentially preventable hospitalizations. The first source to identify such conditions for hospitalizations from the community seems to be a study by Solberg et al. that was published in 1990.[19]

This section describes findings from studies, reports, and quality improvement initiatives on hospitalizations from the community conducted since the 1970s. It presents and discusses the medical conditions that have been used to define potentially preventable hospitalizations from the community in 39 sources published from 1990–2011. For the LTQA, it is important to note that hospitalizations of individuals who could be considered part of the LTQA population constitute only a portion of all hospitalizations from the community.

Findings from early studies about hospitalizations from the community

In the U.S., early work to identify medical conditions associated with potentially preventable hospitalizations from the community was driven by growing awareness of variation in the use of medical services, interest in identifying the factors responsible for that variation, and concern that economic and socio-demographic factors, especially income and race/ethnicity were reducing access to medical care. In the 1970s, several research teams published lists of medical conditions to be used as indicators of possible problems in the ambulatory medical care provided for patients before a hospital admission.[20,21,22,23]

In 1985, the U.S. Health Care Financing Administration (HCFA) contracted with Peer Review Organizations (PROs) to review the quality of care provided by health maintenance organizations (HMOs) with Medicare risk contracts. Subsequently, three national organizations convened an expert group to develop an approach for chart review to identify cases likely to involve inadequate pre-hospital ambulatory medical care. In 1990, the group published a list of "indicator conditions" they thought were likely to identify such cases.[19]

In 1992 and 1993, three other groups of clinicians and researchers published lists of medical conditions that they believed were associated with what they called "potentially preventable (or potentially avoidable) hospitalizations." In 1992, Weissman et al. published a list of 12 "avoidable hospital conditions" developed by a physician panel.[24] In 1993, Billings et al. published a list of "ambulatory care sensitive (ACS) conditions-diagnoses" developed with a modified Delphi approach involving internists and pediatricians.[25] Also in 1993, the Institute of Medicine (IOM) published a report that listed 11 "ambulatory care sensitive conditions for chronic conditions" and seven "ambulatory care sensitive conditions for acute care."[26] The lists of medical conditions from these three sources were very influential, and many later studies, reports, and quality improvement initiatives adopted the lists, sometimes with a few changes. Many of these later sources also adopted the terms "ambulatory care sensitive (ACS)" and "ambulatory care sensitive conditions (ACSCs)" that were used by two of the sources.

Another highly influential list of medical conditions believed to be associated with potentially preventable hospitalizations was developed by researchers at Stanford University and the University of California San Francisco, under contract with the Agency for Healthcare Quality and Research (AHRQ). These "Prevention Quality Indicators (PQIs)" were released in 2001, and have been widely adopted, sometimes with a few changes.[27]

Table 1 shows the medical conditions that have been and are now being used to define potentially preventable hospitalizations in 39 research studies, reports and quality improvement initiatives published from 1990 to 2011. The number at the top of each column is keyed to the list of sources at the bottom of the table. The sources are presented in chronological order by publication date from left (1990) to right (2011). A "+" in a cell means that more information about the wording of the condition is provided in the notes below the table.

The second row in Table 1 shows whether a source used a sample that included only people under 65, thereby excluding older people from the data collection and analysis. The third row shows whether the source used medical conditions that were originally identified specifically for people under age 65. These distinctions are discussed later in this section.

Table 1 does not include every source that was found to have specific wording to define potentially preventable hospitalizations from the community. Additional sources are listed in Appendix A. The table also does not include sources that identify only a single medical condition or refer to hospitalization in general. Measures from these sources are discussed later in this subsection.

Table 1: Medical Conditions Used To Define Potentially Preventable Hospitalizations from the Community in 39 Studies, Reports, and Quality Improvement Initiatives Published from 1990-2011.

SOURCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Sample is only people under 65		x	x	x	x	x	x		x		x								x	x		x	x				x		x			x							
Conditions are for people under 65		x	x	x	x	x	x	x	x	x	x	x	x	x	x +		x	x	x	x		x	x	x			x			x						x ?			?
Condition																																							
Angina				✔	✔		✔		✔	✔	✔	✔	✔	✔		✔	✔			✔		✔	✔	✔		✔	✔	✔	✔			✔			✔	✔			✔
Angina without procedure																					✔																✔	✔	
Ruptured appendix														✔				✔											✔										
Asthma	✔	✔	✔	✔		✔ +	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔		✔		✔	✔	✔ +	✔	✔	✔	✔		✔				✔		✔	✔
Adult asthma															✔						✔					✔								✔	✔		✔		
Bronchitis/ COPD														✔ +															✔										
Cellulitis	✔	✔	✔	✔			✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔		✔		✔	✔		✔	✔	✔	✔									✔
Cellulitis with skin graft			✔	✔						✔																	✔		✔										
Chronic obstructive pulmonary disease			✔	✔		✔ +	✔		✔	✔	✔	✔	✔	✔					✔	✔	✔	✔		✔	✔	✔	✔		✔		✔ +	✔		✔	✔	✔	✔	+	✔
COPD, asthma																																	✔ +						
Congestive heart failure		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔	✔
Constipation, impaction																																	✔						
Convulsions			✔	✔					✔		✔											✔					✔												✔
Dehydration – volume depletion			✔	✔			✔		✔	✔	✔	✔	✔	✔	✔		✔		✔ +	✔	✔	✔		✔	✔	✔			✔			✔	✔	✔	✔		✔	✔	✔
Dental conditions			✔	✔			✔		✔	✔	✔			✔ +						✔		✔						✔	✔										
Diabetes		✔			✔	✔			✔		✔	✔	✔	✔	✔		✔		✔	✔ +		✔	✔	✔			✔		✔			✔		✔		✔			✔
Diabetic acidosis	✔																																						
Diabetes A principal diagnosis on inpatient bill				✔						✔																													

SOURCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Diabetes B principal diagnosis on inpatient bill				✔						✔																													
Diabetes C principal diagnosis on inpatient bill				✔						✔																													
Diabetes short-term complications (includes ketoacidosis, hyperosmolarity and coma)			✔				✔	✔ +										✔		✔	✔				✔ +	✔				✔ +					✔		✔ +	✔	
Diabetes long-term complications			✔				✔														✔					✔									✔		✔	✔	
Uncontrolled diabetes																					✔					✔									✔		✔ +	✔	
Drug toxicity (including overdose, and anticoagulant bleed)	✔																																					
Endometrial cancer	✔																																					
Epilepsy													✔															✔											
Injurious falls																																		✔					
Gangrene	✔	✔						✔						✔				✔												✔									
Gastroenteritis			✔	✔			✔		✔	✔	✔	✔	✔	✔			✔		✔ +	✔		✔		✔		✔ +	✔	✔	✔									✔
Grand mal seizure disorder			✔																	✔									✔									
Grand mal seizures and epileptic convulsions				✔			✔			✔	✔	✔		✔			✔		✔					✔												✔			
Hypertension			✔	✔	✔	✔	✔		✔	✔	✔	✔	✔	✔	✔		✔	✔ +	✔	✔	✔	✔	✔	✔		✔	✔		✔			✔	✔ +		✔	✔	✔	✔	✔
Hypertension, malignant		✔						✔								✔														✔									
Hypoglycemia	✔		✔	✔			✔		✔	✔	✔	✔	✔	✔	✔		✔		✔	✔		✔			+		✔		✔									
Hypokalemia	✔	✔						✔							✔			✔	✔ +											✔									
Immunizable-preventable conditions		✔					✔	✔		✔						✔		✔	✔	✔ +		✔							✔	✔									
Immunization and preventable infections/diseases				✔					✔																														
Influenza															✔																								

SOURCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Iron deficiency anemia							✔		✔					✔					✔	✔		✔							✔											
Kidney or urinary tract infection			✔	✔			✔		✔	✔		✔	✔	✔			✔		✔	✔		✔		✔				✔										✔
Lower-extremity amputation among patients with diabetes																					✔					✔						✔			✔		✔	✔	
Lower limb peripheral vascular disease (PVD) and PVD-related cellulitis																									✔ +														
Malnutrition										✔					✔																								
Weight loss and malnutrition														✔																			✔ +						
Nutritional deficiencies				✔			✔		✔										✔	✔		✔							✔									
Otitis media																✔																							
Pelvic inflammatory disease				✔			✔		✔	✔						✔			✔	✔		✔							✔									
Perforated or ruptured appendix	✔	✔						✔										✔	✔		✔									✔		✔					✔		
Perforated or bleeding ulcer		✔						✔																						✔									
Pneumonia		✔						✔			✔	✔	✔	✔	✔		✔	✔						✔						✔									✔
Bacterial pneumonia			✔	✔			✔		✔				✔						✔	✔	✔	✔			✔ +	✔	✔	✔	✔		✔	✔		✔	✔		✔	✔	
Poor glycemic control																																	✔ +						
Pressure ulcers																																		✔					
Primary breast cancer surgery	✔																																						
Pulmonary embolism/infarction	✔																																						
Pyelonephritis		✔						✔										✔												✔									
Seizure disorder															✔																								
Seizures																																	✔						
Septicemia																									✔														
Severe ear, nose or throat infection			✔	✔			✔		✔	✔	✔	✔	✔	✔	✔		✔		✔	✔		✔		✔			✔	✔	✔										
Stroke																									✔														
Syphilis, congenital							✔		✔										✔	✔									✔										

SOURCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
TIA/CVA under age 65	✔																																						
Tuberculosis				✔			✔		✔	✔									✔	✔		✔						✔	✔										
Ulcer (gastric or duodenal)															✔	✔																							
Ulcer (peptic) with perforation, bleeding, or obstruction	✔																																						
Urinary tract infection											✔				✔						✔				✔	✔						✔	✔	✔	✔		✔	✔	

SOURCES AND NOTES:

1. Solberg et al. (1990); does not list codes; Medicare HMOs are accountable.[19]
2. Weissman et al. (1992); lists codes; no accountability stated, but article advocates for health insurance for uninsured people.[24]
3. Millman ML (ed.) (1993); lists codes; no accountability stated, but article advocates for quality assurance; conditions are counted if they are in the person's hospital discharge record.[26]
4. Billings et al, (1993); conditions and codes are not listed in the article but are listed in Walsh et al., 2010; no accountability stated, but article advocates for better access to ambulatory care for people with low income. [12,25]
5. Parchman and Culler (1994); does not list codes; no accountability stated, but article advocates for better access to primary care.[28]
6. Bindman et al. (1995); does not list codes; no accountability stated, but article advocates for improved access to outpatient care; conditions are counted if they are the primary diagnosis for the hospitalization and, for two of the conditions, asthma and COPD, if they are a secondary diagnosis.[29]
7. Lambrew et al. (1996); lists codes; no accountability stated, but article advocates for patients having a regular medical provider.[30]
8. Pappas et al. (1997); lists codes; no accountability stated, but article advocates for better access to ambulatory care; conditions are counted if they are first-listed or principal diagnoses. The diabetes condition description includes ketoacidosis and coma but does not say it includes hyperosmolarity.[31]
9. Schreiber and Zielinski. (1997); lists codes; no accountability stated, but article advocates for more careful attention to rural/urban variation and variation in other factors that affect ACSC admissions.[32]
10. Blustein et al. (1998); does not list codes; Medicare health plans are accountable; conditions are counted if they are the principal diagnosis on the patient's inpatient bill.[33]
11. Gill and Mainous. (1998); does not list codes; no accountability stated, but the article advocates for continuity of care with a single provider; conditions are counted when they are the primary diagnosis for the first claim for the hospitalization.[34]
12. Culler et al. (1998); lists codes; no accountability stated, but article advocates targeting efforts to reduce potentially preventable hospitalizations to people with various characteristics that make them especially vulnerable; conditions are counted when they are the first or primary diagnosis for the hospitalization.[35]
13. Parchman and Culler. (1999); lists codes; no accountability stated, but article advocates targeting to reduce potentially preventable hospitalizations for people with various characteristics that make them especially vulnerable; conditions are counted when they are the first or primary diagnosis for the hospitalization.[36]
14. Gaskin and Hoffman. (2000); does not list codes; no accountability stated, but article advocates policies to reduce disparities in health care. Article lists "bronchiolitis," which is included as bronchitis/COPD in Table 1; the study also includes 'dental abscess' which is included in 'dental conditions' in Table 1.[37]
15. McCall, et al. (2001); does not list codes; Medicare+Choice plans are accountable.[38]
16. Brown et al. (2001); does not list codes; accountability is for health care systems.[39]
17. Epstein. (2001); lists codes; no accountability stated, but the article points out that the availability of Federally Qualified Health Centers and other public clinics is associated with lower ACSC hospitalizations.[40]

18. Kozak et al. (2001); does not list codes; no accountability stated, but article advocates for more research on ambulatory care.[41]
19. Falik et al. (2001); does not list codes; no accountability stated, but article advocates for providing a regular source of ambulatory care; conditions are counted if they are the primary diagnosis for the hospitalization, but dehydration and iron deficiency anemia were also counted if they are secondary diagnoses, and COPD is counted if it is secondary to acute bronchitis; gastroenteritis, dehydration, and hypokalemia are included as one condition in the study but checked as 3 conditions in Table 1.[42]
20. Porell. (2001); lists codes; no accountability stated, but article advocates use of ACSC hospitalizations as a way for states to monitor access to care; study uses 'immunizable-preventable conditions' as a composite; the conditions are pertussis, rheumatic fever, tetanus, polio and hemophilus meningitis; study uses "diabetes with specified manifestations" and "diabetes without specified complications" as 2 measures; in Table 1, 'diabetes' is checked for both.[43]
21. AHRQ Prevention Quality Indicators (PQIs). (Oct. 2001, Revised version 3.1, March 12, 2007); lists codes; no accountability stated, but the PQIs are intended to evaluate the quality of ambulatory care. PQI conditions are counted if they are the principal diagnosis for a hospitalization except the PQI for diabetes-related lower extremity amputations, which is counted in any diagnosis field.[44]
22. Basu et al. (2002); does not list codes; no accountability stated, but the article advocates the use of the study's methods to test the effects of different policies and incentives on use of hospital services at the patient level.[45]
23. Davis et al. (2003); does not list codes; no accountability stated, but article advocates for reducing racial disparities in the provision of effective primary care.[46]
24. Niefeld et al. (2003); lists codes; no accountability stated, but article advocates for improved outpatient care for older people with Type 2 diabetes; all medical conditions listed in this study are included only for people with diabetes.[47]
25. McCall. (2004); lists codes; no accountability stated, but report is intended to measure increasing rates of hospitalizations for ambulatory care sensitive conditions (ACSCs) for CMS: the study refers to the condition noted in Table 1 as 'diabetes short term complications,' by a different term 'acute diabetic events,' adds hypoglycemia, does not include coma, and specifies that this condition is only measured in people with diabetes; the study also specifies that the condition 'lower limb peripheral vascular disease (PVD) and PVD-related cellulites' is only included for people with diabetes; the study lists the condition 'bacterial pneumonia' but states that it is specified exactly as 'pneumonia' is specified by Weissman et al., 1992.[24,48]
26. Zhan et al. (2004); does not list codes but cites AHRQ source for them; no accountability stated, but the article states that HMOs reduce hospitalizations for some ACSCs.[49]
27. Laditka et al. (2005); does not list codes; no accountability stated, but study advocates for better supply of primary care physicians, at least in urban areas.[50]
28. Roos et al. (2005); does not list codes; no accountability stated, but article notes that the study findings indicate that increasing physician supply in Canada, where there is universal health care, probably will not decrease hospitalizations for the poor.[51]
29. Bindman et al. (2005); lists codes; no accountability stated, but article states that Medicaid managed care is associated with a large reduction in hospitalization, which likely reflects health benefits and is greater for minority vs. white beneficiaries.[52]
30. Gusmano et al. (2006); does not list codes; no accountability stated, but article points to the consequences of access barriers; the study includes ketoacidosis and coma in the condition noted in Table 1 as 'diabetes short term complications' but does not explicitly include hyperosmolarity.[53]
31. O'Malley et al. (2007); lists codes; no accountability stated, but the article advocates for improved primary care; study specifies that the condition 'COPD' is only included if the person had a diagnosis of COPD in inpatient or outpatient claims in the previous year.[54]
32. Bindman et al. (2008); does not list codes; no accountability stated, but article advocates for policies to reduce interruptions in Medicaid coverage.[55]
33. Walsh et al. (2010); lists codes; no accountability is stated, but report was prepared for CMS and notes that reducing the incidence of potentially avoidable hospitalizations "has the potential to substantially reduce Medicare costs, as well as improve health outcomes and beneficiaries' quality of life;" the condition 'COPD/asthma' also includes chronic bronchitis'; the condition 'hypertension' also includes hypotension; the condition 'weight loss and malnutrition' also includes nutritional deficiencies and adult failure to thrive; the condition 'poor glycemic control' includes hyperglycemia and hypoglycemia and diabetes with ketoacidosis or hyperosmolar coma.[12]
34. Jiang HJ, and Wier LM, Potter DEB, and Burgess J. (2010); does not list codes; no accountability stated, but issue brief notes the importance of understanding and addressing conditions that result in potentially preventable hospitalizations for dual eligibles.[10]
35. Jia et al. (2009); does not list codes; no accountability stated but study assesses impact of a VA telehealth program.[56]

36. Canadian Institute for Health Information. (2010); codes are not listed but are available in a technical note; no accountability stated, but the source says that a high rate of ACSC hospital admissions is presumed to reflect problems in obtaining access to appropriate primary care.[57]
37. California Office of Statewide Health Planning and Development. (2010); does not list codes; no accountability stated, but study provides data on potentially preventable hospitalizations in California counties, suggesting accountability; study combines two PQIs, 'diabetes, short-term complications' and 'diabetes uncontrolled" to allow a comparison with the national Healthy People 2010 measure.[58]
38. Moy et al. (2011); does not list codes; no accountability stated, but article cites the value to communities of using potentially preventable hospitalizations as an indicator and lists 3 communities that did so; study omitted the PQI for the condition 'COPD' because of ICD-9 coding changes that cause incompatibility across data years.[59]
39. Chang et al. (2011); does not list codes; no accountability stated, but article advocates for the importance of measuring the proportion of primary care physicians that are practicing ambulatory care in analyses of the impact of primary care on potentially preventable hospitalizations.[60]

Observations

Number and complexity of the medical conditions in Table 1

The 39 research studies, reports and quality improvement initiatives included in Table 1 identify 68 medical conditions. Some of the conditions were identified by only one source; some were identified by several sources, and some were identified by many sources. Conditions identified by 20 or more of the 39 sources are: angina, asthma, cellulitis, COPD, congestive heart failure, dehydration, diabetes, hypertension, and bacterial pneumonia.

Medical conditions that seem to be closely related to each other are identified by various sources. For example, the conditions 'asthma,' 'adult asthma,' 'asthma/bronchitis,' and 'COPD/asthma' are identified by different sources, only one of which identifies more than one of the conditions. Likewise, 'bacterial pneumonia' and 'pneumonia' are identified by different sources, only one of which identifies both conditions. Some of these sources probably refer to exactly the same condition, thereby increasing the number of sources that identify that condition. If, for example, the sources that identified either 'bacterial pneumonia' or 'pneumonia' are combined, a total of 31 sources identify these conditions, compared with 20 sources for 'bacterial pneumonia' alone. To determine whether the identified conditions are exactly the same, it would be necessary to compare the specific codes used by each source, assuming those codes are available in the source document or elsewhere.

Diabetes is especially complex in terms of the specific wording used by different sources. Table 1 shows eight different diabetes conditions. Some of these conditions may be exactly the same, but again, it would be necessary to compare the specific codes to determine this.

A few sources identify one or more medical conditions that are intended to define potentially preventable hospitalizations only for people who have another condition, such as diabetes,[47] COPD or pneumonia.[54] Many of the sources specify that the medical conditions they identify should only be used to define potentially preventable hospitalizations if the condition is the primary diagnosis for the hospitalization, but some sources specify that certain conditions should be used if they are either the primary or a secondary diagnosis for the hospitalization. One source specifies, for example, that "dehydration" and "iron deficiency anemia" should be used if they are either primary or secondary diagnoses and that COPD should be used as a secondary diagnosis if it is secondary to acute bronchitis.[42]

The large number of medical conditions in Table 1 and the complexity of specifications for their use are daunting. Some of the conditions could be eliminated if they were shown to have identical codes, but it is unlikely that the list could be substantially reduced even by a careful search for duplicate codes. Some clinicians, researchers, and policy analysts have suggested that the conditions should be grouped into broader categories that are easier to understand. At first, this seems like a good idea, but it should be noted that the large number of conditions and the complexity of their specifications reflect the objective of the clinicians and researchers who identified them to indicate exactly which conditions are associated with potentially preventable hospitalizations. As noted earlier, this objective is very important, especially if the conditions are to be used for public reporting or reimbursement purposes. If some or all of the medical conditions in Table 1 were combined into broader categories that maintained all the specifications and codes in the original list, the result would be easier to understand at a superficial level, but no less complex from the perspective of anyone who has to use such a list to identify exactly which hospitalizations are considered to be potentially preventable. If the conditions were combined into broader categories and the specifications and codes from the original list were dropped, the result would no longer represent the intent of the clinicians and researchers who identified the conditions to indicate exactly which conditions are associated with potentially preventable hospitalizations.

Medical conditions used

Some of the medical conditions listed in Table 1 are identified most often by sources published more than a decade ago, and other conditions are identified most often by sources published more recently. This apparent change over time could reflect changing perceptions and/or new evidence about conditions associated with potentially preventable hospitalizations. Another possible factor is a gradual change in the age and characteristics of the population for whom the conditions were identified and the samples in which they were tested.

Most of the sources published before 1998 focused exclusively on people under age 65 and used samples that only included only people in that age group. This is true of the three influential studies published in 1992 and 1993[24,25,26] all of which excluded people age 65 and older. As noted previously, a major concern of the clinicians and researchers who published these early studies was that economic and socio-demographic factors, especially income and race/ethnicity, were limiting access to needed medical care. They believed that because older people had Medicare, older people were much less likely than younger people to have problems in accessing medical care and therefore, much less likely to have potentially preventable hospitalizations.

Fewer sources that were published in and after 1998 excluded older people from their study samples. As shown in Table 1, only eight of the 29 studies published from 1998–2011 excluded older people, and some studies focused only on older people. Nevertheless, most of these studies used the same medical conditions to define potentially preventable hospitalizations that had been developed for earlier studies that included only people under age 65. Some studies, including the following, note that use explicitly:

- A 1998 study of potentially preventable hospitalizations in Medicare beneficiaries age 65 and older used 21 medical conditions that had been developed for earlier studies of people under age 65, noting only that the advisory panel for the study "expressed reservations about using the list (of medical conditions) to classify hospitalizations in the elderly, since some diseases present differently in older populations."[33]
- A 1999 study of potentially preventable hospitalizations in Medicare beneficiaries age 65 and older used 14 medical conditions that had been developed for earlier studies of people under age 65, noting only that, "(e)arlier studies of preventable or avoidable hospitalizations explicitly excluded the elderly because it was believed that enrollment in the Medicare program assured adequate ambulatory care access."[36]

One interesting example of perceptions about the relationship between age and the medical conditions used to define potentially preventable hospitalizations is a decision by several sources to omit pneumonia from their list of conditions for older people. A widely cited article published in 1998 explained this decision by saying that pneumonia "is a common terminal event in older people. Therefore, in the analyses reported here, hospitalizations for pneumonia are not classified as preventable."[33, p.179]

A 2004 report prepared for CMS focused exclusively on potentially preventable hospitalizations in people age 65 and older.[48] Results from prior research were used to select 11 medical conditions believed to be most relevant for identifying potentially preventable hospitalizations in older people. The researcher proposed combining two conditions, 'asthma' and 'COPD,' because the two conditions are difficult to distinguish in older people, but CMS chose to keep asthma and COPD separate for this analysis. The study found a 52% increase in hospitalizations for COPD in the period from 1992–2000, and a 26% decrease in hospitalizations for asthma in the same period. The researcher comments that, "coding of these specific conditions (as the reason for a hospital admission) is likely to be somewhat fungible."[48, pps.8,9]

Three findings from the 2004 report are particularly relevant to the LTQA population:

- the presence of medical comorbidities increased the likelihood of hospitalization for the identified conditions by over 25 percent;
- being dual-eligible increased the likelihood of hospitalization for some of the conditions;
- prior year hospitalization for a medical condition appeared to function as a strong proxy for the severity of the condition.[48]

Another finding from the report raises questions about the underlying concept that ambulatory medical care can reduce hospitalizations, at least in older people and for the conditions selected for analysis. The study found that "having a usual source of medical care or having supplemental health insurance, including prescription drug coverage, did not appreciably reduce the likelihood of an ambulatory care sensitive condition hospitalization within the Medicare population"[48, p.7] Among the factors studied, poverty was found to have the strongest relationship with rate of potentially preventable hospitalizations. The researcher concludes that the "(t)he use of ACSC hospitalization rates as a possible quality measure may require further evaluation prior to implementation."[48, p.8]

AHRQ Prevention Quality Indicators

As noted earlier, the AHRQ Prevention Quality Indicators (PQIs) were published in 2001 and since then, have been widely used by many sources to define potentially preventable hospitalizations.[27] The original PQIs included 16 medical conditions for people of all ages. In 2007, two of the PQIs, 'pediatric asthma' and 'pediatric gastroenteritis,' were moved a Pediatric Quality Indicators Module. Another PQI, 'low birth weight,' is only measured in children.[61] The remaining 13 PQIs, all of which are for adults, are shown in Table 1, col.21.

Some studies, reports, and quality improvement initiatives that use PQIs to measure potentially preventable hospitalizations use one or only a few individual PQIs, and others use combinations of PQIs, including composites of all 16 PQIs; the PQIs for adults; chronic, acute, and preventive PQIs; and diabetes-related PQIs. For example, one 2009 AHRQ report used four composites that included 12 PQIs: 1) diabetes (short-term diabetes complications, long-term diabetes complications, uncontrolled diabetes, and lower-extremity amputation); 2) chronic cardiac conditions (hypertension, congestive heart failure, and angina without procedure); 3) chronic respiratory conditions (chronic obstructive pulmonary disease and adult asthma); and 4) acute conditions (dehydration, bacterial pneumonia, and urinary tract infection).[62] From a methodological perspective, these different combinations could have a significant, although perhaps not always recognized effect on the number and proportion of hospitalizations that are defined as potentially preventable, especially in people with multiple acute and chronic medical conditions.

Various clinicians and researchers have expressed concerns about the PQIs that are relevant to the LTQA population. A recently published study funded by AHRQ assembled two clinician panels to assess the face validity of 12 PQIs when used to define potentially preventable hospitalizations for three purposes: quality improvement, public reporting, and pay-for-performance.[63] From the LTQA perspective, the most relevant concerns expressed by the panels pertained to using PQIs for patients with clinically complex medical conditions and patients who may not adhere to medical recommendations. Interestingly, the panels also commented that a hospital admission "reflects high-quality care when a patient does not have an adequate home support system to adhere to treatment recommendations."[63, p.683]

Other measures of potentially preventable hospitalizations from the community

Some quality measures identify hospitalization in general, without specifying any particular medical condition(s), and some measures identify a single condition. These measures generally do not state explicitly that the hospitalizations are potentially preventable, but that is certainly implied. Examples of such measures are the following, listed by source.

National Quality Forum (NQF)

- Hospital transfer/admission: rate of ambulatory surgical center admissions requiring a hospital transfer or hospital admission upon discharge from the ambulatory surgical center (NQF # 265).
- Acute care hospitalization (risk-adjusted) for home health care: number of home health episodes in which the patient is hospitalized (NQF # 171)
- Proportion admitted to the ICU in the last 30 days of life: percentage of patients who died from cancer and were admitted to the ICU in the last 30 days of life (NQF # 213)

National Committee for Quality Assurance (NCQA)

- Inpatient utilization-general hospital/acute care (NCQA)

Canadian Institute for Health Information

- Hip fracture: age-standardized rate of new hip fractures admitted to an acute care hospital per 100,000 population age 65 and older (Health Indicators 2010)
- Stroke: age-standardized rate of new stroke events admitted to an acute care hospital per 100,000 population age 20 and older (Health Indicators 2010)
- Injury: age-standardized rate of acute care hospitalizations due to injury resulting from the transfer of energy (excluding poisoning and other non-traumatic injury) per 100,000 population (Health Indicators 2010)
- Acute myocardial infarction: age-standardized rate of new AMI events admitted to an acute care hospital per 100,000 population age 20 and older (Health Indicators 2010)

Another measure endorsed by NQF in January 2011 pertains to potentially preventable hospitalizations in people age 18–65. The measure (NQF # 709), "Proportion of patients with a chronic condition that has a potentially avoidable complication during a calendar year," includes as a "potentially avoidable complication," "any hospitalization that is related to the patient's core chronic condition and is potentially controllable by the physicians and hospital that manage and co-manage the patient, unless the hospitalization is considered to be a typical service for a patient with that condition."[64] The measure applies to people who have at least one of six chronic conditions: diabetes mellitus, congestive heart failure, coronary artery disease, hypertension, chronic obstructive pulmonary disease (COPD), or asthma.

Medical conditions in measures from sources that focus on the LTQA population

Only two of the sources listed in Table 1 focus specifically on people who could be considered part of the LTQA population. The first of these two sources is a 2010 AHRQ report on dual eligibles that uses nine medical conditions to identify potentially preventable hospitalizations (Table 1, col.34).[10] The nine conditions include seven PQIs (adult asthma, bacterial pneumonia, chronic obstructive pulmonary disease, congestive heart failure, dehydration, diabetes and urinary tract infection) plus two other conditions identified by the researchers as highly relevant for older people, 'injurious falls' and 'pressure ulcers.'

The second of the two sources is a 2010 report prepared for CMS that also uses nine medical conditions to identify potentially preventable hospitalizations for community-dwelling dual eligibles who are receiving long-term services and supports through Medicaid HCBS waiver programs (Table 1, col.33).[12] Three of the nine conditions (congestive heart failure, dehydration, and urinary tract infection) also appear in the 2010 AHRQ report described above. The researchers and clinicians who prepared the report for CMS first identified 16 conditions intended to apply to dual eligibles living in nursing facilities as well as those living in the community. Seven of the 16 conditions were later eliminated for dual eligibles living in the community because the researchers and clinicians believed that long-term services and supports needed to reduce hospitalizations were less likely to be available in the community than in nursing homes. Only the nine conditions considered appropriate for dual eligibles living in the community are shown in Table 1.

Defining potentially preventable hospitalizations from the community for quality monitoring, public reporting, and pay-for-performance programs

As described below, home health agencies and Medicare Advantage health plans are currently required to report hospitalization data for government quality monitoring purposes, and AHRQ is developing a set of measures for quality monitoring for Medicaid programs that is likely to include measures of potentially preventable hospitalizations. Measures of potentially preventable hospitalizations will also be used for quality monitoring and pay-for-performance purposes in several programs mandated by the 2010 Affordable Care Act (ACA). Since most of these programs serve or will serve at least some individuals who could be considered part of the LTQA population, the definitions they use for potentially preventable hospitalizations are important for this population.

Since 1999, home health agencies that serve Medicare beneficiaries have been required to report hospitalization data from the Medicare Home Health instrument, Outcome and Assessment Information Set (OASIS). The federal government uses the data to calculate the NQF measure, "Acute care hospitalization (risk-adjusted)" (NQF # 171). This measure has been used for quality monitoring for years and is now being used for public reporting on the Medicare Home Health Compare website.(65)

Since 2006, Medicare Advantage health plans have been required to report the NCQA measure listed earlier, "Inpatient utilization-general hospital/acute care," which is included in HEDIS (the Healthcare Effectiveness Data and Information Set). Some Medicaid managed care plans are also required to report this measure for quality monitoring purposes.

Neither the NQF measure for Medicare home health agencies nor the NCQA measure for Medicare Advantage health plans and HEDIS states explicitly that some hospitalizations are potentially preventable, and neither uses particular medical conditions to define potentially preventable hospitalizations. In contrast, a forthcoming AHRQ report on measures for monitoring the quality of Medicaid home and community-based services programs is likely to refer explicitly to potentially preventable hospitalizations and specify particular medical conditions. Development of the Medicaid measures was mandated by the Deficit Reduction Act of 2005. The identified population for the measures includes anyone who is enrolled in a 1915(c) waiver program or receiving 1915(c) waiver services and anyone who is receiving Medicaid state plan services, e.g., personal care, adult day care, home health care exceeding 90 days, residential care, at-home private duty nursing, or at-home hospice care.(13)

To develop the mandated measures, AHRQ conducted an environmental scan of available measures, and an expert panel identified 21 measure domains, including preventable hospitalizations. The final report on the environmental scan suggests that AHRQ will propose the use of PQIs to measure potentially preventable hospitalizations. It notes, however, that the PQIs "require additional testing and/or modifications to determine their appropriateness for the Medicaid HCBS population."(13)

Some additional testing has been completed, and an AHRQ staff power point presented in October 2010, indicates that the agency will propose 12 quality measures for potentially preventable hospitalizations, including seven PQIs (short-term complications of diabetes, asthma and/or COPD, congestive heart failure, bacterial pneumonia, urinary tract infection, and dehydration); three PQI composites (ACSC chronic conditions, ACSC acute conditions, and ACSC acute and chronic conditions) and measures of two additional medical conditions, pressure ulcers and injurious falls.(66) The AHRQ power point indicates that these quality measures show "meaningful variation in the underlying health and outcomes of the Medicaid HCBS population." The power point also indicates that, "Systematic variation associated with individual and area characteristics suggests the need for risk adjustment by age, gender, diagnosis, and health condition." (66) As of December 2011, the final AHRQ report on the quality measures has not been released.

In addition to the measures discussed above for quality monitoring of Medicare home health agencies, Medicare Advantage plans, and Medicaid home and community-based services programs, measures of potentially preventable hospitalizations have been or will soon be used to determine payment in several pay-for-performance programs.

- In 2008 and 2009, the NQF measure for home health agencies, "Acute care hospitalization (risk-adjusted)" (NQF # 171), was used to determine payment in the Medicare Home Health Pay for Performance (HHP4P) Demonstration that was conducted in more than 450 home health agencies in 7 states.[67,68] Section 3006 of the 2010 Affordable Care Act (ACA) mandated the development of a Value-Based Purchasing program for Medicare Home Health agencies, and it is likely that the quality measures used to determine payments for the program will include one or more measures of potentially preventable hospitalizations.
- Accountable Care Organizations (ACOs), that were mandated by Section 3022 of ACA, will provide coordinated care intended to increase quality of care and reduce costs for unnecessary services. In October 2011, CMS published the final set of 33 quality measures for ACOs, including two PQIs: chronic obstructive pulmonary disease and congestive heart failure.[69]
- The Independence at Home Demonstration Program, mandated by Section 3024 of ACA, will test a payment incentive and service system in which physicians and nurse practitioners direct home-based primary care teams. The program is intended to reduce preventable hospitalizations of chronically ill Medicare beneficiaries who have had a non-elective hospital admission, have received acute or subacute rehabilitation services in the previous year and have two or more functional dependencies. As of October 2011, CMS is developing the quality measures for the program that will certainly include measures of potentially preventable hospitalizations.
- The Initial Core Set of Health Quality Measures for Medicaid Eligible Adults, mandated by Section 2701 of ACA, will provide measures for voluntary use by state Medicaid programs and organizations that contract with Medicaid. In December 2010, the federal government published 51 proposed measures for this purpose, including the NCQA measure, "Inpatient utilization-general hospital/acute care," and 13 PQIs to measure potentially preventable hospitalizations.[70] Public comments on the proposed measures were due in March 2011, and final measures must be published by January 2012.
- Extension of the Special Needs Plan (SNP) Program, mandated by Section 3205 of ACA, extends the SNP program through Dec. 31, 2013, and requires SNPs to be NCQA-approved. In 2011, NCQA required SNPs to report HEDIS measures, including the measure, 'inpatient utilization-general hospital/acute care.' SNPs were also required to report detailed structure and process measures of care transitions, including transitions from the patient's usual setting of care to the hospital.[71] In 2012, SNPS will be required to report the HEDIS measure of inpatient utilization. As of Dec. 2011, NCQA had not yet released the 2012 structure and process measures for SNPs.

Two other ACA-related programs do not have requirements for monitoring or reducing potentially preventable hospitalizations but will certainly serve people who could be considered part of the LTQA population. These programs could provide an opportunity for testing one or more measures of potentially preventable hospitalizations that are appropriate for this population.

- With ACA funding from the Innovations Center, CMS has selected 15 states to receive grants up to $1 million for the first phase of the State Demonstrations to Integrate Care for Dual Eligible Individuals program. The 15 states are expected to design new ways to coordinate primary, acute, behavioral, and long-term care services for dual eligibles. In the second phase of the program, some of the states will be selected to implement the approaches they designed, and some of those states might be willing to test one or more measures of potentially preventable hospitalization that are appropriate for dual eligibles.
- The Medicare Hospice Concurrent Care Demonstration Program, mandated by Section 3140 of ACA, establishes a 3-year demonstration program in which people who are receiving hospice care will also be allowed to receive all other Medicare-covered services. The legislation requires reporting about the cost-effectiveness of the program but does not explicitly address potentially preventable hospitalizations.

The review conducted for this white paper identified only one measure of potentially preventable hospitalizations in the end of life: "Proportion of patients admitted to the ICU in the last 30 days of life: percentage of patients who died from cancer and were admitted to the ICU in the last 30 days of life" (NQF # 213). The NQF draft document, *Palliative Care and End of Life Care: A Consensus Report*, released for public review in October 2011, did not include measures of potentially preventable hospitalizations.[72] Yet studies conducted over at least the past 20 years show that terminally ill people are frequently hospitalized, and clinicians, families and others often regard these hospitalizations as unnecessary and sometimes believe they are harmful to the person. Analysis of the literature on hospitalization at the end of life is beyond the scope of this white paper, but the development of measures of potentially preventable hospitalizations that are appropriate for end-of-life care in the LTQA population is an important priority. The Medicare Hospice Concurrent Care Demonstration Program could provide one venue for implementation and testing of such measures.

Lastly, three recently released documents from federal government initiatives to improve quality of health care prioritize the reduction of potentially preventable hospitalizations and readmissions. These initiatives may provide opportunities for the development and testing of hospitalization measures that are appropriate for the LTQA population.

- In December 2010, the U.S. Department of Health and Human Services released a report, *Multiple Chronic Conditions: A Strategic Framework: Optimum Health and Quality of Life for Individuals with Multiple Chronic Conditions*. One goal outlined in the report is to define appropriate health care outcomes for individuals with multiple chronic conditions, including reducing hospitalizations and hospital readmissions.[73] An NQF draft report, *Multiple Chronic Conditions Measurement Framework*, that was commissioned by the Department of Health and Human Services and released for public comment in Dec. 2011, provides concepts and guidelines for the development and endorsement of quality measures that address the complex circumstances and needs of people with multiple chronic conditions.[74]
- *The National Strategy for Quality Improvement In Health Care*, released in March 2011, describes general goals but notes that the next version of the Quality Strategy will include HHS agency-specific plans, goals, benchmarks, and quality metrics where available.[75] Under the priority area, Effective Care Coordination, one of the "opportunities for success" is to reduce preventable hospital admissions and readmissions.

Implications for the LTQA population

As discussed in this section, the lists of medical conditions used to define potentially preventable hospitalizations from the community were not developed for the LTQA population. The first lists of conditions were developed for people under age 65, reflecting the concern of clinicians, researchers, and policy makers about disparities in access to ambulatory medical care. They believed that lack of ambulatory medical care would lead to unnecessary hospitalizations, and the lists of conditions were intended to identify problems in access to such care. Elderly people were excluded because it was believed that they did not have problems in access since they had Medicare, which would pay for any needed ambulatory medical care.

The early lists of conditions were widely adopted and soon used to identify potentially preventable hospitalizations in people of all ages. Later studies cited earlier studies as justification for using the condition lists. Some clinicians and researchers expressed concerns about using the conditions to measure potentially preventable hospitalizations in older people, and many of these concerns are relevant to the LTQA population: for example, concerns about using the conditions for people with medical comorbidities and clinically complex medical conditions, people who are not able to adhere to medical recommendations and dual eligibles.

Only two of the 39 sources included in Table 1 focused specifically on people who could be considered part of the LTQA population.[10,12] Both sources focused on dual eligibles, and both analyzed but did not test the validity of using particular conditions to measure potentially preventable hospitalizations in these people. The testing done through the congressionally mandated AHRQ initiative to identify measures for monitoring quality in Medicaid home and community-based services programs seems to be the first instance in which measures that incorporate particular conditions have been formally tested in people who could be considered part of the LTQA population. The test results have not published yet but will be useful in considering the implications of using such measures in this population.

The sources discussed in this section used two approaches to accommodate medical comorbidities in measures of potentially preventable hospitalizations. Some sources used risk adjustment. Other sources used very precise specification of the medical conditions included in their measures. Although valuable for some purposes, both approaches make the measures less transparent to clinicians who make decisions about hospitalization.

As noted earlier, many clinicians have been involved over the years in selecting and/or approving the medical conditions used to define potentially preventable hospitalizations. Nevertheless, the literature reviewed for this white paper focuses more on the use of particular medical conditions to define potentially preventable hospitalizations for research, quality monitoring, public reporting, and pay-for-performance purposes than on how the use of these conditions might affect clinical decisions about hospitalizing individuals.

Finally, as measures of potentially preventable hospitalizations are used more widely in quality monitoring, public reporting and pay-for-performance programs, they are likely to have a strong impact on hospitalization for people in the LTQA population. In this context, it is important for the LTQA to understand as much as possible about the likely impact, to anticipate negative effects, and to plan for and encourage rigorous, ongoing evaluation to detect such effects. For this purpose, it would be valuable to have analyses of the effects of using measures that incorporate particular medical conditions in completed studies and programs where the LTQA population can be identified. Likewise, it would be valuable to have similar analyses of the effects on hospitalizations of using measures that do not specify any particular medical conditions.

2. Medical Conditions Used to Define Potentially Preventable Hospitalizations from Nursing Homes

Over the past thirty years, many research studies, reports, and quality improvement initiatives have addressed the topic of hospitalizations from nursing homes. Interestingly, only a few of these sources have identified particular medical conditions to define potentially preventable hospitalizations. The first source to identify such conditions for hospitalizations from nursing homes seems to be a study by Carter that was published in 2003.(76)

This section describes relevant findings from studies, reports, and quality improvement initiatives on hospitalizations from nursing homes that have been conducted since the late 1970s. It presents and discusses the medical conditions that have been used to define potentially preventable hospitalizations from nursing homes in ten sources published from 2003–2011. It also discusses a different approach to defining potentially preventable hospitalizations from nursing homes that has been tested in a few recently published studies. This approach uses a structured process through which the staff of one nursing home evaluate hospitalizations from that facility to determine whether the hospitalizations could have been prevented.

For the LTQA, it should be noted that almost all hospitalizations from nursing homes involve individuals who could be considered part of the LTQA population.

Findings from early studies about hospitalizations from nursing homes

In the U.S., early studies of hospitalizations from nursing homes were stimulated by clinicians' growing awareness of the large number of hospitalizations from nursing homes and concerns about the appropriateness of the hospitalizations. Many clinicians and others were also concerned about serious negative health effects that were often associated with hospitalization for nursing home residents. These concerns clearly differ from the concerns about disparities in access to ambulatory medical care for people under age 65 that stimulated the development of measures of potentially preventable hospitalizations from the community.

Two early studies of hospitalizations from nursing homes between 1979 and 1984 found that the most common reasons for the hospitalizations were cardiovascular and gastrointestinal conditions, pneumonia, and hip fractures. A retrospective review of findings from one of the studies indicated that 39% of the hospitalizations might have been preventable and that many of these hospitalizations probably resulted from insufficient availability of medical care in the facility.(77) The other study found that residents of large, skilled-level nursing home units and facilities were less likely to be hospitalized than residents of intermediate-level units and facilities, and residents of skilled-level units and facilities that had on-site medical staff were least likely to be hospitalized.(78) The researchers hypothesized that the lesser availability of medical and nursing care in the intermediate-level facilities probably contributed to the higher hospitalization rates from those facilities.

Two other early studies found that infections were the most common reason for hospitalization of nursing home residents.(79,80) One of the research teams concluded that hospitalization could have been avoided for at least one third of the residents with infections if the facility had the capacity to provide IV medications and fluids. They also noted that almost a third of the residents who returned to the nursing home after hospitalization had new or worsened pressure sores.

In 1982, the Monroe County Long-Term Care Program in upstate New York implemented what was probably the first U.S. initiative intended to reduce unnecessary hospitalizations from nursing homes.(81) The initiative created a "Sudden Decline" benefit that provided a financial incentive for physicians and nursing homes to treat residents with acute medical conditions in the nursing home rather

than sending them to the hospital. The benefit paid physicians to examine residents in the nursing home before deciding whether to hospitalize them and to make daily visits to residents with acute medical conditions who were not hospitalized. It also raised the nursing home payment for residents who were not hospitalized and paid for tests and procedures needed to manage these residents' care in the facility.

Data on the first 112 residents cared for under the "Sudden Decline" benefit in 1982 and 1983, show that they were significantly ill: 21% had to be hospitalized despite the benefit, and half of these individuals died in the hospital; likewise, 18% of the residents who were managed in the nursing home died in the brief time they were covered by the benefit.(81) There was no control group, but a retrospective analysis conducted by three physicians not connected to the nursing homes found that 60% of the 112 cases cared for under the benefit represented certain or likely hospitalizations that had been prevented. The researchers conclude that, "it seems highly likely that significant hospital days can be saved by this kind of a program, and that deleterious effects of patient transfer can be avoided."(81, p.128) A 1988 editorial about the initiative noted that the "Sudden Decline" benefit addressed many of the factors that encourage hospitalization of nursing home residents and that additional research would be required to determine whether the kind of care needed to manage residents effectively without hospitalizations could be provided in a typical nursing home.(82)

Another 1988 report described many factors in addition to residents' medical conditions that encourage hospitalization, including insufficient onsite physician consultation, insufficient numbers of well- trained nurses willing to work in nursing homes, and system-level factors, such as Medicare and Medicaid regulatory and reimbursement policies and hospital discharge planning practices. These factors were said to result in the "ping-ponging" of residents between nursing homes and hospitals.(83)

A study that compared nursing homes with high versus low hospitalization rates found that residents' medical conditions were similar in the two types of facilities, but more residents of facilities with high hospitalization rates were hospitalized for fever, infections and pneumonia, whereas more residents of facilities with low hospitalization rates were hospitalized for more serious, acute conditions, such as hip fracture, GI bleeding, and stroke.(84) Facilities with low hospitalization rates were more likely to have onsite physician coverage and 24-hour RN staff and less likely to hospitalize residents who were chronically ill, physically frail and/or cognitively impaired. Interestingly, nurses from facilities with low hospitalization rates were more likely than nurses from facilities with high hospitalization rates to have negative views about hospitalizing residents and more likely to say that hospitalized residents often returned to the facility in a deteriorated state.

A 1989 study followed 215 "acute illness episodes" for residents age 33 to 102 in three nursing homes to identify factors associated with hospitalization.(85) The study found large differences among the facilities in the proportion of residents with acute medical conditions who were hospitalized, ranging from 24% in one facility to 49% and 59% in the second and third facilities, respectively. The study reports residents' diagnoses and symptoms but places much greater emphasis on other factors believed to affect decisions about hospitalization. These factors include availability of laboratory, x-ray and pharmacy services, availability of nurses who could administer IV therapy, physician perceptions about the relative convenience of managing acutely ill residents in the facility versus the hospital, the speed with which nurses could contact a resident's physician, and pressure from families who believed that the nursing home staff was not capable of managing their relative's medical condition.

In the mid-1990s, some studies of hospitalization of nursing home residents continued to focus primarily on residents' medical conditions (see, e.g., Murtaugh and Freiman, 1995).[86] In general, however, the main focus of most studies published in this period was factors beyond residents' medical conditions that were associated with hospitalization. One study analyzed data from a nationally representative sample of nursing home residents and found a small but statistically significant negative relationship between nursing home reimbursement rates and hospitalization.[87] The researchers commented that "facilities receiving more funds for the care of a resident are more likely, and possibly better able, to assume the risks of treating residents with potentially acute or life-threatening illness episodes."[87, p.358]

A 1994 study of physician decisions about hospitalization for nursing home residents with respiratory tract or urinary tract infections found that less than one-fourth (23%) of the hospitalized residents were evaluated by a physician in the nursing home before being hospitalized.[88] Another study that followed more than 300 residents with pneumonia, 21% of whom were hospitalized, found that the residents who were hospitalized had worse health outcomes, including greater mortality, than those who were treated in the facility, even after adjustment for baseline differences between the residents.[89,90]

A 1996 literature review identified 26 studies of hospitalization of nursing home residents published between 1980 and 1995.[91] The reviewers concluded that despite some progress in understanding the determinants of hospitalizations, additional research was needed to support initiatives to improve resident care and reduce hospitalization rates.

In 2000, Saliba et al. reported results from a retrospective analysis of 100 hospitalizations from eight California nursing homes, showing that 40% of the hospitalizations were inappropriate.[92] A 2008 literature review of 59 studies of hospitalization of nursing home residents published through 2006, including the study by Saliba et al., noted that much had changed since the 1996 review.[93] In particular, the reviewers state that, "more recent studies have begun to distinguish between hospitalizations that are potentially preventable and those that are not" and that, "(o)bviously, the factors associated with potentially preventable hospitalizations are of the most interest to policy makers."[93, p.5]

Table 2 shows the medical conditions that have been used to define potentially preventable hospitalizations from nursing homes in ten studies, reports, and quality improvement initiatives, beginning with the 2003 study by Carter.[76] The number at the top of each column is keyed to the list of sources at the bottom of the table. The sources are presented in chronological order by publication date from left (2003) to right (2010). A "+" in a cell means more information about the wording of the condition is provided in the notes below the table.

Table 2 does not include every source found to have specific wording to define potentially preventable hospitalizations from nursing homes. Additional sources are listed in Appendix B.

Table 2: Medical Conditions Used To Define Potentially Preventable Hospitalizations from Nursing Homes in Ten Studies, Reports, and Quality Improvement Initiatives Published From 2003–2011

IDENTIFIED CONDITION	1	2	3	4	5	6	7	8	9	10
Altered mental status, acute confusion, delirium									✔	
Anemia									✔	
Anemia for long-stay residents					✔+					
Angina	✔	✔	✔	✔		✔	✔	✔		
Angina without procedure										✔
Asthma	✔	✔	✔	✔		✔	✔	✔		
Adult asthma										✔
Cellulitis	✔	✔	✔	✔		✔	✔	✔		
Chronic obstructive pulmonary disease	✔	✔	✔	✔		✔	✔	✔		✔
COPD, asthma									✔+	
Congenital syphilis	✔									
Congestive heart failure		✔	✔	✔		✔	✔	✔	✔	✔
Congestive heart failure for short-stay residents					✔+					
Congestive heart failure for long-stay NH residents					✔+					
Constipation, impaction									✔	
Dehydration	✔	✔	✔	✔		✔	✔	✔	✔+	✔
Dental conditions	✔			✔				✔		
Diabetes		✔	✔			✔	✔	✔		
Diabetes short-term complications (includes ketoacidosis, hyperosmolarity, coma)	✔			✔						✔
Diabetes long-term complications										✔
Diabetes with specified manifestations	✔+			✔+						
Diabetes without specified manifestations	✔+			✔+						
Uncontrolled diabetes										✔
Diarrhea, gastroenteritis, C. *Difficile*									✔+	
Electrolyte imbalance for short-stay residents					✔+					
Electrolyte imbalance for long-stay residents					✔+					
Epilepsy		✔				✔	✔			
Failure to thrive	✔							✔		
Falls/trauma									✔	
Gastroenteritis	✔	✔	✔	✔		✔	✔	✔		

IDENTIFIED CONDITION	1	2	3	4	5	6	7	8	9	10
Grand mal seizure disorder	✔			✔				✔		
Grand mal status and epileptic convulsions			✔							
Hypertension	✔	✔	✔	✔		✔	✔	✔	✔+	✔
Hypoglycemia	✔	✔	✔	✔		✔	✔	✔		
Poor glycemic control									✔+	
Immunization for preventable infectious diseases	✔							✔		
Injuries from falls/fractures				✔						
Iron deficiency anemia	✔							✔		
Kidney/Urinary tract infection	✔		✔	✔						
Lower-extremity amputation among patients with diabetes										✔
Weight loss and malnutrition									✔+	
Nutritional deficiencies	✔							✔		
Pelvic inflammatory disease	✔							✔		
Perforated or ruptured appendix										✔
Pneumonia		✔	✔	✔		✔	✔		✔+	
Bacterial pneumonia								✔		✔
Psychosis, agitation, organic brain syndrome									✔	
Respiratory infection for short-stay residents					✔+					
Respiratory infection for long-stay residents					✔+					
Seizures									✔	
Sepsis for short-stay residents					✔+					
Sepsis for long-stay residents					✔+					
Septicemia				✔						
Severe ear, nose or throat infection	✔	✔	✔			✔	✔	✔		
Skin ulcers and cellulites									✔+	
Tuberculosis	✔							✔		
Urinary tract infection		✔				✔	✔	✔	✔	✔
Urinary tract infection for short-stay residents					✔+					
Urinary tract infection for long-stay NH residents					✔+					

SOURCES:

1. Carter. (2003); lists codes; condition 'diabetes with specified manifestations' is specified as ICD-9-CM codes 250.8 and 250.9; condition 'diabetes without specified manifestations' is specified as ICD-9-CM codes 250.0.[76]
2. Intrator et al. (2004); does not list codes.[94]
3. Grabowski et al. (2007); does not list codes.[95]
4. Walker et al. (2009); lists codes; the condition 'diabetes with specified manifestations' is specified as ICD-9-CM codes 250.8 and 250.9; the condition 'diabetes without specified manifestations' is specified as ICD-9-CM code 250.0.[96]
5. White et al. (2009); does not list codes.[97]
6. Young et al. (2010); does not list codes.[98]
7. Young et al. (2010); does not list codes.[99]
8. Becker et al. (2010; does not list codes.[100]
9. Walsh et al. (2010); lists codes; the condition 'COPD/asthma' includes chronic bronchitis; the condition 'dehydration' includes acute renal failure, kypokalemia, and hyponatremia; the researchers note that 'acute renal failure' is included because "it is often the code used for patients who are dehydrated," the condition, 'diarrhea, gastroenteritis, C. *Difficile*' specifies gastroenteritis with nausea and vomiting; the condition 'hypertension' also includes hypotension; the condition 'poor glycemic control' includes hyperglycemia and hypoglycemia and diabetes with ketoacidosis or hyperosmolar coma; the condition 'weight loss and malnutrition' also includes nutritional deficiencies and adult failure to thrive; the condition 'pneumonia' includes lower respiratory disease and bronchitis; the condition 'skin ulcers, cellulitis' specifies skin ulcers including pressure ulcers.[12]
10. Jacobson et al.; does not list codes.[101]

Observations

Number and complexity of the medical conditions in Table 2

The 10 research studies, reports and quality improvement initiatives included in Table 2 identify 59 medical conditions that have been used to define potentially preventable hospitalizations from nursing homes. A few of these medical conditions were identified by only one or a few of the sources, but some were identified by many of the sources. Conditions identified by seven or more of the ten sources are: angina, asthma, cellulitis, COPD, congestive heart failure, dehydration, gastroenteritis, hypertension, and hypoglycemia.

As was true for the medical conditions used to define potentially preventable hospitalizations from the community and discussed in the previous section, many of the medical conditions shown in Table 2 seem to be closely related. These conditions include: 1) 'asthma,' 'adult asthma,' and 'COPD/asthma;' 2) 'pneumonia' and 'bacterial pneumonia;' 3) 'gastroenteritis' and 'diarrhea, gastroenteritis, C. *Difficile*;' and 4) 'urinary tract infection' and 'kidney/urinary tract infection.' Some of these conditions are probably identical, thereby increasing the number of sources that identify that condition. If, for example, the conditions 'urinary tract infection' and 'kidney/urinary tract infection' are identical, then that condition is identified by all ten sources. To determine whether the identified conditions are identical, however, it would be necessary to compare the specific codes used by each of the sources.

Medical conditions used

Most of the sources shown in Table 2 use lists of medical conditions that were first identified by sources discussed in the previous section and were intended to define potentially preventable hospitalizations from the community. Some of the sources in Table 2 acknowledge that the conditions they used were identified for community-dwelling people under age 65 and comment on their use of these conditions to study hospitalizations from nursing homes.

In her 2003 study of resident, facility and market-level factors associated with hospitalizations from nursing homes, Carter (Table 2, col.1) used 22 medical conditions to define potentially preventable hospitalizations. The 22 medical conditions are attributed to the 1993 IOM report.[26] Carter notes that hers is the first study to use measures of ambulatory care sensitive (ACS) conditions to analyze hospitalizations from nursing homes and comments that, "Unfortunately, most of the research efforts to date aimed at validating ACS measures have relied on age groups between 18 and 64 years of age, raising questions about the measures' reliability for older populations."[76, p.298] She cites a doctoral dissertation by Bethel (1996) that was not reviewed for this white paper but is said to examine the reliability and validity of ACS hospitalization measures and to conclude that, "use of rates of ACS hospitalizations for measuring health care system performance among populations aged 65 years and older is … methodologically robust."[76, p.298]

Four sources included in Table 2 use what are probably the same 14 medical conditions to define potentially preventable hospitalizations. The only difference in the conditions used by these sources is the wording of one condition that three of the sources refer to as 'epilepsy' and one source refers to as 'grand mal status and epileptic convulsions.'

- Intrator et al. (2004) (Table 2, col.2) attribute the 14 medical conditions to a 1998 study of potentially preventable hospitalizations from the community in people age 65 and older[35] which, in turn, attributed the conditions to the three studies conducted in 1992 and 1993 that selected conditions to identify potentially preventable hospitalizations in people under age 65.[24,25,26] Intrator et al. comment that, "although it has not yet been established that these particular diagnoses directly apply in the NH setting, it is reasonable to surmise that long-term NH residents face similar clinical problems that older adults living in the community face."[94, pps.1730-1731]

- Grabowski et al. (2007) (Table 2, col.3) attribute the 14 medical conditions to the same 1998 study, commenting that, "any definition of potentially avoidable hospitalizations is subjective, and we acknowledge a lack of consensus among clinicians on this issue. Specifically, the ACS conditions were developed for the community-dwelling population, not the chronically ill nursing home population. However, other studies—using alternative definitions—also suggest that a large proportion of nursing home hospitalizations may be potentially preventable."(95, p.1759)
- Young et al. (2010a and 2010b) (Table 2, cols.6,7) attribute the 14 conditions to Grabowski et al. (2007) (above), and note that "(t)hese ACS diagnoses were developed for the community-dwelling elderly and have also been applied to the nursing home population."(98, p.173; 99, p.902)

Walker et al. (2009) (Table 2, col.4) uses 18 medical conditions to create a definition of potentially avoidable hospitalizations that is applicable to Canadian nursing home residents.(96) The researchers started with a list of 11 conditions, attributed to one of the 1993 studies that selected medical conditions to identify potentially preventable hospitalizations in community-dwelling people under age 65. An expert panel revised the list, adding septicemia and falls/fractures and deleting immunization-preventable conditions, nutritional deficiencies, severe ear, nose and throat infections, and TB, because these conditions were found to be relatively rare in the Canadian nursing home population.

A 2010 report prepared for CMS (Table 2, col.9) uses 16 medical conditions to define potentially preventable hospitalizations for dual eligibles who receive long-term services and supports in Medicaid-covered nursing facilities and Medicare-covered skilled nursing facilities.(12) The list of codes used to specify the 16 conditions is 53 pages long, including 33 pages of codes for the condition 'falls and trauma.' The researchers also added one new condition, 'altered mental status, acute confusion, delirium,' commenting that:

> "Depending on (the) underlying condition, (these conditions) often can be managed without hospitalization ... Hospitalization is only necessary if the patient is a danger to herself or others."(12, p. 31)

Defining potentially preventable hospitalizations from nursing homes for quality monitoring, public reporting, and pay-for-performance programs

The review conducted for this white paper identified one pay-for-performance program that is using measures of potentially preventable hospitalizations from nursing homes. The Nursing Home Value-Based Purchasing (NHVBP) demonstration, which began in 2009 and is being implemented in three states, uses 11 medical conditions to define potentially preventable hospitalizations, including five conditions, each of which is defined differently for short-stay residents, i.e., those who spend less than 90 days in the NH during an episode of care, and long-stay residents, i.e., those who spend at least 90 days in the NH during an episode of care; a sixth condition, 'anemia,' is only used for long-stay residents (Table 2, col.5).(97) Risk adjustment algorithms developed for the demonstration include adjustments for many resident-related factors that have been shown to be associated with hospitalization, including comorbidities, prior hospitalization, and functional status.(102)

In 2008, two articles in the *Journal of the American Geriatrics Society* discussed the pros and cons of using measures of potentially preventable hospitalizations in pay-for-performance programs in general and in the NHVBP demonstration in particular. Briesacher et al. (2008) comment that "(it) is unclear … whether appropriate versus inappropriate hospitalizations can be distinguished for nursing home residents" and add that the

construct, *potentially preventable hospitalization* was developed for and tested in community-dwelling people.[103, p.1938] The authors point out that nursing homes would require up-front resources to provide the kinds of care needed to reduce resident hospitalizations and warn nursing homes that they "would be well advised to think carefully before participating in CMS' NHVBP demonstration because "they could invest resources to improve quality of care but fail to meet the requirement for Medicare savings resulting from a reduction in hospitalizations.[103, p.1939] In an editorial response, Ouslander and Lynn (2008) agree that many nursing homes do not have current capacity or the resources that would be needed to reduce resident hospitalizations but argue against "throwing the baby out with the bath water."[104] They point out that, in theory at least, savings from the prevention of resident hospitalizations could be invested over time in the development of the needed capacity, assuming that the savings come back to the nursing home.

Little is known about how the particular medical conditions used to define potentially preventable hospitalizations will affect outcomes in the NHVBP demonstration or any other pay-for-performance program. A 2009 literature review on nursing home pay-for-performance programs found only one program that used reduced hospitalizations as an outcome measure. The program was conducted in San Diego in the early 1980s. Residents of the participating nursing homes were reportedly hospitalized less often than residents in control facilities,[105] but it is not clear whether the program counted all hospitalizations or only hospitalizations for specified medical conditions. Another study of state Medicaid pay-for-performance programs in nursing homes found that in 2007, six states had an operational program, but none of the states used 'potentially preventable hospitalizations' to determine reimbursement.[106]

The review conducted for this white paper did not identify any measures of potentially preventable hospitalizations from nursing homes that are being used for quality monitoring or public reporting purposes. The nursing home quality measures endorsed for public reporting by the National Quality Forum (NQF), including the measures endorsed by NQF in 2011, do not include measures of potentially preventable hospitalizations. Likewise, the quality indicators on the CMS website, *Nursing Home Compare*, do not include potentially preventable hospitalizations. Grabowski et al. (2007) suggested that CMS could add a risk-adjusted measure of potentially avoidable hospitalizations to *Nursing Home Compare* and noted that developing such a measure is one objective of the ongoing NHVBP demonstration."[95, p.1759]

An alternate approach to defining potentially preventable hospitalizations from nursing homes

Instead of prospectively defining hospitalizations for particular medical conditions as potentially preventable, three recently published articles describe interventions that involve staff members from individual nursing homes in trying to reduce hospitalizations from their own facility, including structured procedures to encourage staff members to consider in retrospect whether particular hospitalizations from the facility could have been prevented.

- A 6-month quality improvement pilot project conducted in three Georgia nursing homes in 2007 used a set of procedures and tools intended to reduce potentially preventable hospitalizations.[107] In each facility, a staff team was designated to participate in training sessions, and one team member was appointed as the project champion to lead the team and promote the use of the project procedures and tools. Every two weeks, the project champion completed a review form on any hospitalizations that occurred, noting what happened and whether anything could have been done to avoid the hospitalization. The 6-month pilot project resulted in a 50% reduction in hospitalization rates across the three facilities compared with rates during the 15 months before the project began.

Despite this substantial reduction in hospitalizations, an analysis of the review forms showed that the project champions also thought an additional 40% of the hospitalizations that did occur were potentially preventable. The researchers comment that the use of such review forms "could be a powerful learning strategy in future quality improvement initiatives focused on reducing avoidable hospitalizations."[107,p.648]

- A second 6-month quality improvement project conducted in 25 nursing homes in three states in 2009 used a revised set of procedures and tools intended to reduce potentially preventable hospitalizations.[108] One nursing home staff member, usually a nurse, was appointed to be the project champion and to complete a structured review of any hospitalizations that did occur, what happened, and whether anything could have been done to avoid the hospitalization, using the "Quality Improvement Tool for Review of Acute Care Transfers."[109] This 6-month project resulted in a 17% reduction in hospitalizations from the 25 nursing homes, with a higher reduction (24%) in the 17 nursing homes that were most engaged in the project. Data from the "Quality Improvement" forms showed that the project champions also thought 24% of the hospitalizations that did occur were potentially preventable. The proportion judged to be potentially preventable was somewhat higher (25.9%) in the engaged nursing homes, and increased in those facilities from 18% in the first month of the project to 30% at the end of the project.[110] Narrative reports of collaborative calls with the project champions indicated that some of them "change(d) their perceptions of avoidability of (hospital) transfers" and "initiated dialogue with other staff about the potential for preventing or anticipating events that could lead up to a hospital transfer."[110, p.1671] The researchers comment that additional studies are needed to understand the factors associated with changes in these staff perceptions and behaviors.
- A third, quasi-experimental project conducted in a hospital-based skilled nursing unit from 2009-2010, used several approaches to reduce hospital readmissions from the unit.[111] One of the approaches was multidisciplinary meetings, referred to as Team Improvement for the Patient and Safety (TIPS) meetings. Nurses, nursing aides, physicians, therapists, social workers, a nursing home administrator, and other staff members attended the TIPS meetings, which were intended to examine the "root causes" of particular hospital readmissions and identify ways in which they might have been avoided. The meetings usually lasted 30 minutes, and meeting times were varied to ensure that night and evening staff were included. Nursing aides were paid to attend TIPS conferences after their shifts ended, and a 'lessons learned" email was sent to all direct care staff after each meeting. A pre-post evaluation indicated that hospital readmissions from the unit dropped by 20% during the project period.

The researchers who conducted these three studies point out that it is not clear which component(s) of the interventions resulted in the reduction in hospitalizations and that the retrospective reviews by facility staff can be time-consuming. On the other hand, the interventions did result in large reductions in hospitalizations.

Other studies that have interviewed nursing home staff members have found that staff members in the same and different facilities have widely different views about the reasons for hospitalizing residents; the pros and cons of hospitalization for residents, their families, their physicians, and the nursing home; and the extent to which they have any control over decisions about hospitalizations, see, e.g., Buchanan et al., 2006;[112] Cohen-Mansfield and Lipson, 2003;[113] Lynn, 2010;[114] Perry et al. 2010;[115]

Teresi et al. 1991.[84] Additional research is needed to test interventions like those described above that try to focus administrator and staff attention on the goal of preventing unnecessary hospitalizations and provide them with tools and structured procedures to help them accomplish this goal.

Implications for the LTQA population

Retrospective reviews of hospitalizations from nursing homes have found that substantial proportions of these hospitalizations are potentially preventable, and quasi-experimental studies have shown that substantial proportions of hospitalizations from nursing homes can, in fact, be prevented. The latter studies did not use particular medical conditions to define potentially preventable hospitalizations. Rather, the clinician researchers trained, assisted and encouraged the staff of each participating nursing home to try to prevent unnecessary hospitalizations and then to analyze retrospectively whether hospitalizations that did occur could have been prevented. In contrast, the sources included in Table 2 used medical conditions to define potentially preventable hospitalizations prospectively. Interestingly, most of these sources used their definitions in research on non-resident factors associated with potentially preventable hospitalizations, rather than in interventions to reduce hospitalizations.

A 1996 editorial about hospitalizations from nursing homes asks, "What is the right rate?"[116] The editorial reviews the many non-resident factors that have been shown to drive decisions about hospitalization. It also provides case examples to show that decisions about whether an individual nursing home resident *should be* hospitalized depend not only on the presenting medical condition that could be the reason for hospitalization but also on the resident's other medical conditions, stage of illness, and preferences; whether the hospitalization will benefit the resident; whether the resident will be able to avoid hospital-related complications and iatrogenic illness; and, importantly, whether the nursing home has the capacity and resources needed to manage the resident's care effectively without hospitalization. Thus, the right decision for residents with the same presenting medical condition could differ, and the right decision for the same resident in facilities with less or more capacity and resources to manage the resident's care could also differ.

In this context, the NHVBP demonstration will provide useful information about the effects on hospitalization rates and residents' health and quality of life of using payment incentives based on measures of potentially preventable hospitalizations defined as they are for the demonstration. Similar efforts are needed to evaluate the effects of using payment incentives based on measures that incorporate different medical conditions to define potentially preventable hospitalizations. Concurrently, larger-scale, controlled trials are needed to test the alternate approach of training, assisting, and encouraging nursing home staff to prevent unnecessary hospitalizations. CMS initiatives, such as the newly announced demonstration program to improve quality of care for nursing home residents[117] provide opportunities to implement and evaluate these alternate approaches.

3. Medical Conditions Used to Define Potentially Preventable Hospital Readmissions

A widely cited study published in 2009 found that almost 20% of fee-for-service Medicare beneficiaries who were discharged from a hospital in 2003 were readmitted within 30 days.[118] Likewise, in 2008, 19% of Medicare beneficiaries age 65 and older and 24% of those age 18-64 who were discharged from a hospital were readmitted within 30 days.[119]

Some, but not all, hospital readmissions of Medicare beneficiaries involve individuals who could be considered part of LTQA population. Among Medicare beneficiaries, nursing home residents are certainly part of the LTQA population and generally have higher readmission rates than community-dwelling Medicare beneficiaries. Among Medicare beneficiaries who are discharged from a hospital to a skilled nursing facility, about one-quarter are readmitted to a hospital within 30 days.[120,121] When time intervals longer than 30 days are used, readmission rates for Medicare beneficiaries, in general, and nursing home residents, in particular, are even higher.[101,118]

Adults with chronic medical conditions also have higher readmission rates than those without chronic conditions. Among people age 18 and older who were hospitalized in six states in 2002, 20% were readmitted within the year.[122] Those with one chronic condition were 61% more likely than those with no chronic conditions to be readmitted, and the likelihood of readmission increased with each additional chronic condition. People with seven chronic conditions were 193% more likely than those with no chronic conditions to be readmitted. Greater severity of illness was also associated with greater likelihood of readmission.

This section describes findings from studies about hospital readmissions that have been conducted since the late 1970s. It presents and discusses the medical conditions that have been used to define potentially preventable readmissions in six sources published from 2004–2011. It also discusses the implications for the LTQA population of the strong current emphasis on reducing readmissions in Medicare and other programs that pay for medical care, and in particular, the definitions of potentially preventable readmissions that have been or are currently being developed for these programs.

From the perspective of the LTQA, it is important to note that many hospitalizations from the community and nursing homes, that were the focus of the previous two sections of this white paper, can also be categorized as hospital readmissions depending on the length of the time interval (e.g. 30 days, 60 days or longer) between the first and subsequent hospitalizations that is used to define a readmission. Conversely, almost all readmissions can also be categorized as either hospitalizations from the community or hospitalizations from nursing homes or similar subacute and residential care facilities. Conceptually, categorizing hospitalizations as readmissions places the hospital at the center or at least the starting point of the person's episode of care. In contrast, categorizing the same hospitalizations as hospitalizations from the community or nursing homes places these settings and the health care and long-term services and supports provided in the settings at the center or at least the starting point of the episode of care. This distinction is important for people in the LTQA population, all of whom are, by definition, receiving paid or unpaid long-term services and supports. The implications of the distinction are discussed further at the end of this section.

Findings from early studies about hospital readmissions

In the U.S., early research on hospital readmissions was stimulated by awareness of the large number and high cost of readmissions. Based on data from the mid-1970s, Anderson and Steinberg (1984) published an influential study showing that 23% of hospitalizations of Medicare beneficiaries were followed by readmission within 60 days and that these readmissions accounted for 24% of Medicare inpatient expenditures.[123] Medicare beneficiaries under age 65 were slightly more likely than beneficiaries age 65 and older to be readmitted, and readmission rates were also higher for dual-eligibles. The researchers concluded that further study of factors associated with readmissions could "identify high-risk patient groups for whom increased outpatient supports might prove cost effective."[123, p. 1353]

Other early studies focused primarily on factors associated with readmissions.[124,125,126,127,128] Like Anderson and Steinberg (1984), these studies point out that information about the characteristics of patients who were likely to be readmitted could be used to identify individuals who should receive better discharge planning and postdischarge care and supports. The studies addressed readmissions that occurred within various time intervals between the first and subsequent hospitalizations, from 2 weeks to a year. Their findings about patient characteristics associated with readmission include many characteristics that are common in the LTQA population, e.g., multiple chronic conditions, advanced stage and severity of illness, poor health status, high number of medications, medication changes near the time of discharge, multiple previous admissions, and difficulty coping in the community.

Implementation of the Medicare Prospective Payment System (PPS) in 1984 led to a shift in focus for research and policy-related analyses about hospital readmissions. PPS created strong financial incentives for shorter hospital stays. Clinicians, researchers, and policymakers were concerned that the new incentives would result in reduced quality of hospital care and premature discharges.[129] Thus, the focus of research and policy analysis shifted to the relationship between the quality of care provided in the hospital and subsequent readmissions. Readmission rates were also believed to be an easy and appealing way to measure problems in the quality of hospital care – easy because data to measure readmissions were available from administrative records and appealing because readmissions were known to result in higher costs.[130,131]

With the implementation of PPS, federally funded Peer Review Organizations (PROs) were required to monitor hospital readmissions, focusing first on readmissions within 7 days from discharge and then readmissions within 15 days and then 31 days from discharge.[132] PROs were initially required to review only 'related readmissions,' interpreted to mean readmissions to the same hospital. Beyond that restriction, however, PROs had wide discretion about which readmissions to review. A 1989 report of the U.S. Office of the Inspector General (OIG) concluded that this wide discretion had resulted in substantial variation among PROs in the types of readmissions they reviewed and the readmission rates they reported. Subsequently, the third PRO 'scope of work' added a requirement for review of 25% of all readmissions within 31 days of discharge regardless of whether the readmission seemed to the PRO to be "related" to the initial admission.[132, p.3]

More importantly for this white paper, the OIG's analysis of readmission data found that, "Readmissions do not significantly differ from other hospitalizations in the rate of unnecessary admissions, poor quality care or premature discharge."[132, p.i] The OIG recommended that PROs stop focusing their hospital reviews on readmissions.

Beginning in this period, many studies were conducted to determine whether hospital readmissions are caused by problems in the quality of hospital care and premature discharges. Conclusions from these studies were equivocal.

- A 1991 study of readmissions within 31 days for patients discharged from Michigan hospitals found that the factors most consistently associated with readmissions were the severity and complexity of patients' conditions.[133] The study found "no consistent patterns suggestive of quality of care problems" associated with readmissions.[133, p.377]

- A 1994 study of readmissions within a 3-year period for Medicare beneficiaries age 65 and older who were discharged from hospitals in New Haven and Boston found that regardless of the reason for the initial hospitalization, Medicare beneficiaries in Boston were more likely than Medicare beneficiaries in New Haven to be readmitted.[134] This difference was not explained by patient characteristics or other aspects of the hospital stay that were included in the study, and the researchers concluded that it was probably associated with differences in hospital bed availability in the two communities.

- A 1995 study of readmissions within 14 days for veterans who were discharged from 12 VA hospitals evaluated quality of care in the initial hospitalization using disease-specific criteria developed by expert physician panels.[130] The study found that for patients with diabetes or heart failure, average scores on the quality of care criteria related to 'readiness-for-discharge' were lower for those who were readmitted than for those who were not readmitted. Among patients with COPD, average scores on the quality of care criteria related to the hospital 'admission work-up' were lower for those who were readmitted than for those who were not readmitted.

- A 1995 study of readmissions within 30 days for Medicare beneficiaries age 65 and older who were discharged from California hospitals evaluated quality of care in the initial hospitalization using PRO criteria for selecting hospitalizations for further quality review.[135] The study found that two of the PRO discharge-related criteria (absence of documentation of discharge planning and medical instability of the patient at discharge) were associated with readmission, whereas the PRO screens related to inpatient care (nosocomial infections, unscheduled return to surgery during the same hospital stay and trauma suffered in the hospital) were not associated with readmission.

One review of hospital readmission studies published from 1966–1993, concluded that readmissions are associated with the quality of care provided in the initial hospitalization and increase by more than 50% when inpatient care is of low quality.[130] Another review of readmission studies published from 1991-1998 cited the conclusion of the previous review but also described other studies that found no association between readmissions and the quality of care provided in the initial hospitalization.[136] The second review concluded that general measures of readmissions have limited value as measures of the quality of inpatient care, but that, "high readmission rates of patients with defined conditions, such as diabetes and bronchial asthma, may identify quality-of-care problems. A focus on the specific needs of such patients may lead to the creation of more responsive health care systems for the chronically ill."[136, p. 1074]

Along with early studies of factors associated with readmissions and the relationship of readmissions to the quality of inpatient care, other early studies tested interventions intended to reduce readmissions. In the late 1980s and early 1990s, at least five randomized, controlled studies were conducted in the U.S. to evaluate the impact of enhanced post-discharge care for people considered to be at risk of readmission (see, Weinberger et al. 1988;[137] Naylor et al. 1994;[138] Fitzgerald et al.,1994;[139] Naylor et al. 1999;[140] Weinberger et al. 1996;[141] These studies enrolled patients who were believed to be at risk of readmission because of their medical condition(s) and other factors, such as severity of

illness, previous hospitalizations, and previous emergency department visits. The patients were randomized to an intervention or control group; patients in the intervention groups received enhanced discharge planning and post-discharge care provided by a nurse, other case manager, or physician-nurse team, and the impact of the intervention on hospital readmission was measured. Three of the studies found reduced readmissions in the intervention group; one found no difference in readmissions between the intervention and control group; and one found increased readmissions in the intervention group.

Although all five studies enrolled samples with medical conditions believed to increase risk of readmission, the researchers did not explicitly identify medical conditions to define potentially preventable readmissions. The first U.S. source to identify medical conditions for that purpose seems to be a study by Friedman and Basu that was published in 2004.[142]

Table 3 shows the medical condition-descriptors that have been and are now being used to define potentially preventable hospital readmissions in six studies, reports, and government policy initiatives published since 2004. The number at the top of a column is keyed to the list of sources at the bottom of the table. The sources are presented in chronological order by publication date from left (2004) to right (2011). A "+" in a cell means that more information about the wording of the condition is provided in the notes below the table.

Table 3 does not include every source that was found to have specific wording to define potentially preventable readmissions. Additional sources are listed in Appendix C. The table also does not include sources that identify only a single medical condition or refer to hospitalization in general. Measures from these sources are discussed later in this section.

Note: Measures that define potentially preventable readmissions must have a description of: 1) the initial hospitalization; 2) the readmission; and 3) the time interval between them. The term, *condition-descriptor*, is used in this white paper to refer to that 3-part description.

Table 3: Medical Condition-Descriptors Used To Define Potentially Preventable Hospital Readmissions in Six Studies, Reports, and Policy Initiatives Published from 2004–2011

IDENTIFIED CONDITION	1	2	3	4	5	6
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of diabetes, short term complication (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of diabetes, short term complication (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of perforated appendix (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of perforated appendix (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of diabetes, long term complication (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of diabetes, long term complication (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of COPD (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of COPD (PQI)	✔					
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of COPD			✔			
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of hypertension (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of hypertension (PQI)	✔					
All-cause readmission within 30 days from discharge for people with a previous admission for a principal diagnosis of congestive heart failure						✔
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of congestive heart failure (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of congestive heart failure (PQI)	✔					
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of heart failure			✔			
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of dehydration (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of dehydration (PQI)	✔					
All-cause readmission within 30 days from discharge for people with a previous admission for a principal diagnosis of pneumonia						✔
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of pneumonia			✔			
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of bacterial pneumonia (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of bacterial pneumonia (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of urinary tract infection (PQI)	✔					

IDENTIFIED CONDITION	1	2	3	4	5	6
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of urinary tract infection (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of angina (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of angina (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of diabetes, uncontrolled (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of diabetes, uncontrolled (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of adult asthma (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of adult asthma (PQI)	✔					
All-cause readmission within 3 months from discharge for people with a previous admission for a principal diagnosis of lower extremity amputation (PQI)	✔					
All-cause readmission within 6 months from discharge for people with a previous admission for a principal diagnosis of lower extremity amputation (PQI)	✔					
All-cause readmission within 30 days from discharge for people with a previous admission for a principal diagnosis of acute myocardial infarction (AMI)						✔
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of acute myocardial infarction (AMI)			✔			
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of coronary artery bypass graft (CABG) surgery			✔			
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of percutaneous transluminal coronary angioplasty (PTCA) surgery			✔			
All-cause readmission within an unspecified, but short, time from discharge for people with a previous admission for a principal diagnosis of other vascular surgery			✔			
Readmission for angina pectoris and coronary atherosclerosis (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for angina (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for adult asthma (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for bipolar disorders (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for cardiac arrhythmia and conduction disturbance (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for cardiac arrhythmia (6 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for cardiac arrhythmia (6 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				

IDENTIFIED CONDITION	1	2	3	4	5	6
Readmission for other cardiovascular disease (27 codes except 7 subcodes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for other cardiovascular disease (27 codes except 7 subcodes) in 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for cerebrovascular disease (9 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for cerebrovascular disease (9 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Chronic obstructive lung disease (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for COPD (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for congestive heart failure (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission from a SNF for congestive heart failure within 30 days of a previous discharge				✔		
Readmission from a SNF for congestive health failure within 100 days of a previous discharge				✔		
Readmission for congestive heart failure (2 codes) within 30 days for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for congestive heart failure (2 codes) within 180 days for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for heart failure (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for dehydration (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for diabetes short term complications (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for diabetes long term complication (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for diabetes uncontrolled (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for diabetes within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for diabetes within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				

IDENTIFIED CONDITION	1	2	3	4	5	6
Readmission for end stage renal disease (5 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for end stage renal disease (5 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for eye disease (cataract, retinal, glaucoma, blindness, and vision defects) (9 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for eye disease (cataract, retinal, glaucoma, blindness, and vision defects) (9 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for fluid and electrolyte disorders within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for fluid and electrolyte disorders within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission from a SNF for electrolyte imbalance within 30 days of a previous discharge				✔		
Readmission from a SNF for electrolyte imbalance within 100 days of a previous discharge				✔		
Readmission for hypertension (PQI) within 6 months from discharge for people with previous admission for principal diagnosis of the same PQI	✔					
Readmission for hypertension (7 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for hypertension (7 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for ischemic heart disease (7 codes) within 30 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for ischemic heart disease (7 codes) within 180 days from discharge for people with a secondary diagnosis of diabetes and a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for lower extremity amputation (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for lower extremity disease with neurological complications (10 codes) within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				

IDENTIFIED CONDITION	1	2	3	4	5	6
Readmission for lower extremity disease with neurological complications (10 codes) within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for lower extremity disease with skin infections and chronic ulcer (27 codes) within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for lower extremity disease with skin infections and chronic ulcer (27 codes) within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for major depressive disorder (identified by APR-DRGs) within 15 days from a previous disorder					✔	
Readmission for mycoses (15 codes) within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for mycoses (15 codes) within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for perforated appendix (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for peripheral vascular disease related to lower extremity disease (17 codes) within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for peripheral vascular disease related to lower extremity disease (17 codes) within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for bacterial pneumonia (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission for other pneumonia (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for renal failure (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for other renal disease (11 codes) within 30 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission for other renal disease (11 codes) within 180 days from discharge for people with a previous admission for principal diagnosis of diabetes or a secondary diagnosis of diabetes and any of the identified codes for diabetes-related conditions		✔ +				
Readmission from a SNF for respiratory infection within 30 days from a previous discharge				✔		
Readmission from a SNF for respiratory infection within 100 days from a previous discharge				✔		
Readmission for schizophrenia (identified by APR-DRGs) within 15 days from a previous discharge					✔	
Readmission for septicemia and disseminated infection (identified by APR-DRGs) within 15 days from a previous discharge					✔	

IDENTIFIED CONDITION	1	2	3	4	5	6
Readmission from a SNF for sepsis within 30 from a previous discharge				✔		
Readmission from a SNF for sepsis within 100 days from a previous discharge				✔		
Readmission for urinary tract infection (PQI) within 6 months from discharge for people with a previous admission for principal diagnosis of the same PQI	✔					
Readmission from a SNF for urinary tract infection within 30 days from a previous discharge				✔		
Readmission from a SNF for urinary tract infection within 100 days from a previous discharge				✔		

PQIs are Prevention Quality Indicators

APR-DRGs are All Patient Refined Diagnosis Related Groups; this term is used by Goldfield et al. (2008) and described later in the text.

SOURCES:

1. Friedman and Basu. (2004); does not list codes.[142]
2. Jiang et al. (2005); lists codes; codes for diabetes are 2500, 2501, 2502, 2503, 2506, 2507, 2508, and 2509; the number of listed codes for diabetes related conditions, including cardiovascular conditions, renal conditions, lower extremity conditions, eye conditions, and other conditions are shown as part of the condition-descriptors in Table 3.[143]
3. MedPAC. (2007); does not list codes; readmissions are identified using 3Ms software that identifies potentially preventable readmissions.[144]
4. Kramer et al. (2007); does not list codes.[145]
5. Goldfield et al. (2008); lists APR-DRG numbers.[146]
6. Center for Medicare and Medicaid Services. *Hospital Compare*; does not list codes. [147]

Observations

Number and complexity of medical condition-descriptors in Table 3

The six sources included in Table 3 identify 99 condition-descriptors that have been or are being used to define potentially preventable hospital readmissions. None of the condition-descriptors are used by more than one of the sources.

These condition-descriptors are more complex than the medical conditions shown in Tables 1 and 2. The greater complexity is caused by the need to specify the three parts of the condition descriptor: the initial hospitalization, the readmission, and the time interval between them. The initial hospitalization could be any previous hospitalization or a previous hospitalization for a particular medical condition or conditions. Likewise, the readmission could be any readmission (i.e., all-cause readmissions) or readmission for a particular medical condition or conditions. The time intervals used by the sources shown in Table 3 are 15 days, 30 days, three months, 100 days, 180 days, and six months. Although the differences between some of these time intervals are small, e.g., the difference between six months and 180 days, they are nevertheless meaningful for anyone who has to determine exactly which readmissions are considered potentially preventable.

Medical condition-descriptors used

The source shown in Table 3, col.1 uses the 13 AHRQ Prevention Quality Indicators (PQIs) for adults to identify potentially preventable readmissions.(142) The 13 PQIs are combined in three ways: 1) readmission for any cause within three months from discharge following a hospitalization caused by one of the PQIs (13 condition-descriptors); 2) readmission for any cause within six months from discharge following a hospitalization caused by one of the PQIs (13 condition-descriptors); and 3) readmission for a PQI within six months from discharge following a hospitalization caused by the same PQI (13 condition-descriptors). These combinations account for 39 of the 99 condition-descriptors in Table 3.

The source shown in Table 3, col.2 uses ICD-9-CM codes to identify potentially preventable diabetes-related readmissions for two time intervals, 30 days and 180 days.(143) This combination of conditions and time intervals accounts for 30 of the 99 condition-descriptors in Table 3. As shown in the table and notes, the researchers used 2 to 27 ICD-9-CM codes to specify each of diabetes-related medical conditions that could cause the initial hospitalization and the readmission, thereby increasing the apparent complexity of each condition-descriptor.

The condition-descriptors shown in Table 3, col.5 come from a rigorously conducted study intended to identify an exhaustive set of condition-descriptors to define potentially preventable readmissions.(146) The researchers used the 314 'All Patient Refined Diagnosis Related Groups (APR DRGs)' to categorize each hospitalization by cause. They created a matrix in which each APR-DRG was combined with each APR-DRG, resulting in 98,596 cells representing all possible condition-descriptors. They assembled a panel of four physicians (two general internists and two pediatricians), plus other physician specialists as needed, to determine whether the APR-DRGs for the initial hospitalization and readmission in each cell were clinically related. Of the 98,596 possible condition-descriptors, the clinical panel and specialists judged that 33% (32,230 condition-descriptors) were clinically related. Each of the clinically related APR-DRG condition-descriptors was then further divided into four levels of severity of illness. The resulting condition-descriptors were tested in a sample of 4.3 million readmissions to Florida hospitals in 2004–2005. Table 3 shows the ten *medical* APR-DRG condition-descriptors that were most common in the Florida data, using a 15-day time interval. The study also presents the most common *surgical* APR-DRG condition-descriptors, but these condition-descriptors are not shown in Table 3.

Interestingly, three of the ten medical condition-descriptors that were most common in the Florida readmission data were not identified by any other source included in this white paper. The three new condition-descriptors identify behavioral health conditions: major depressive disorder, schizophrenia, and bipolar disorder.(146)

A 2007 report to Congress by the Medicare Payment Advisory Commission (MedPAC) recommends that Medicare use the seven medical and surgical diagnoses shown in Table 3, col.3, as a "starter set" of conditions to define potentially preventable readmissions for purposes of public reporting and eventual payment adjustments for readmissions.(144) The MedPAC report presents data on potentially preventable readmissions based on an analysis of 2005 Medicare claims using 3M software that incorporates many of the same concepts and procedures used to identify the APR-DRG condition-descriptors described above. The "starter set" of seven conditions accounted for 28.1% of all readmissions of Medicare beneficiaries in 2005 and 28.8% of Medicare expenditures for readmissions in that year.

Another analysis uses the same concepts and procedures to calculate the reduction in Medicare expenditures for hospital readmissions that could be obtained with a recommended revision to the existing Medicare Inpatient Prospective Payment System (IPPS).(148) The researchers describe several problems with using measures of potentially preventable readmissions to determine Medicare payments for hospital care. They note that very few condition-descriptors identify readmissions that are always or even almost always preventable. The exceptions are condition-descriptors for readmissions related to obvious errors in the initial hospitalization, such as a foreign object left in the patient's body after surgery. They say that most potentially preventable readmissions are "not clearly linked to a single medical error, and are more likely to result from a series of oversights and inadequacies in the course of the hospitalization or the discharge planning and post-discharge follow-up care."(148, p.2) They further point out that labeling a particular readmission as preventable, "implies that there was a preventable quality problem for that patient, which the physician and the hospital will interpret as an accusation of inadequate care," even though judgments about whether a particular readmission was preventable are "unlikely to be consistent, since we cannot know for certain, or at least are unlikely to consistently agree on the preventability of a specific readmission."(148, p.3) As a result, they envision the following:

> "Physicians and hospitals will, predictably and understandably, respond defensively, not only to save face and protect reputation, but also out of fear that the perceived failure could serve as the basis of a malpractice suit. These defensive responses can include demands for an appeals process in order to contest any judgments considered incorrect or unfair, as well as efforts to discredit the methods used to decide which readmissions were preventable. Both these responses will lead to increased administrative costs and detract from the primary goal of identifying and correcting quality problems."(148, p.2)

Instead of a Medicare payment policy based on identifying particular readmissions as preventable, these researchers propose that Medicare payments for readmissions should be based on hospital-specific readmission rates averaged across APR-DRG condition-descriptors and compared with a best practice standard established by a similar procedure. They also say that hospital-specific readmission rates should be adjusted for factors shown to affect the number of potentially preventable readmissions, including severity of illness, "the presence of certain behavioral health and substance abuse problems (e.g., schizophrenia, alcohol abuse) (and) extremes of age (i.e., greater than 85)."(148, p.5)

The complexity of the condition-descriptors in Table 3 reflects the intent of the clinicians and researchers who developed them to specify exactly which readmissions are potentially preventable. Although important and laudable on the one hand, the complexity of the condition-descriptors will make it difficult for physicians and other health care professionals to know whether a readmission for an individual patient will be considered preventable. The APR-DRG condition-descriptors are probably more complex than the condition-descriptors used by any of the other sources included in Table 3.

Although they may result in more precise and accurate designation of potentially preventable readmissions, they are likely to be even more difficult for physicians and other health care professionals to understand and apply in making decisions about hospital readmission for an individual patient. It is notable that the recommended Medicare payment policy based on hospital-specific readmission rates averaged across APR-DRG condition-descriptors is explicitly intended to eliminate problems associated with using measures of potentially preventable readmissions for individuals by making it difficult, if not impossible, for physicians and other health care professionals to know whether a readmission for an individual patient has been or will be considered preventable.

Other measures of potentially preventable hospital readmissions

In contrast to the sources shown in Table 3, each of which identifies several condition-descriptors to define potentially preventable readmissions, some quality measures identify a single condition-descriptor, and some of these single-condition-descriptors do not specify any particular medical condition, instead identifying readmissions for any medical condition, referred to as all-cause readmissions. None of the single-condition or all-cause readmission measures found in the review conducted for this white paper states explicitly that the readmissions are potentially preventable, but that is certainly implied. Examples of such measures are the following, listed by source.

National Quality Forum

- All-cause readmission index (risk adjusted): total inpatient readmissions within 30 days from non-maternity and non-pediatric discharges to any hospital (NQF # 329)
- 30-day all-cause risk-standardized readmission rate following heart failure hospitalization (risk adjusted) (NQF # 330)
- 30-day all-cause risk standardized readmission rate following hospitalization for acute myocardial infarction (AMI) among Medicare beneficiaries aged 65 years or older at the time of the index hospitalization (risk-adjusted) (NQF # 505)
- 30-day all-cause risk-standardized readmission rate following hospitalization for pneumonia (29 ICD-9 codes) among Medicare beneficiaries aged 65 years and older at the time of the index hospitalization (risk adjusted) (NQF # 506)
- 30-day risk-standardized readmission rates following percutaneous coronary intervention (PCI) (NQF # 695)
- 30-day post-hospital acute myocardial infarction (AMI) discharge care transition composite measure: the incidence among hospital patients during the month following discharge from an inpatient stay having a primary diagnosis of heart failure for 3 types of events, including readmission (NQF # 698)
- 30-day post-hospital heart failure discharge care transition composite measure: the incidence among hospital patients during the month following discharge from an inpatient stay having a primary diagnosis of heart failure for 3 types of events, including readmission (NQF # 699)
- Proportion of patients who died from cancer and had more than one hospitalization in the last 30 days of life (NQF # 212)

Institute for Clinical Systems Improvement

- Heart failure in adults: Percentage of adult patients with a primary diagnosis of heart failure who were admitted for heart failure within 30 days of discharge
- Rate of admissions to an ambulatory surgical center that require a hospital admission upon discharge from the ambulatory care surgical center

Canadian Institute for Health Information

- Acute myocardial infarction (AMI): risk-adjusted rate of unplanned readmission following discharge for AMI in a one-year period, age 15-84 (Health Indicators 2010)
- Asthma: risk-adjusted rate of unplanned readmission following discharge for asthma in a one-year period, age 15-84 (Health Indicators 2010)
- Prostatectomy: risk-adjusted rate of unplanned readmission following discharge for prostatectomy, in a one-year period, age 15-84 (Health Indicators 2010)

It is interesting to consider the term 'unplanned readmissions' that is used in the measures developed by the Canadian Institute for Health Information. Although 'planned' or 'expected' readmissions have been excluded from the readmission samples used in many U.S. studies of potentially preventable readmissions, the term 'unplanned readmissions' appears infrequently in readmission measures developed in the U.S.

Defining potentially preventable readmissions in quality monitoring, public reporting, and pay-for-performance programs

Medicare and many other public and private programs are using or planning to use measures of potentially preventable readmissions for quality monitoring, public reporting, and pay-for-performance programs, with the objective of reducing such readmissions.

In 2003, CMS and The Joint Commission (TJC, previously JCAHO) began working together to create a completely uniform set of measures for monitoring the quality of hospital care; the resulting measure set includes three readmission measures:[149]

- 30-day all-cause risk-standardized readmission rate (RSRR) following acute myocardial infarction (AMI) hospitalization
- 30-day all-cause risk-standardized readmission rate (RSRR) following heart failure hospitalization
- 30-day all-cause risk-standardized readmission rate (RSRR) following pneumonia hospitalization

In 2009, CMS began reporting hospital-specific 30-day all-cause readmission rates for AMI, heart failure, and pneumonia on its public website, Hospital Compare.[150] Hospitals were required to report the 30-day all-cause readmission measure for heart failure as part of the Hospital Inpatient Quality Reporting (IQR) Program, beginning in fiscal year 2010, and are now required to report the readmission measures for AMI and pneumonia.

In 2009, CMS also selected 14 communities nationwide to participate in a pilot project, led by Quality Improvement Organizations (QIOs), to reduce unnecessary hospital readmissions. The project used the same 30-day all-cause readmission measures for heart failure, AMI, and pneumonia. In addition, CMS initiated the Medicare Acute Care Episode (ACE) Demonstration mandated by Section 646 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MIPPA).[151] The 3-year demonstration allows for global payments for all Medicare Parts A and B services for episodes of care involving certain orthopedic and cardiovascular procedures. The participating organizations are required to report 30-day readmission rates.

In 2010, the National Quality Forum approved six readmission measures for public reporting of patient safety events. The six measures include four measures shown above that apply to adults (NQF #s 329, 330, 505, and 506) and two measures for infants readmitted to a pediatric intensive care unit.[152] The National Quality Forum also approved three readmission measures for "high-impact conditions," including NQF #s 695, 698 and 699.[153]

In 2011, NCQA added a measure of 30-day all-cause readmissions to HEDIS (the Healthcare Effectiveness Data and Information Set). Medicare Advantage health plans and some Medicaid managed care plans are required to report HEDIS measures for federal and state quality monitoring purposes.

The 2010 Affordable Care Act (ACA) mandates many programs that require the measurement of potentially preventable readmissions. Regulations identifying the readmission measures for these programs have recently been finalized or are being developed, as described below. Some of the same ACA-mandated programs require measurement of potentially preventable hospitalizations, and regulations responding to these requirements were described in the earlier section on potentially preventable hospitalizations from the community.

- Accountable Care Organizations (ACOs) mandated by Section 3022 of ACA will provide coordinated care intended to increase quality of care and reduce costs for unnecessary care. In October 2011, CMS published the final set of 33 quality measures for ACOs, including a readmission measure, "risk-standardized, all-condition readmissions within 30 days of discharge from an acute care hospital."[154] CMS notes, however, that the readmission measure "has been under development and that finalization of this measure is contingent upon the availability of measures specifications before the establishment of the Shared Savings Program on January 1, 2012."[154]
- The Payment Reform Bundling Program mandated by Section 3023 of ACA will establish a national pilot program to encourage hospitals, doctors, and post-acute care providers to improve patient care and achieve Medicare savings through bundled payment models that provide post-hospital care coordination, medication reconciliation, discharge planning, and transitional care services. The target population is Medicare beneficiaries who are hospitalized with one of eight to ten medical conditions designated by the federal government. The pilot program must be established by January 2013 and will run for five years. Quality measures for the program will be developed by the federal government and must include measures of potentially preventable readmissions.
- The Independence at Home Demonstration Program mandated by Section 3024 of ACA, will test a payment incentive and service delivery system in which physicians and nurse practitioners direct home-based primary care teams. The program is intended to reduce preventable hospital readmissions of chronically ill Medicare beneficiaries who have had a non-elective hospital admission in the previous year, have received acute or subacute rehabilitation services in the previous year, and have two or more functional dependencies. As of October 2011, CMS was developing measures for the program that will certainly include one or more measures of potentially preventable readmissions.

- The Hospital Readmissions Reduction Program mandated by Section 3025 of ACA will reduce Medicare payments for hospitals with "excess readmissions" beginning in October 2012. In August 2011, CMS published a final rule for this program, stating that hospital-specific 30-day all-cause risk-standardized readmission rates for AMI, heart failure, and pneumonia (NQF measures # 330, 505, and 506) will be used to calculate readmission rates.(155) The final rule also describes the methodology that will be used to calculate an "excess readmission ratio" for each hospital and notes that specific information about the payment adjustment will be provided in 2012. ACA also mandates that readmissions for four additional conditions be added to the program in 2015 and specifies four conditions identified by MedPAC in its June 2007 Report to Congress: chronic obstructive pulmonary disease (COPD), coronary artery bypass graft (CABG) surgery, percutaneous transluminal coronary angioplasty (PTCA) surgery, and other vascular surgery.(144)

  The CMS final rule responds to public comments about the program, including concerns about possible negative consequences, such as, provider avoidance of patients who are seriously ill and patients with complex medical conditions that make them more likely to be readmitted; pressure on emergency physicians not to readmit patients within the 30-day time interval; changes in hospital coding practices to avoid identifying patients with AMI, heart failure or pneumonia; and other systematic shifting, diversion, and delays in care. CMS states that it will be monitoring the program to detect such negative consequences in order to take appropriate action to minimize them.

- The Medicare Community-Based Care Transitions Program (CCTP) mandated by Section 3026 of ACA will provide funding for projects to test models to improve care transitions for high-risk Medicare beneficiaries, particularly those with multiple chronic conditions, depression, cognitive impairment, and/or a history of multiple hospital admissions. Since April 2011, CMS has accepted applications on a continuous basis from partnerships involving a community-based organization that provides care transition services and one or more hospitals that have high 30-day all-cause readmission rates for Medicare beneficiaries with a previous hospitalization for heart failure, AMI, or pneumonia.(156) Applicants must identify the root causes of re-admissions and define their target population and the care transitions model(s) they will implement. The projects will be evaluated with measures of primary care provider follow-up within seven days and 30 days of hospital discharge; patient-reported measures of the quality of hospital discharge procedures, and three readmission measures. The first seven communities to receive CCTP funding were announced in November 2011.

  The Medicare Community-Based Care Transitions Program is one part of the "Partnership for Patients," a public-private partnership announced by the federal government in April 2011.(157) The program is expected to reduce 30-day hospital readmissions by 20% over a 3-year period. This same goal, reducing 30-day readmissions by 20% over 3 years, is one of the strategic aims in the 10th Statement of Work for Quality Improvement Organizations (QIOs), which are required to provide technical assistance to communities to improve care transitions, including communities that receive CCTP funding.(158)

- Extension of the Special Needs Plan (SNP) Program mandated by Section 3205 of ACA extends the SNP program through Dec. 31, 2013, and requires SNPs to be NCQA-approved. Beginning in 2011, NCQA required SNPs to report HEDIS measures, including the measure of 30-day all-cause readmissions. SNPs were also required to report detailed structure and process measures of care transitions, including all transitions from the patient's usual setting of care to the hospital.(71) As of November 2011, NCQA had not yet released the 2012 structure and process measures for SNPs.(159)
- The Initial Core Set of Health Quality Measures for Medicaid Eligible Adults, mandated by Section 2701 of ACA, will provide measures for voluntary use by state Medicaid programs and organizations that contract with Medicaid. In December 2010, the U.S. Department of Health and Human Services published 51 proposed measures to respond to this mandate, including the NCQA measure of all-cause readmissions.(70) Public comments on the proposed measures were due in March 2011, and the Secretary is required to publish the final measures by January 2012.
- State Option To Provide Health Homes for Enrollees with Chronic Conditions mandated by section 2703 of ACA creates a state Medicaid option to enroll Medicaid beneficiaries with chronic conditions into a health home that would include a team of health professionals, provide a comprehensive set of medical services and result in lower hospital readmission rates. A 2010 CMS letter to state Medicaid agencies encourages them use 30-day readmission measures that have been endorsed by NQF. ACA mandates a report to Congress by January 2017 that will describe the effect of the health home model on reducing hospital readmissions.(160)

As discussed earlier in the section on potentially preventable hospitalizations from the community, two other ACA-related programs do not have requirements for monitoring or reducing potentially preventable hospitalizations or readmissions but will certainly serve people who could be considered part of the LTQA population.

- With ACA funding from the Innovations Center, CMS has selected 15 states to receive grants up to $1 million for the first phase of the State Demonstrations to Integrate Care for Dual Eligible Individuals program. The 15 states are expected to design new ways to coordinate primary, acute, behavioral, and long-term care services for dual eligibles. In the second phase of the program, some of the states will be selected to implement the approaches they designed, and some of those states might be willing to use one or more measures of potentially preventable readmissions that are appropriate for dual eligibles.
- The Medicare Hospice Concurrent Care Demonstration Program, mandated by Section 3140 of ACA, establishes a 3-year demonstration program in which people who are receiving hospice care will also be allowed to receive all other Medicare-covered services. The legislation requires reporting about the cost-effectiveness of the program but does not explicitly address potentially preventable hospital readmissions.

The review conducted for this white paper identified only one measure of potentially preventable readmissions in the end of life: "Proportion of patients who died from cancer and had more than one hospitalization in the last 30 days of life" (NQF # 212). The NQF draft document, *Palliative Care and End of Life Care: A Consensus Report*, released for public review in October 2011, does not include measures of potentially preventable readmissions.(72) Yet many studies conducted over the past 20 years or more show that substantial proportions of people in the last days, weeks, and

months of their lives experience multiple hospitalizations. One research team referred to this process as "churning."[161] Analysis of this literature is beyond the scope of this white paper, but development of measures of potentially preventable hospitalizations that are appropriate for end-of-life care in the LTQA population is an important priority. The Medicare Hospice Concurrent Care Demonstration Program could provide one venue for implementing and testing such measures.

Lastly, recently released documents from government initiatives to improve the quality of health care prioritize the reduction of potentially preventable hospitalizations and readmissions. As described earlier, in the section on potentially preventable hospitalizations from the community, the 2010 document, *Multiple Chronic Conditions: A Strategic Framework: Optimum Health and Quality of Life for Individuals with Multiple Chronic Conditions*, includes one goal to define appropriate health care outcomes for individuals with multiple chronic conditions, including reducing hospitalizations and hospital readmissions.[73] Likewise, *The National Strategy for Quality Improvement In Health Care*, released in March 2011, notes that one of the "opportunities for success" is to reduce preventable hospital admissions and readmissions.[75] These initiatives may provide opportunities for the development and testing of measures of hospitalization and readmissions that are appropriate for the LTQA population.

Implications for the LTQA population

The strong emphasis on reducing hospital readmissions in the ACA-mandated programs summarized above has created attention, a favorable context and new funding opportunities for initiatives that fit with the mission and strategic priorities of the LTQA. The Medicare Community-Based Care Transitions Program (CCTP) matches most closely the LTQA priorities on improving care transitions and avoiding unnecessary readmissions, but several other ACA-mandated programs also provide funding for initiatives intended to achieve the same objectives. The Health Care Innovation Challenge, announced in Nov. 2011,[162] probably matches most closely the LTQA's support for innovative community partnerships to improve quality of care, implement effective transitional care, and reduce unnecessary hospital readmissions,[163] but other ACA-mandated programs are also intended to encourage and provide funding for partnerships of hospitals, community-based agencies and other organizations to achieve these objectives.

While these new programs clearly fit with and support the mission and priorities of the LTQA, it is not clear that the readmission measures that will be used to evaluate their impact are appropriate for the LTQA population. Measures of 30-day readmissions will be required for most of the programs for which measures have been designated to date. The CCPT, for example, requires three readmission measures:

- 30-day risk-adjusted all-cause readmission rate;
- 30-day unadjusted all-cause readmission rate; and
- 30-day risk-adjusted readmission rates for heart failure, acute myocardial infarction (AMI) and pneumonia.[156]

In theory at least, aspects of these measures are inconsistent with the usual patterns of service use and care needs of the LTQA population. The first of these aspects is the 30-day time period. Although multiple hospitalizations are common in frail and chronically ill adults and older people who receive long-term services and supports, their hospitalizations may or may not occur within a 30-day period after a previous hospitalization. For these people, multiple hospitalizations are better understood as a series of acute events in a long span of chronic illness than as readmissions within 30 days of an initial hospitalization.

Early studies on hospital readmissions that were discussed at the beginning of this section focused on factors associated with readmissions within various time periods up to a year after hospital discharge. The shift in focus to shorter, more uniform and precisely specified time periods began with implementation of the Medicare Prospective Payment System (PPS) in 1984, when researchers, clinicians and others worried that PPS would result in reduced quality of inpatient hospital care and premature discharges and concluded that readmission rates would be an easy way to monitor these problems. Peer Review Organizations (PROs) were first required to monitor readmissions within seven days, later extended to 15 and then 31 days after discharge.

There has been considerable debate about the right time period to be used in readmission measures. Hospital representatives and others point out that using time intervals longer than 7 to 15 days increases the likelihood that hospitals will be unfairly held accountable for readmissions that are actually caused by factors other than the quality of care provided by the hospital.[144,148,155] The 30-day time period used in readmission measures for most ACA-mandated programs for which measures have been specified thus far seems to reflect an assumption that 30 days is the maximum time period for which it is reasonable to hold the hospital accountable for problems in the quality of care provided in a previous hospitalization that result in readmission.

For the LTQA, the important point from the debate about the right time period to use in readmission measures is the clear link between 30-day and other short time periods and the underlying concept that potentially preventable readmissions occur because of problems in the quality of care provided by the hospital during a previous hospitalization. While this concept is undoubtedly accurate for some hospitalizations of frail and chronically ill adults and older people who receive long-term services and supports, the literature on readmissions for these people places much more emphasis on the impact of inadequate post-hospital care, including inadequate medical follow-up, care coordination, nursing and other long-term services and supports to meet the person's needs in the community or in a nursing home or other long-term care facility. Thus, the second aspect of 30-day readmission measures that is, at least in theory, inconsistent with the care needs of the LTQA population is the underlying concept that potentially preventable hospitalizations occur because of problems in the quality of inpatient hospital care.

Early studies on hospital readmissions considered a wide range of patient characteristics and hospital and post-hospital factors associated with readmissions, with a primary objective of identifying people and situations for which better discharge planning and post-hospital care and supports could reduce unnecessary readmissions. Many later studies on hospital readmissions have considered the same range of factors and generally found strong relationships among readmissions and the adequacy of post-hospital care and supports in people who could be considered part of the LTQA population.[164,165,166] Moreover, most of the studies that have tested interventions to reduce potentially preventable readmissions in these people have focused primarily on post-hospital care and supports. Examples are the five randomized controlled trials noted earlier that were conducted in the U.S. in the late 1980s and early 1990s[137,138,139,140,141] and similar studies conducted more recently, see, e.g., Naylor et al., (2004);[167] Daly, et al. (2005);[168] Coleman et al. (2006);[169] and Parry et al. (2009).[170]

Other studies have tested interventions that are limited to in-hospital discharge planning and patient instruction, with or without very brief post-discharge follow-up provided by the hospital.[171,172,173] The distinction between these interventions and the interventions described above is fuzzy because many of the interventions described above also provided enhanced discharge planning; nevertheless, the distinction is important for the LTQA population. It is illustrated in part in comments by Boutwell (2010) about findings from a study that showed no association between readmissions and a measure of the adequacy of documentation in patients' hospital charts that discharge instructions had been provided.[173]

Boutwell noted that there was no reason to expect this measure would be related to reduced readmissions, explaining that, "(b)etter discharge practices are necessary but not sufficient: linking to and enhancing community-based care are essential to facilitating improved coordination of care over time and across settings."(174, p.1244)

The preceding discussion suggests both pros and cons for the LTQA in selecting and endorsing quality measures based on hospital readmissions. Clearly, the current emphasis on reducing readmissions in ACA-mandated programs that will be implemented over the next few years creates attention, support, and funding for high-priority LTQA initiatives on care transitions and innovative community partnerships. At the same time, the 30-day readmission measures that will be used to determine whether hospital readmissions have been reduced, are, at least in theory, inconsistent with the usual pattern of hospitalizations and the kinds of non-hospital services and supports that are required to avoid unnecessary readmissions for the frail and chronically ill adults and older people that constitute the LTQA population.

The review conducted for this white paper did not identify any studies that analyzed and tested 30-day readmission measures specifically in the LTQA population; thus, there is no research-based evidence about how the measures work in this population. Several studies have found that models based on factors believed to be associated with 30-day readmissions performed fairly well in predicting readmission rates for general adult and Medicare populations.(175,176,177) In contrast, a 2011 systematic review of 26 models, most of which were based on factors believed to be associated with 30-day readmissions, found that the models generally performed poorly in predicting readmissions.(178)

As discussed earlier in this section, 30-day readmission measures have been used increasingly over the past few years for quality monitoring and public reporting. In Oct. 2012, the Hospital Readmissions Reduction Program will begin decreasing Medicare payments to hospitals with "excess readmissions," based on measures of 30-day all-cause readmission rates following hospitalizations for AMI, heart failure, and pneumonia. An editorial responding to the findings of the 2011 systematic review cited above states that, "(a)ccountability measures should have a strong evidence base for their validity, should accurately measure whether high-quality care has been provided and should have a low risk for unintended consequences."(179, p.504) The editorial argues that the poor performance of the readmission prediction models analyzed in the 2011 systematic review "undermines the potential validity of using readmission rates in determining hospital reimbursement."(179, p.504)

Implementation of the Medicare Hospital Readmissions Reduction Program will create strong financial incentives for reduced readmissions, at least in the 30-day post-hospital time period. The tie between 30-day readmissions rates and hospital payment is less direct in other ACA-mandated programs that are intended to reduce readmissions and are likely to use 30-day readmission measures to evaluate effectiveness, e.g., the ACO Program, the Independence at Home Demonstration Program, the Community-Based Care Transitions Program (CCTP), and the Payment Reform Bundling Program. Nevertheless, reducing 30-day readmissions is clearly tied to longer-term funding and therefore, the sustainability of these other programs.

The impact on the LTQA population of programs intended to reduce 30-day readmissions cannot be known at present, but it is easy to imagine both positive and negative effects. On the positive side, reduced 30-day readmissions could mean fewer unnecessary hospitalizations, less "ping-ponging" and "churning" of these people between home, nursing home, hospital, and other care settings, and reduced hospital- and transition-related complications and resulting morbidity and mortality.

On the negative side, reduced 30-day readmissions could mean that some people will not receive hospital care that would benefit them. Readmission measures are not specific enough to dictate clinician decisions about hospitalization for individuals. Moreover, the complexity of decisions about hospitalization for frail, chronically ill individuals creates uncertainty about the right decision in many cases. Given this uncertainty, strong financial incentives to reduce 30-day readmissions could lead to reduction in necessary hospitalizations for some individuals.

Public comments about the Medicare Hospital Readmissions Reduction Program that were reviewed in the CMS final rule for the program suggested possible negative consequences, many of which are relevant for the LTQA population: for example, provider avoidance of patients who are seriously ill and patients with complex medical conditions that make them more likely to be readmitted, pressure on emergency physicians not to readmit patients within the 30-day time period, and other systematic shifting, diversion, and delays in care.(155) As noted earlier, CMS responded to these comments by saying that it will monitor the program to detect such negative consequences and take appropriate action to minimize them.

Many LTQA member organizations are in a position to be aware of both positive and negative effects of programs intended to reduce hospital readmissions. These organizations could provide early feedback about the effects to CMS, either individually or through the LTQA. Systematic monitoring of positive and negative effects for frail and chronically ill adults and older people who receive long-term services and supports will require a structured process or algorithm for identifying these people. The LTQA could develop such a process or algorithm or work with CMS to develop it. Either way, it will be important for the LTQA to articulate clearly why it is necessary to monitor these effects for the LTQA population in particular.

Assuming that programs intended to reduce 30-day readmissions are effective, many hospitals could have empty beds. As part of the Institute for Healthcare Improvement (IHI) project, State Action on Avoidable Readmissions (STARR), hospital financial officers have been encouraged to analyze the financial impact of readmissions *and* the likely effects of reducing readmissions on their hospitals, but few financial officers, even in hospitals that have publicly committed to reducing readmissions, have conducted such analyses.(180)

Some hospitals that have empty beds and reduced revenues as a result of reduced 30-day readmissions will probably try to fill the beds, and hospital admissions could increase for some people and groups, both within and beyond the 30-day readmission time period. The complexity of decisions about hospitalization for frail, chronically ill people and the resulting uncertainty about the right decision in many cases will make these people a likely source of increased admissions. Many of them have multiple medical conditions that could justify hospitalization, thus making it relatively easy to adjust admitting diagnoses and the timing of hospitalizations to avoid triggering condition-descriptors used to define potentially preventable readmissions.

For the LTQA, it is important to note that different hospitals and health care systems will be more or less willing and able to accommodate the financial effects of reduced readmissions. Interim results from the Medicare Physician Group Practice Demonstration, a program intended to reduce total Medicare expenditures and improve quality of care, show that only five of the ten demonstration sites reduced Medicare expenditures enough to earn performance payments.(181) CMS had expected that reduced Medicare expenditures would result from reduced hospitalizations, readmissions, and emergency department visits,(182) but most of the reduced expenditures, at least in the first two years of the demonstration, occurred because of reduced use of outpatient rather than inpatient services.(181)

One commentator notes that, "(no) performance payments were earned by the five PGPs (physician group practices) that are part of integrated delivery systems (systems that include hospital ownership but are not affiliated with academic medical centers)" and quotes the demonstration evaluator as hypothesizing that the presence of a hospital was "'a potential deterrent to achieving savings … since these systems may be unable to reduce avoidable admissions or use lower cost care substitutes without affecting their inpatient revenue.'" (181, p. 200)

High readmission rates are more common in communities with high overall hospitalization rates,(183) and high readmission rates from skilled nursing facilities are more common in communities with high overall use of medical care.(120) As programs intended to reduce 30-day readmissions are implemented nationally, hospitals and health care systems in geographic areas with high overall hospitalization rates and high use of medical care may have more difficulty achieving reduced readmissions than hospitals and health care systems in other geographic areas. Targeting LTQA support for innovative community partnerships of hospitals, community-based agencies and other organizations to hospitals, health care systems and geographic areas that can be expected to have more difficulty reducing readmissions could help to lessen these problems.

Lastly, as programs intended to reduce 30-day readmissions are implemented nationally, clinicians who make decisions about hospitalization for frail, chronically ill individuals in various settings may experience more uncertainty and more external pressure associated with these decisions. Readmission measures are complex, as shown in Table 3, and their complexity will make it difficult or impossible for clinicians to know whether a readmission for an individual patient will be considered preventable. These clinicians will need information, tools, training and support to make wise decisions about hospitalization of individuals in this context. The LTQA could develop or advocate with other organizations to develop and provide the needed information, tools, training and support.

ROLE OF THE EMERGENCY DEPARTMENT IN POTENTIALLY PREVENTABLE HOSPITALIZATIONS

As noted at the beginning of this white paper, the literature on potentially preventable hospitalizations that was reviewed for the paper rarely mentions the emergency department (ED). This is true even though more than half of all hospital admissions, including hospitalizations and readmissions from the community and nursing homes, begin in the ED.[184]

An analysis of 2003 data for people of all ages found that more than 70% of potentially preventable hospitalizations began in the ED, including hospitalizations for COPD, urinary tract infections and pnemonia.

Available data are not adequate to determine the proportion of potentially preventable hospitalizations for frail, chronically ill adults and older people that begin in the ED, but it is probably very high. Among people of all ages who have an ED visit, older people are more likely than younger people to be hospitalized. In 2008, 41% of ED patients age 65 and older were hospitalized, compared with 12% of ED patients age 18-64.[185] Likewise nursing home residents who have an ED visit are more likely to be hospitalized than non-nursing home residents who have an ED visit. In 2008, there were 9.1 million ED visits by nursing home residents in the U.S., and almost half (48%) of these visits resulted in hospitalization, compared with only 13% of ED visits by non-nursing home residents.[186] Moreover, large proportions of potentially preventable hospital admissions for people of all ages begin in the ED:

- An analysis of 1996 California data for people age 18-64 found that 72% of potentially preventable hospitalizations for five conditions (asthma, congestive heart failure, COPD, diabetes, and hypertension) began in EDs.[187]
- An analysis of 2003 U.S. data for people of all ages found that more than 70% of potentially preventable hospitalizations began in the ED, including hospitalizations for congestive heart failure (72%), COPD (72%), urinary tract infections (74%), and pneumonia (71%).[184]
- AHRQ researchers have recently completed an analysis of national data for 2008 on the proportion of potentially preventable hospitalizations that began in the ED, focusing on five conditions: asthma, congestive heart failure, and bacterial pneumonia in people of all ages, diabetes in children and nonelderly adults, and pediatric gastroenteritis in children. The results of the analysis have not yet been published, but preliminary findings indicate that more than 80% of potentially preventable hospitalizations for these conditions began in the ED.[188]

Given these data, the lack of attention to the role of the ED in potentially preventable hospitalizations is puzzling. Certainly physicians, nursing home and other residential care staff, community care providers, and family members know that decisions about hospitalization are made in the ED. Anecdotal reports and some studies describe the difficulty ED clinicians often face in making decisions about treatment and discharge location for frail, chronically ill patients, especially those who arrive without adequate information about their medical history, usual health and functional status and the acute change that led to the ED visit. At the extreme, Hospital-at-Home programs that enroll patients from the ED demonstrate that a large proportion of hospitalizations from the ED are potentially preventable if sufficient skilled medical care and supportive services can be provided for the patient outside the hospital.[189] In a quasi-experimental study of one Hospital-at-Home program, 91% of the 455 elderly patients with pneumonia, heart failure, chronic obstructive pulmonary

disease (COPD) or cellulitis who enrolled in the program were first identified and approached in the ED.

Whatever the reason for the failure to date to recognize or address the role of the ED in potentially preventable hospitalizations in general, and for the LTQA population in particular, studies should be initiated now to understand the process through which decisions about hospitalization are made in the ED. Analyses should focus on whether and, if so, how the role of the ED should be accommodated in measures of potentially preventable hospitalizations and readmissions from the community and nursing homes. As programs intended to reduce 30-day readmissions are implemented nationally, ED clinicians will face the same uncertainty as clinicians who make decisions about hospitalization for frail, chronically ill people in other settings and are likely to experience more direct and immediate pressure to reduce readmissions. Like other clinicians, they will need information, tools, training and support to make wise decisions about hospitalization of the frail and chronically ill adults and older people who constitute the LTQA population.

SUMMARY AND RECOMMENDATIONS

Summary of the Findings

Based on this extensive review of existing literature and other documents related to federal initiatives related to reducing the frequency and costs of hospitalizations, there is no uniformly agreed upon definition of potentially preventable hospital admissions or readmissions that can be applied to the LTQA population.

There is no uniformly agreed upon definition of potentially preventable hospitalizations or re-admissions that can be applied to the LTQA population.

Most definitions of potentially preventable hospitalizations and readmissions specify a list of diagnosis codes or conditions agreed upon by a group of medical "experts", usually working with researchers and/or policy analysts. A structured review of medical records by expert clinicians who rate hospitalizations as avoidable or not avoidable has also been used in a small number of studies. This methodology will be useful in individual facilities or programs to examine the preventability of hospitalizations, but may not be practical for large scale use in federal programs because it requires data not readily available from existing administrative data bases and is labor and resource intensive.

Conditions and diagnoses associated with preventable hospitalizations were initially identified for people under age 65, specifically excluding older people, and were later adopted and used for the older population, with some additions and deletions. Little research has focused specifically on people that would be considered part of the LTQA population.

While risk adjustment may be desired for quality measures of preventable hospitalizations and hospital readmissions, there is no agreed upon methodology available to risk-adjust these conditions and diagnoses for the LTQA population.

In addition, available methodologies used for risk adjustment are not transparent to clinicians making decisions to hospitalize older patients, and therefore may not be helpful in designing interventions targeted at patients at highest risk of preventable hospitalizations.

To further complicate developing valid measures of potentially preventable hospitalizations, a myriad of diverse factors, including incentives to hospitalize and disincentives to attempt to manage conditions outside of the hospital, influence the decision to hospitalize individual patients (as depicted in **Figure 1** above). Multiple factors in each individual's clinical, psychosocial, and economic situation also influence decisions about hospitalization. Thus, it is impossible to determine whether a decision to hospitalize was appropriate from currently available administrative data, which does not capture most of the factors involved in these decisions at the individual level.

Recommendations

Currently there are no strong incentives for hospitals, post-acute facilities and programs, and agencies that deliver residential and home and community based services for the LTQA population to reduce preventable hospitalizations. This situation will change rapidly over the next several years as health policy and reimbursement reforms are put into place that incentivize better coordinated transitions in care and reducing hospitalizations and hospital readmissions.

Most acute care hospitals do not have programs, staff, or expertise in place to address reducing potentially preventable hospitalizations in the LTQA population. Disruption in the continuity of medical care during hospitalization related to the increasing role of hospitalists adds to these challenges.

In addition, the vast majority of potentially preventable hospitalizations for the LTQA population involves the Emergency Department (ED) and reflects decisions made by ED staff. Transitional care interventions that account for these factors may help reduce preventable hospitalizations in the LTQA population. Providers, facilities, or agencies who deliver these interventions should be held accountable for measures of their outcomes and receive a portion of any savings resulting from prevented hospitalizations.

Work should therefore begin now to develop and test specific measures and measurement methods that are appropriate for these providers, agencies, and facilities when caring for the LTQA population. Such measures must:

- Account for the multiple factors that can influence the decision to hospitalize an individual patient;
- Be feasible to use on a large scale;
- Be transparent and fair to providers; and
- Avoid major unintended consequences.

With these characteristics in mind, the following recommendations should be considered in developing measures of preventable hospitalizations:

1. A list of diagnoses or conditions applicable to the LTQA population could be developed, using previous research and recommendations not specific to this population, which most expert clinicians would likely agree can, **in some proportion of cases**, be managed safely and effectively outside of an acute hospital given the clinical condition of the patient.
2. This list of diagnoses or conditions should not be equated with potentially preventable hospitalizations, because **diagnoses alone cannot account for severity of illness or the many other factors that can contribute to the decision to hospitalize an individual person**.
3. A short clinical data set could be added to uniform reporting requirements (such as discharge assessments from LTC facilities or home health programs, inter-facility electronic or paper transfer forms, emergency room documentation) that would provide more insight into whether a hospitalization was preventable than diagnoses alone. These data could also be used to target quality improvement interventions aimed at reducing unnecessary hospital transfers and hospitalizations.
4. From a clinical standpoint, the multiple factors and incentives that contribute to the decision to hospitalize an individual are essentially the same whether the hospitalization is a readmission within a period of time such as 30 days, or a new index admission.

   Since the Partnership for Patients and other initiatives (bundling of payments and other financing policies) focus on readmissions (generally within 30 days), it may be important to include one or more measures of readmissions for the LTQA population.
5. Given the current lack of, as well as the complexity involved in developing validated definitions for potentially preventable hospitalizations and related risk adjustment methodology for the LTQA population, it may be most appropriate to recommend a broad approach to measurement at the current time, as outlined in **Figure 2**, including measures of hospitalizations, and consideration of additional measures related to quality of care for and outcomes for the LTQA population. This approach would:

   a. Track all unplanned hospital admissions.

b. Allow tracking of readmissions as a subset of all admissions, and tracking admissions or readmissions for all diagnoses as well as a subset of specific diagnoses and conditions that are associated with avoidable or potentially preventable hospitalizations.

6. Additional potential measures could include:

   a. **Process measures**, including clinical information from discharge transfer forms to help determine preventability of the transfer and adherence to clinical practice guidelines for diagnoses and conditions that are associated with potentially preventable hospitalizations.

   b. **Emergency department** (ED) visits, because frail elderly people who go to an ED are highly likely to be admitted to the hospital, and most hospitalizations begin in the ED.

   c. **Observation stays** because: 1) they are increasing in frequency because of Medicare audits; 2) patients can be responsible for large copayments on Medicare Part B charges; 3) they expose frail elderly patients to the same risks of hospital acquired complications as inpatient stays; and 4) they do not count towards the three day requirement for Medicare Part A reimbursement for a SNF stay.

Figure 2: Quality Measures for Acute Care Transfers and Hospitalizations of the LTC Population

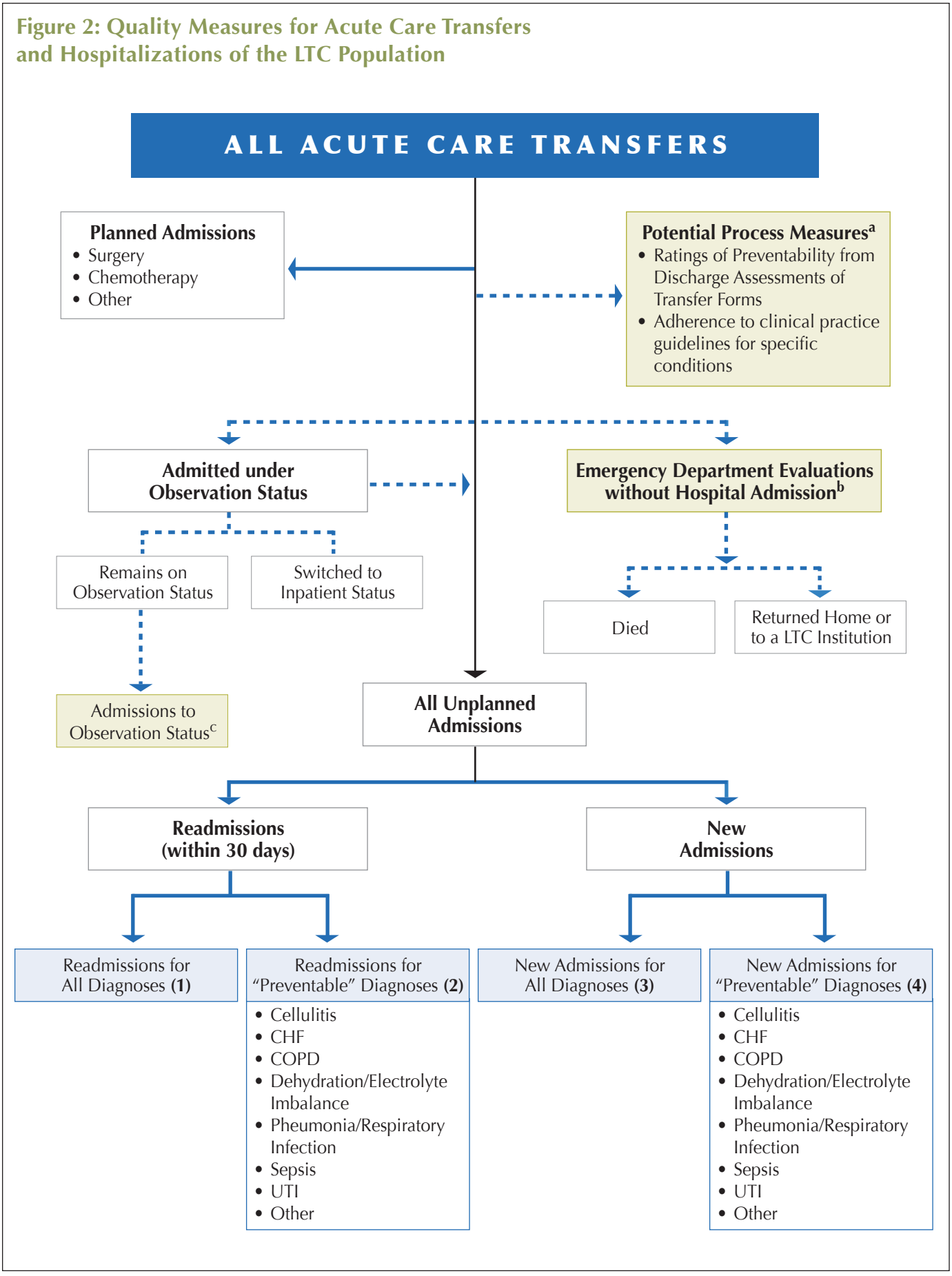


Figure 2: Quality Measures for Acute Care Transfers and Hospitalizations of the LTC Population (continued)

Quality Measures

- The LTC population could be subdivided by payment status and/or setting
  - — Nursing Facility
    - Medicare Part A (post-acute)
    - Long term (Medicaid or private pay)
    - Other
  - — Community
    - Home vs. Assisted Living vs. Other
    - Medicare only vs. Dual eligible

Hospitalization Measures in Blue Boxes

(1) = 30-Day Readmissions for all Diagnoses
(2) = 30-Day Readmissions for "Preventable" Diagnoses
(3) = New Admissions for All Diagnoses (not within 30 days of a prior admission)
(4) = New Admissions for "Preventable" Diagnoses

Potential Additional Measures in Green Boxes

a = Process Measures (including ratings of preventability based on data from discharge assessments, transfer forms, and/or other data sources from institutional settings or home care programs; and adherence to clinical practice guidelines for diagnoses/conditions that are associated with avoidable or preventable admissions)

b = Emergency Department Visits without Admission

c = Admissions to Observation Status

APPENDIX A

ADDITIONAL ARTICLES ON HOSPITALIZATION FROM THE COMMUNITY

1. Articles about hospitalization from the community

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APPENDIX B

ADDITIONAL ARTICLES ON HOSPITALIZATION FROM NURSING HOMES

1. Articles about hospitalization from nursing homes

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APPENDIX C

ADDITIONAL ARTICLES ON HOSPITAL READMISSIONS

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