Do pneumonia readmissions flagged as potentially preventable by the 3M PPR software have more process of care problems? A cross-sectional observational study

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ABSTRACT

Background In the USA, administrative data-based readmission rates such as the Centers for Medicare and Medicaid Services' all-cause readmission measures are used for public reporting and hospital payment penalties. To improve this measure and identify better quality improvement targets, 3M developed the Potentially Preventable Readmissions (PPRs) measure. It matches clinically related index admission and readmission diagnoses that may indicate readmissions resulting from admission- or post-discharge-related quality problems.

Objective To examine whether PPR software-flagged pneumonia readmissions are associated with poorer quality of care.

Methods Using a retrospective observational study design and Veterans Health Administration (VA) data, we identified pneumonia discharges associated with 30-day readmissions, and then flagged cases as PPR–yes or PPR–no using the PPR software. To assess quality of care, we abstracted electronic medical records of 100 random readmissions using a tool containing explicit care processes organised into admission work-up, in-hospital evaluation/treatment, discharge readiness and post-discharge period. We derived quality scores, scaled to a maximum of 25 per section (maximum total score=100) and compared cases by total and section-specific mean scores using t tests and effect size (ES) to characterise the clinical significance of findings.

Results Our abstraction sample was selected from 11 278 pneumonia readmissions (readmission rate=16.5%) during 1 October 2005–30 September 2010; 77% were flagged as PPR–yes. Contrary to expectations, total and section mean quality scores were slightly higher, although non-significantly, among PPR–yes (N=77) versus PPR–no (N=23) cases (respective total scores, 71.2 ±8.7 vs 65.8±11.5, p=0.14); differences demonstrated ES >0.30 overall and for admission work-up and post-discharge period sections.

Conclusions Among VA pneumonia readmissions, PPR categorisation did not produce the expected quality of care findings. Either PPR–yes cases are not more preventable, or preventability assessment requires other data collection methods to capture poorly documented processes (eg, direct observation).

INTRODUCTION

In the USA, readmission rates are increasingly being adopted as hospital performance measures for public reporting and payment in an effort to improve care and decrease costs. The Centers for Medicare and Medicaid Services (CMS) posts 30-day all-cause readmission rates after discharge for three selected medical conditions (acute myocardial infarction, heart failure (HF), pneumonia) on its Hospital Compare website and penalises hospitals with excessive readmission rates under the Medicare Hospital Readmission Reduction Program.[1 2] CMS selected these conditions because they are common reasons for hospitalisations and readmissions, result in substantial healthcare costs, and have associated evidence-based processes of care that may reduce 30-day readmissions.[3–6] Despite general agreement that at least some readmissions are preventable through improved quality of care, the actual proportion is uncertain (5–79%),[7] as is the extent to which they result from

patient- and community-level factors that are outside a hospital's control.

Recognising the need to identify readmissions that are more likely to be preventable and therefore better quality improvement targets, 3M Health Information Systems developed the commercially available Potentially Preventable Readmissions (PPRs) software. Like the CMS measures, the PPRs use administrative data. A PPR is defined as a readmission that is clinically related to care received during or following the prior hospitalisation within a specified time interval and that might have been prevented by appropriate care.[8] Specifically, a readmission is considered potentially preventable if it might have been prevented through "provision of quality care in the initial hospitalization; adequate discharge planning; adequate post-discharge follow-up; [or] coordination between inpatient and outpatient healthcare teams."[8] This definition was put into operation by clinician panels determining 'clinical relatedness' through pairing 'all patient refined-diagnosis related groups' from the index admission and subsequent readmission.[8] Non-PPR readmissions are considered less likely to be preventable for reasons such as being not clinically related, or clinically related but with low preventability (eg, a patient with a bone marrow transplant readmitted with shingles after a pneumonia admission).[8]

Although the degree to which such paired admissions–readmissions reflect process of care deficiencies and are therefore potentially preventable is unclear, State Medicaid programmes are increasingly adopting the PPRs for public reporting and hospital payment.[9–11] A recent Medicare Payment Advisory Commission analysis lent some face validity to the PPRs, as condition-specific PPR rates dropped slightly more than CMS all-cause readmissions from 2009 to 2011.[12] While both CMS readmission measures and PPRs are intended for hospital-level comparisons, hospitals concerned about their rates and targeting quality improvement activities require information on preventability at the individual case level. Therefore, using the cohort of pneumonia discharges and associated all-cause readmissions identified by CMS methods, we examined whether the PPR algorithm identifies readmissions that are more likely to be preventable based on electronic medical record (EMR) review. Because software-flagged PPR cases are considered more preventable than unflagged cases, we hypothesised that they would demonstrate more processes of care failures. The Veterans Health Administration's (VA's) comprehensive highly integrated national EMR system, containing both inpatient and outpatient information, enables us to assess an extensive range of processes and include the post-discharge/outpatient setting.[13]

METHODS

Study design

This was a cross-sectional retrospective observational study using VA administrative and EMR data from 1 October 2005 to 30 September 2010. We obtained relevant institutional review board approvals.

Data sources

We obtained inpatient information (demographics, ICD-9-CM coded diagnoses and procedures and discharge status) and outpatient encounter diagnoses from the VA's National Patient Care Database and dates of death from VA vital status files.[14] We accessed VA EMR data using VistaWeb.[15] We also used CMS MedPar files for selected sensitivity analyses.

Study sample

Since we were interested in how the PPR measure potentially improves upon the CMS all-cause pneumonia readmission measure, we used CMS methods, as described in previous work, to identify all VA acute index discharges with a principal diagnosis of pneumonia during FY07 through FY10 associated with a VA readmission within 30 days.[4 16] Although the PPR measure also excludes certain admissions as ineligible because they require "follow-up care that is intrinsically clinically complex and …preventability is difficult to assess" (eg, admissions for 'major or metastatic malignancy'),[8] we retained these PPR-ineligible cases to be consistent with CMS methods, which include these cases. For similar reasons and to simplify EMR abstraction, we used CMS methods to identify index admissions associated with a single readmission, defined as the first VA acute-care hospitalisation occurring within the 30-day post-index discharge period.[4 8] Of 68 158 index discharges, 11 278 (16.5%) were readmitted.

We next applied the 3M PPR software (V.28.0) to flag readmissions as a PPR (yes/no; the software also identifies ineligible cases, which we included with the PPR–no cases). We randomly selected 600 index discharge–readmission pairs for potential EMR abstraction. Our goal was to fully review 100 pairs. (We expected to exclude cases intended as CMS exclusions that were not captured by the administrative data and that might make attributing a readmission to the care associated with the index hospitalisation and/or post-discharge period harder, such as having a transfer out to a non-VA hospital. We also excluded planned readmissions, consistent with both PPR and CMS methods).[4 8] Assuming a SD of 10 for the 0–100 quality score (described below) and a 0.05 significance level, a sample size of 100 gave us approximately 90% power to detect a half SD difference in quality scores between PPR–yes and PPR–no cases. This represents a medium effect size (ES) and, is a threshold widely used to discriminate change.[17 18] (See figure 1 for further study sample details).

Development of explicit process criteria representing pneumonia standard of care

Figure 2 shows the steps involved in developing pneumonia process of care criteria. We first identified

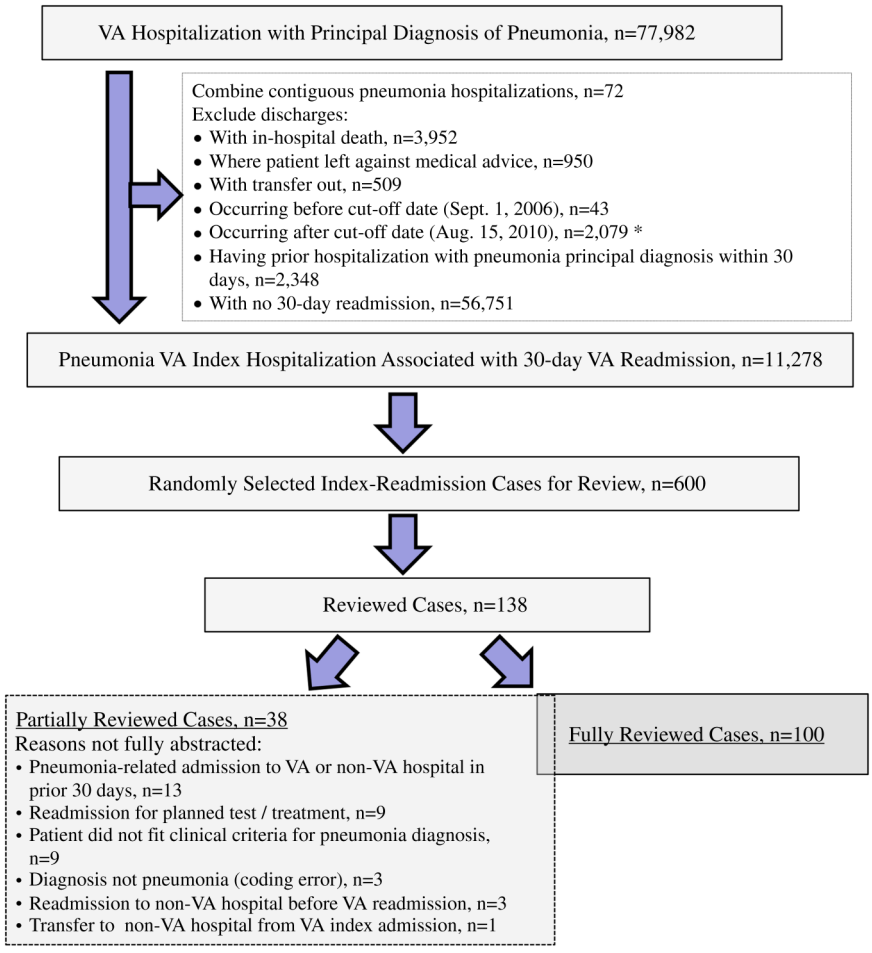

Figure 1 Study Sample. *This cut-off date, 45 days before the last day of FY2010, accounted for the 30-day span from discharge to potential readmission, plus the readmission's length of stay (95% of all hospitalisations had a length of stay <15 days). Our final sample of 100 cases represented 58 of the 124 Veterans Health Administration's (VA) acute care hospitals. The median number of cases per hospital in our abstraction sample was 1, IQR 1–3, range 1–5.

candidate criteria representing the standard of pneumonia care through an extensive literature review, including studies on pneumonia readmissions, pneumonia quality of care, and generic studies on readmission preventability (see online supplementary appendix 1), plus national pneumonia clinical practice guidelines and process measures.[1 19–21] Clinical co-investigators helped to modify the list, yielding 97 criteria. According to previous studies, we grouped criteria into four sections: (A) admission work-up; (B) in-hospital evaluation and treatment; (C) discharge readiness (clinical stability at discharge) and planning; and (D) post-discharge period.[22 23]

We then refined criteria using a consensus panel model based on the RAND/UCLA appropriateness method.[24] We assembled an expert panel of four internists, three pulmonologists, and three infectious disease specialists. Using an online survey, panellists rated individual items on the extent to which they believed they represented the standard of pneumonia care using a seven-point scale (1=strongly disagree, 7=strongly agree). Panellists could also propose additional items or wording changes to existing items. In line with standard RAND/UCLA appropriateness methods, we conducted two rating rounds, collating results after each round. We assessed disagreement/uncertainty based on median panellist score: <6.0 represented lack of agreement with the item, eligible for modification/re-rating; median ≥6.0 and no rating <5 represented strong agreement with the item. We kept items meeting this latter criterion without further discussion or rating. After round 1, we discussed items with disagreement/uncertainty via teleconference. Panellists then re-rated items for which there was a previous lack of agreement (n=48) and rated any added or modified items (n=5). After this process, we kept 92 items, those with strong agreement plus those with a median score ≥6.0 and only *one* rating <5.

Abstraction tool development/medical record abstraction

We incorporated clinical items into an abstraction tool if they could be converted to 'if/then' statements to assess quality of care (see online supplementary Appendix 2a for if/then statement examples). The tool also included case ascertainment items (ie, the

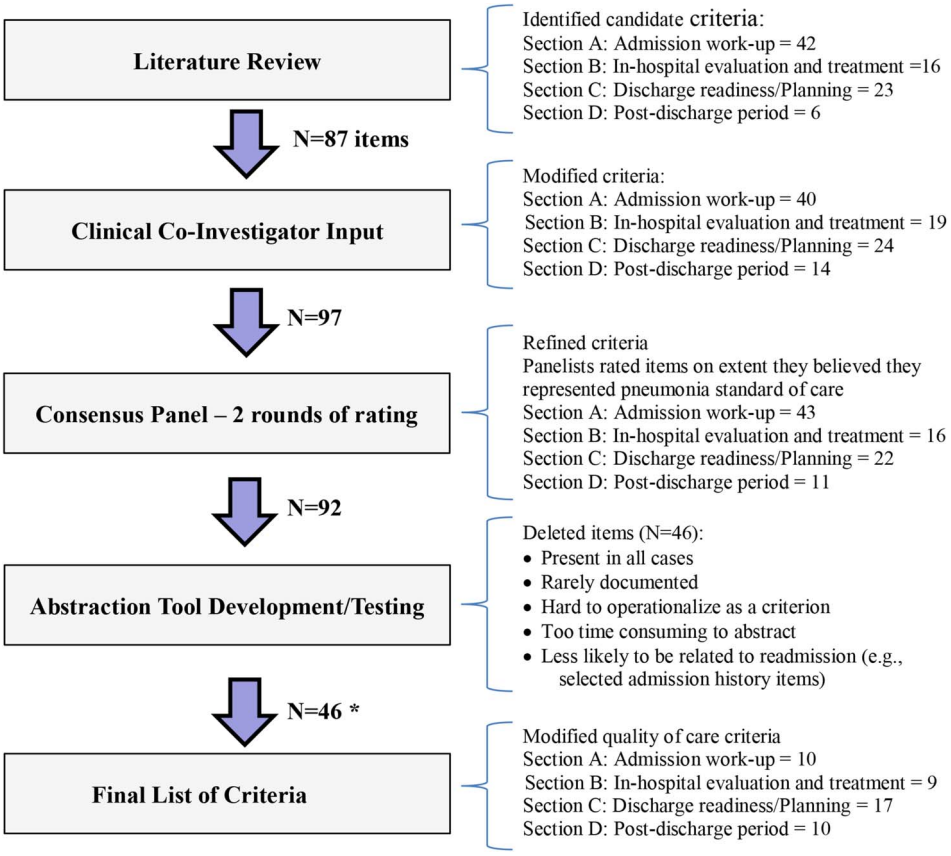

Figure 2 Development of explicit pneumonia process of care criteria. *We also abstracted electronic medical record information in order to ascertain the diagnosis of pneumonia, as well as information on risk factors and severity of illness. These were not included in list of process of care criteria that made up the quality-of-care score.

case had to fit a clinical definition of pneumonia that included a new chest X-ray infiltrate),[25] and selected items contained in the Pneumonia Severity Index score.[26]

Two trained nurse-abstractors reviewed the EMRs. After piloting the tool on five records, we dropped items that were present in all cases (eg, having a white blood cell count performed on admission), present in very few cases (eg, functional status documentation), difficult to use as a quality criterion (eg, the discharge summary documented recommendations for medication changes—this would require assessing whether any medication changes or lack thereof were appropriate), or time consuming to abstract/of low reliability (eg, "If a medication for a comorbidity was changed within 24 h of discharge, then post-discharge follow-up was arranged within 7 days." We frequently found discrepancies in documentation of admission medications or in-hospital changes depending on the source reviewed making this time consuming to assess and of low inter-rater reliability). We also dropped several items pertaining to admission history documentation (unless they were relevant to appropriate antibiotic choice) since prior work showed no association between admission documentation and readmissions.[22] This yielded 46 criteria (figure 2 shows the number of items in each section).We assessed nurse-abstractors' inter-rater reliability on 20 complete records, achieving 98% observed agreement across all questions. See online supplementary appendices 2b and 5 for the final criteria and abstraction tool, respectively. (The discharge readiness/planning and post-discharge sections contained both generic and pneumonia-specific items.)

Nurses sequentially reviewed 138 of the 600 randomly chosen cases to obtain 100 fully abstracted cases. The most common reason for exclusion from full abstraction was that the patient had had a pneumonia-related admission to a non-VA hospital in the previous 30 days (n=13) (see figure 1). Clinician co-investigators (KG, JS) assisted the lead clinical investigator (AMB) in assessing antibiotic choice and dosage appropriateness from abstracted data.

Analyses

We compared fully abstracted cases with all VA pneumonia discharges with a 30-day readmission by demographics and selected Elixhauser comorbidities (using outpatient and inpatient diagnostic codes from administrative data from 12 months before the index plus the index admission), length of stay, and time to readmission.[27] We also compared PPR–yes with PPR–no cases for these same variables, plus selected

EMR-abstracted comorbidities. We used parametric and non-parametric tests as appropriate.

Baseline analyses

We compared PPR–yes and PPR–no cases by mean quality scores as follows: (1) we scaled scores, based on achievement of specified items (yes/no), to a maximum of 25 per section and summed scores across sections (maximum obtainable quality score=100; 'equal section weights'); (2) we weighted individual items equally (regardless of section) and scaled total scores out of 100 (ie, total score=(number of items achieved/46 items)×100; 'equal item weights'). Higher scores indicate achievement of more process of care items and therefore higher quality.

Sensitivity analyses

We conducted several sensitivity analyses. (1) We weighted items using the mean panel rating of the item then re-ran quality score methods 1 and 2 above. (2) We re-examined baseline results by modifying the original items either with respect to the numerator or denominator specification or dropping items with low achievement rates. For example, for one item, "the patient is ready for discharge if the white blood cell count closest to discharge is stable or falling compared with the admission value," we modified the numerator to give a pass to cases only if the decrease was ≥20%. (3) Because 51% of all VA patients and 93% of those aged ≥65 are VA and Medicare dually enrolled,[28] using CMS MedPar files, we examined the frequency of post-discharge Medicare use by PPR status among our abstracted sample and determined its potential impact on findings.

To further examine the association between the quality score and PPR status, we ran a multivariate logistic regression model predicting PPR status, including the overall 'equal section weights' score, adjusting for age, race, gender, and number of comorbidities.[27] We repeated this using the 'equal item weights' score and individual section scores. We also repeated these logistic analyses excluding PPR–no cases ineligible for a PPR (n=8) (see online supplementary appendix 3, which shows PPR reasons among abstracted cases).

Lastly, to lend further construct validity to our methods, we examined quality score and time to readmission associations; we hypothesised that patients experiencing more quality of care problems would be readmitted sooner. For the full abstraction sample, we generated descriptive statistics of consecutive time-to-readmission intervals (0–3, 4–7, 8–14, 15–30 days) by quality score using equal section weights, then examined quality score and readmission time associations using a simple correlation, plus linear regression adjusting for age, gender, race, and number of comorbidities. We also re-examined PPR–yes vs PPR–no quality scores using 7- and 14-day readmission windows. We performed these analyses using (1) total quality score based on equal section weights; (2) section scores (scaled out of 25); and (3) total score without section D, since one would expect more opportunities to fulfil section D criteria the further from index discharge.

We compared PPR–yes and PPR–no group scores using t tests, and calculated ES, which is independent of sample size, for selected results to characterise the clinical significance of findings[18] (Cohen defines an ES of 0.2, 0.5, and 0.8 as small, medium, and large, respectively). For multivariate logistic analyses, we examined ORs and 95% CIs.

RESULTS

Of the fully abstracted cases, 77% were flagged as PPR–yes, versus 72% of all pneumonia readmissions (and 77% of the potential abstraction sample of 600). Table 1 shows all pneumonia discharges with a readmission versus fully abstracted cases. There were no significant differences between these groups and no obviously associated trends despite some relatively minor comorbidity prevalence differences. For fully abstracted cases, table 1 shows PPR–yes and PPR–no characteristics. Again, no differences were significant. However, there was a trend towards more comorbidities such as chronic lung disease, HF, and liver disease, among PPR–yes cases; as expected by our methodology, PPR–no cases were more likely to have cancer. PPR–yes cases were also more likely to require intensive care unit admissions or be nursing home residents. Comorbidity differences using administrative data were also non-significant (data not shown for individual comorbidities).

PPR–yes cases had higher achievement rates than PPR–no cases on 28 of 46 process criteria, although criterion differences were not significant. Total baseline scores were slightly higher using the equal item weight method than the equal section weight method (70.4±8.7 vs 64.8±12.0) primarily because section D scores were low and contained only 22% of items. By both methods, scores were slightly higher among PPR–yes versus PPR–no cases, although differences were non-significant; however, ES were midway between small and medium for total score by both methods (>0.30) and for sections A (admission work-up) and D (0.30 and 0.40, respectively) (see table 2).

Sensitivity analyses: *panel weights*: We obtained similar results when weighting items using panel weights. Scores were slightly higher for all sections except section D, as were total scores, again with a non-significant trend towards higher scores among PPR–yes cases and slightly larger ES (≥0.40) (see table 2).

Individual item numerator/denominator modifications or deletion if low achievement rates: No item modifications or deletions had any meaningful effect on findings (data not shown; available from authors).

Table 1 Characteristics of all pneumonia discharges with a readmission and abstracted sample*

	All pneumonia discharges with a readmission (n=11 278)		PPR status—fully abstracted cases (n=100)	
Variable	**Not fully abstracted (n=11 178)**	**Fully abstracted (n=100)**	**Yes (n=77)**	**No (n=23)**
Age, mean (SD)†	71.0 (12.2)	71.1 (13.1)	73.0 (12.2)	67.0 (15.2)
Sex, male, n (%)	10 950 (98.0)	96 (96.0)	75 (97.4)	21 (91.3)
Race, n (%)‡				
White	–	–	56 (72.7)	14 (60.9)
Black	–	–	10 (13.0)	6 (26.1)
Hispanic	–	–	5 (6.5)	2 (8.7)
Other	–	–	6 (7.8)	1 (4.3)
Length of stay, days, median (25th, 75th centile)	5 (3, 8)	5 (3, 9.5)	5 (3, 10)	5 (4, 8)
Time to readmission, days, median (25th, 75th centile)	12 (5, 20)	9.5 (4.5, 19)	9 (4, 19)	12 (6, 16)
Severity of illness, n (%)§				
1—Minor	611 (5.5)	2 (2)	2 (2.6)	0 (0)
2—Moderate	4665 (41.7)	47 (47.0)	36 (46.8)	11 (47.8)
3—Major	4867 (43.5)	41 (41.0)	30 (39.0)	11 (47.8)
4—Extreme	1034 (9.3)	10 (10)	9 (11.7)	1 (4.4)
Number of Elixhauser comorbidities, mean (SD)¶	5.9 (2.5)	5.8 (2.4)	6.0 (2.5)	5.1 (2.1)
Selected Elixhauser comorbidities, n, %¶				
Heart failure	3901 (34.9)	34 (34.0)	–	–
Chronic pulmonary disease	6874 (61.5)	69 (69.0)	–	–
Metastatic cancer	858 (7.7)	3 (3.0)	–	–
Solid tumour without metastasis†	3022 (27.0)	19 (19.0)	–	–
Liver disease	828 (7.4)	8 (8.0)	–	–
Renal failure	3105 (27.8)	31 (31.0)	–	–
Psychoses	2152 (19.3)	23 (23.0)	–	–
Depression	2929 (26.2)	24 (24.0)	–	–
Selected EMR-abstracted comorbidities, n (%)**				
Chronic lung disease	–	–	53 (68.8)	13 (56.5)
COPD††	–	–	46 (59.7)	11 (47.8)
Cancer	–	–	6 (7.8)	3 (13.0)
Liver disease	–	–	5 (21.7)	4 (17.4)
Heart failure	–	–	23 (29.9)	3 (13.0)
Stroke	–	–	10 (13.0)	2 (8.7)
Chronic kidney disease	–	–	19 (24.7)	7 (30.4)
Receiving home oxygen†	–	–	20 (26.0)	2 (8.7)
Intensive care unit admission, n (%)	–	–	15 (19.5)	2 (8.7)
Nursing home patient, n (%)	–	–	14 (18.2)	2 (8.7)

*No significant differences (ie, no p<0.05) between groups (not fully abstracted pneumonia readmissions vs abstracted cases and PPR–yes vs PPR–no cases).
†Indicates differences with p values between 0.05 and 0.10. For age, this only applies to the PPR–yes vs PPR–no comparison. All other p values were >0.10.
‡Our administrative dataset did not contain race.
§This is derived from the APR-DRGs which classify patients according to their reason for admission and severity of illness. Severity of illness level is APR-DRG-specific and takes into account the patient's age, principal diagnosis, secondary diagnoses and procedures from the index admission.[29]
¶Consists of 29 Elixhauser comorbidities obtained from administrative data (both inpatient and outpatient) from year before admission up to and including the index admission.[27]
**Comorbidities obtained from EMR.
††COPD; subset of chronic lung disease.
APR-DRGs, all patient refined-diagnosis related groups; COPD, chronic obstructive pulmonary; EMR, electronic medical record; PPR, Potentially Preventable Readmission.

Potential Medicare use impact: Of the sample, 16% had Medicare outpatient claims between index discharge and readmission, representing 17% (n=13) of PPR–yes and 13% (n=3) of PPR–no cases (p=1.0). Recalculating results after removing either section D or cases with non-VA post-discharge care did not alter the findings.

Table 2 Quality scores

Variable	Fully abstracted sample (n=100)	PPR–yes (n=77)	PPR–no (n=23)	p Value	Effect size
Baseline analysis					
Section A	19.6 (3.1)	19.8 (2.9)	18.8 (3.6)	0.15	0.32
Section B	18.0 (6.1)	18.0 (6.0)	17.9 (6.5)	0.94	0.02
Section C	20.2 (2.1)	20.2 (2.2)	20.2 (1.9)	0.94	0.02
Section D	7.0 (8.0)	7.7 (8.1)	4.7 (7.3)	0.11	0.39
Total score: equal section weight	64.8 (12.0)	65.8 (11.5)	61.6 (13.3)	0.14	0.34
Total score: equal item weight	70.4 (8.7)	71.2 (8.7)	67.9 (8.7)	0.11	0.38
Panel weight analysis					
Section A	21.9 (2.9)	22.1 (2.8)	21.2 (3.3)	0.21	0.29
Section B	19.3 (6.2)	19.6 (6.1)	18.5 (6.4)	0.47	0.17
Section C	19.5 (2.6)	19.5 (2.6)	19.4 (2.4)	0.90	0.03
Section D	6.8 (8.0)	7.5 (8.1)	4.4 (7.3)	0.11	0.39
Total score: equal section weight	67.5 (12.3)	68.7 (11.6)	63.6 (13.9)	0.08	0.40
Total score: equal item weight	74.9 (8.8)	75.7 (8.7)	72.1 (8.7)	0.09	0.41

Results are shown as mean (SD).
Section A=admission work-up; section B=in-hospital evaluation and treatment; section C=discharge readiness/discharge planning; section D=post-discharge period.
Equal section weight method—totals of items within each section scaled to maximum score of 25 and summed to a maximum of 100.
Equal item weight—total of all items scaled to a maximum of 100.
PPR, Potentially Preventable Readmission.

Quality scores as PPR status predictors: Logistic models adjusted for demographics and comorbidities showed no significant association between quality score and PPR status (all CIs included 1.0) (see table 3). Exclusion of PPR–ineligibles from PPR–no cases did not affect these results (see online supplementary appendix 4 and table 3s).

For the full sample, quality scores were higher the longer the time to readmission. This trend was most apparent for section D, but held even when section D was removed and was significant by correlations and multivariate regression modelling (see online supplementary appendix 4 and table 1s). Equal section weight quality scores by PPR-status comparisons using 7- or 14-day readmission windows were similar to 30-day results. PPR–yes scores were higher than PPR–no cases; however, associated ES were larger, especially for the 14-day comparison, with several differences of at least of medium clinical significance (see online supplementary appendix 4, figure 1s and table 2s).

Table 3 Association of quality score and PPR status (PPR–yes vs PPR–no)

Variable	OR	95% CI	C statistic
Model 1			
Total score: equal section weight	1.03	(0.99 to 1.08)	0.682
Model 2			
Total score: equal item weight	1.05	(0.99 1.11)	0.695
Model 3			
Section A score	1.11	(0.94 to 1.31)	0.697
Section B score	0.99	(0.91 to 1.08)	
Section C score	1.04	(0.81 to 1.34)	
Section D score	1.04	(0.97 to 1.12)	

All models are adjusted for age, sex, race and number of Elixhauser comorbidities.
Elixhauser comorbidities consist of 29 comorbidities obtained from inpatient and outpatient administrative data from year before admission up to and including the index admission.[27]
PPR, Potentially Preventable Readmission.

DISCUSSION

This is one of the few studies to examine whether the PPR algorithm distinguishes between good and bad quality of care at the individual case level. Among veterans readmitted after a pneumonia discharge, we found no significant difference in quality of care, as measured by processes of care received during the index admission and after discharge, between cases flagged as PPRs and non-flagged cases. Indeed, contrary to our hypothesis, quality scores were slightly higher among PPR-flagged cases.

Although both CMS and PPR measures are intended for hospital-level comparisons of risk-adjusted rates, we believe our case-level analysis is meaningful. Although both use slightly different methods to control for comorbidity, the presumption of each is that since these important drivers of readmission are controlled for, resultant high rates must be due, in part, to modifiable unmeasured factors such as quality of care.[4 8] Thus, to try to improve rates, a hospital identified as a high outlier by either measure would have to look for more detailed information at the individual patient level to examine whether there were any quality of care problems. The PPR software attempts to improve upon the CMS measure by maximising identification of preventable readmissions (ie, those associated with quality of care problems) by matching

clinically related admissions and readmissions.[8] Despite this refinement, our findings suggest that the PPRs are no better than CMS measures in ascertaining which cases are preventable.

Consistent with existing studies, a large proportion of our readmissions were clinically related based on admission and readmission administrative codes and therefore flagged as PPRs (77%).[30–32] Estimated preventable readmission rates from other chart review studies are generally much lower than observed rates obtained using the PPRs (5–79%, with a median of only 27%).[7] Jackson *et al*[32] recently compared potential preventability of readmission as assessed by clinical judgement based on triangulating results from EMR review and interviews with treating providers and a subset of patients and their caregivers, with the PPRs.[33] They identified 47% of readmissions as potentially preventable, versus 78% by the PPRs.[32] They concluded that agreement between methods was insufficient to supplant manual review.[32] Others have also reported concerns about the ability of PPRs to appropriately flag readmissions that are truly preventable when examined at the individual case level.[34]

We intentionally measured quality of care using detailed explicit process of care information to improve the reliability and generalisability of findings and focus on items potentially modifiable by a hospital. Notably, the previously cited Jackson *et al*[32] study used implicit review to assess preventability and included relatively few in-hospital processes of care.[33] Moreover, the extent to which some of the concerns identified might have been dealt with is unclear (eg, inadequate attention to psychological or social needs was mentioned as an important problem contributing to preventable readmission in over half of their cases).[32 33 35]

In general, process–outcome links supported by clinical trials have been harder to demonstrate in observational studies, especially with respect to readmissions. Of the few prior studies specifically examining explicit quality of inpatient care criteria and readmission risk, none included the post-discharge period.[22 36–38] Further, the strongest associations have been found by aggregating individual processes of care into a single score or multiple scores representing different stages of the hospital stay rather than using individual process measures and also when examining data at the patient, rather than hospital, level.[22 37]

Studies examining processes of care and readmissions of patients with pneumonia are scarce, with most focusing on few criteria. Weissman *et al*[37] used a case–control design to examine the association between PPRs, defined as 'related adverse readmissions' based on clinician panel assessments of paired readmission diagnoses and readmission periods, and index hospitalisation quality of care for patients with pneumonia and HF. As in our study, charts were abstracted for several process criteria, including those related to the admission history, treatment/evaluation during the stay, and discharge readiness/stability. As we found, overall explicit quality scores in patients with pneumonia and related adverse readmissions were similar to those of other readmitted patients with pneumonia, but significantly lower than for non-readmitted patients.[37] Notably, the observed association was strongest for discharge stability measures.

Other studies of pneumonia have assessed a limited number of process criteria, with relatively few examining the association with readmissions. Dean *et al*[39] examined initial antibiotic choice at the hospital level, while Halm *et al*[40] investigated measures of clinical stability at discharge at the patient level. Both examined the association with 30-day readmission and mortality. The former found a non-significant readmission decrease and a significant mortality decrease in hospitals that implemented a specific pneumonia antibiotic guideline.[39] The latter found that having specific markers of clinical instability at discharge significantly increased the risk of both readmissions and death, with the risk increasing with the number of markers present.[40]

Ours is among the first studies to examine the PPRs using detailed discharge-level EMR abstracted processes of care and go beyond the inpatient period to examine post-discharge processes. Further study strengths include use of the VA EMR, allowing access to VA-wide care information and performance of multiple sensitivity analyses, which showed consistent findings. Additionally, our preliminary findings in cohorts of patients with acute myocardial infarction and HF have been similar.[41]

However, our study had a few limitations. (1) Our sample size might have been too small to show statistical significance. To deal with this, we calculated ES which are independent of sample size; the higher-quality scores among PPR-flagged cases represented an ES midway between small and medium, but in the opposite direction than expected.[18] (Therefore, if our sample were larger, we might find that quality scores were significantly higher in PPR–yes cases but the ES should remain unchanged.) (2) We dropped certain criteria that were difficult to find and not clearly linked to hospitalisation or readmission (eg, whether an influenza vaccine was given).[42] (3) We do not know whether low 'post-discharge' scores resulted from absence of VA care or poor EMR documentation of actual care received, although only 36% of patients had a follow-up visit to a VA provider. (4) We lacked non-VA EMR post-discharge care information. However, for both items 3 and 4, excluding post-discharge care did not change the findings. (5) Despite using a well-established consensus method to develop explicit criteria, the reproducibility of criteria selected and associated weights may vary by clinical panel.[43] (6) We did not specifically abstract process information related to prevention or management of potential complications of care (eg,

antibiotic-related increases in international normalised ratio in patients receiving warfarin) or management of active comorbidities (eg, diabetes).

Conceptually, the PPRs represent an attractive alternative to an administrative all-cause readmission measure such as CMS or a preventability measure based on chart review. The latter would be exceedingly resource intensive and thus impracticable for large-scale implementation. However, the problems discussed above illustrate the difficulty in using administrative data-based readmission measures, such as the PPRs, to produce information that hospitals can use to reduce readmissions. These problems would exist regardless of whether one used a measure based on ICD-9 codes as in the USA, or one based on ICD-10 codes, which are used in most other countries. Reasons for readmissions are myriad with many, such as socioeconomic factors, being difficult to modify by the hospital.[35 44] Similarly, there may be problems in using the EMR to determine potential preventability.

Lack of EMR documentation of care, such as that delivered in the post-discharge period, is concerning. Certain processes, such as those related to patient–provider communication, may be difficult to document accurately, requiring other data collection methods such as direct observation. Nevertheless, it is important that providers are aware of the need to document all aspects of care as far as possible. Reaching out to providers, coders, and hospital senior leadership may be a necessary step in accomplishing this.

From a hospital perspective it would also be useful to be able to predict preventable readmissions in order to prevent them. At the individual readmission level, PPRs produce a categorical outcome (yes, no or ineligible). Whether the PPRs could be used to provide a probabilistic likelihood for readmission, or recalibrated/modified to identify readmissions that have a higher likelihood of being preventable, requires further investigation.

CONCLUSIONS

PPR categorisation did not reflect expected differences in quality of care received during the index admission or post-discharge period among readmitted cases. Although the PPRs represent an important step towards developing a fairer measure for hospital reimbursements than all-cause readmissions, our findings did not support their use at the individual case level. Future studies should examine whether the PPRs better discriminate quality if other data collection methods are used to capture poorly documented potentially relevant processes, or if cases are sampled from hospitals with higher and lower than expected PPR rates.

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Data sharing statement Scores for individual items and results of additional sensitivity analysis mentioned in the paper but not reported (individual item numerator/denominator modifications or deletion if low achievement rates) may be available to any interested parties by sending a request to the corresponding author.

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Appendices

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Appendix 1. Literature Review Details

We searched PubMed using the Mesh Terms "Patient Readmission" AND "Pneumonia," "Hospitalization" AND "Pneumonia," "Quality Indicators, Healthcare" AND "Pneumonia," and The Text Words "Preventable Readmission" from 2000 to present. We used the following filters: English Language, Humans, Items with Abstracts.

We also reviewed bibliographies of retrieved papers and selected medical texts (i.e., UpToDate) for additional references. (We included papers from prior to 2000 resulting from these searches.)

Additionally, we reviewed current clinical practice guidelines from US national societies and existing CMS/Joint Commission and Veterans Health Administration pneumonia process of care performance measures (both current and retired measures).

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Appendix 2. Pneumonia Process of Care Criteria

2a. Examples of Pneumonia Process of Care Criteria/Items

Section	Clinical Item	Quality of Care Item
A: Admission Work-Up	The admission note should document risk factors for healthcare associated pneumonia if present	If the patient had an acute or subacute hospital stay in the 90 days prior to admission, then this should be documented in the admission note, to fulfill the criterion
	Blood cultures should be performed within 24 hours of admission, with at least 1 set drawn prior to antibiotic administration	If pneumonia is suspected upon admission, then at least one set of blood cultures should be drawn within the first day of admission, prior to giving antibiotics, to fulfill the criterion
B: In-Hospital Evaluation and Treatment	The initial empiric antibiotic selection is consistent with the clinical picture and current national pneumonia guidelines	If the patient received appropriate antibiotics (type and dosage; based on clinician review of risk factors), the criterion is fulfilled
C: Discharge Readiness / Planning	The patient is ready for discharge when there is documented improvement in symptoms (e.g., dyspnea, cough) or signs of pneumonia	If there is documented improvement in symptoms (dyspnea, cough) or signs (e.g., decrease in fever, improved oxygen saturation) in the EMR, then the criterion is fulfilled
	Discharge medications include oral antibiotics to complete at least a total 5-day course	If the patient did not complete at least 5 days of antibiotics in-hospital, then discharge medications need to include antibiotics to complete at least 5 days, to fulfill the criterion
D: Post-Discharge Period	There was a post-discharge phone call or in-person home visit, or scheduled provider visit within 72 hours of discharge	If there was documentation of a phone call, home visit, or scheduled provider visit within 72 hours of discharge, then the criterion is fulfilled

Appendix 2b. Final List of Pneumonia Processes of Care Criteria – Clinical Items

A. The Admission Work-up

The admission history should document:

A1. Allergies or intolerances to medications

A2. Adherence to medication regimen

A3. Cigarette smoking (pack-years)

A4. Alcohol use (amount per day or average drinks per week)

A5. Illicit drug use, including injection drugs

A6.If the patient had an acute or subacute (rehabilitation/geriatrics) hospital admission for at least 48 hours within the prior 90 days

The admission physical examination (MD unless otherwise specified) should include:

A7. Level of consciousness

Tests performed within 24 hours of admission should include:

A8. Blood cultures with at least one set performed prior to antibiotic administration

A9. EKG

A10. Chest x-ray (upright postero-anterior (PA) and lateral if possible)

B. Evaluation and Treatment During the Stay

Diagnostic Evaluation

B1. Obtain a sputum gram stain and culture (in patients who are producing sputum) **or**

obtain an endotracheal aspirate for gram stain and culture in intubated patients

If pneumonia not diagnosed on admission but suspected shortly after admission:

B2. Obtain blood cultures

B3. Obtain a repeat chest x-ray (including PA and lateral; if PA/lateral not done on admission)

Treatment / Monitoring

B4. Patient is candidate for antibiotics (not palliative), and initial empiric antibiotic selection is consistent with clinical picture and current national pneumonia guidelines. *

B5.Aspiration pneumonia and coverage for anaerobes considered if appropriate history and chest x-ray findings (i.e., history of swallowing problems, altered level of consciousness, alcohol/drug abuse, seizure, right upper lobe infiltrate)

B6. Antibiotics modified based on culture findings †

B7. Antibiotic levels monitored and adjusted as appropriate (e.g. vancomycin and aminoglycosides) †

B8. Antibiotics dosed appropriately based on renal or liver function †

B9. Appropriate venous thromboembolism prophylaxis should be administered during the hospital stay until patient is fully ambulatory, unless he/she is on full-dose anticoagulation

C. Readiness for Discharge Criteria

Clinical Stability

The patient admitted for pneumonia is ready for discharge when:

C1. Documented improvement in symptoms (e.g., dyspnea/cough) has occurred

C2. White blood cell count is stable or falling, not rising

C3. Blood urea nitrogen is stable or falling, not rising

C4. Creatinine is stable or falling, not rising

None of the following have occurred within 24 hrs of discharge (Halm, Arch Intern Med 2002):

C5. Systolic blood pressure ≤90 mm Hg (in patient whose baseline BP is > 90 mm Hg)

C6. Heart rate >100 bpm (in patient whose baseline is <100)

C7. Respiratory rate >24 /min (in patient whose baseline is <24)

C8. Temperature >100°F

C9. Room air oxygen saturation <90% (in patient not previously on home oxygen) or patient discharged on home oxygen when not previously on this.

C10. Altered mental status

C11. Inability to maintain enteral intake, either orally or by other means (e.g., PEG tube)

Discharge Planning

C12. Discharge medications include oral antibiotics to complete at least a total 5-day course

There is documentation in the chart that the patient or family:

C13. Received written discharge instructions or other educational material regarding all of the following: 1) activity level, 2) diet, 3) discharge medications, 4) follow-up appointment

C14. Understands the medication regimen

Plans for post discharge medical care are stated in the chart and/or discharge summary, including:

C15. List of discharge medications, with medication reconciliation including specific medication changes made compared to admission medications

C16. Follow-up clinic visit arranged with primary care provider or specialist (infectious disease or pulmonology) as appropriate

C17. Discharge summary completed by time of follow-up visit, and therefore available to follow-up provider

D. Post-Discharge Period

There should be documentation that the following occurred:

D1. There was a post-discharge phone call or in-person home visit within 72 hours to the patient by a nurse or other healthcare staff or scheduled provider office visit within 72 hours

If there was a post-discharge phone call / home visit it consisted of:

D2. Patient asked about any change in condition since discharge including breathing and cough

D3. Patient asked about his/her understanding of what the medications are for

D4. Review of pending clinic appointments and tests

D5. Reinforcement of other discharge instructions including recommended diet and what to do if symptoms worsen

Follow-up Provider Visit

D6. There was a follow-up visit with the provider prior to readmission

At follow-up visit with provider, if the visit occurred at least a day before the readmission date, the following should be documented:

D7. Patient's current functional status including exercise tolerance with respect to breathing and ability to perform activities of daily living

D8. If medications changed or discontinued, appropriate justification given

D9. Medications reconciled including updating medication list

D10. Provider's awareness of pending tests

Notes:

* Item B4 was addressed by review of each case by the study lead (Dr. Borzecki) and clinical co-investigators (Drs. Gupta and Strymish) using abstracted information, and in several cases, going back to the chart for additional details.

In order to assess antibiotic appropriateness, we included several questions about risk factors for drug resistance, disease severity, and increased risk for certain pathogens that might affect antibiotic choice (e.g., additional questions about healthcare associated pneumonia risk including being a long-term care resident, attendance at a hemodialysis clinic or hospital clinic for wound care or IV therapy in the prior 30 days, immunosuppressive disease history, use of immunosuppressive treatment including steroids or recent antibiotic use).

† Items B6, B7, and B8 were also reviewed by study lead and clinical co-investigators noted above.

Appendix 3. Reasons for PPRs among Fully Abstracted Cases

Reasons for PPR-Yes Cases	**N**
Medical readmission for a continuation or recurrence of the reason for the initial admission, or for a closely related condition	52
Ambulatory care sensitive conditions as designated by ARHQ*	14
All other readmissions for a chronic problem that may be related to care either during or after the initial admission	8
Readmission for a substance abuse diagnosis reason following an initial admission for a non-mental health, non-substance abuse reason.	2
Readmission for surgical procedure to address a complication that may be related to or may have resulted from care during the initial admission.	1
Reasons for PPR-No Cases	
Not clinically related	10
Ineligible for a PPR†	8
Malignancy ‡	3
Clinically related, not preventable	2

* Specific to pneumonia discharges, readmissions with a diagnosis of pneumonia are considered as a " medical readmission for a continuation or recurrence of the reason for the initial admission …" and not as an ambulatory care sensitive condition.

†Includes: 5 "major/metastatic malignancy", and 1 "non-event malignancy." The PPR algorithm designates patients with "major/metastatic malignancy" as ineligible for a PPR because they are considered to be at very high risk for readmission due to their medical condition and thus hard to prevent. For our study, we considered ineligible patients as PPR-No cases.

‡ Includes one known case of lung cancer from index admission, 1 case of lung cancer diagnosed after the index admission and 1 case of lymphoma with malignant effusion from the index admission. Of note, there were 8 cases of malignancy among the PPR-Yes cases (6 of which were lung cancer.)

Appendix 4. Time to Readmission and Quality Score Analyses

Table 1s. Time to Readmission and Quality Score. Consecutive Intervals

Time to Readmission	N	Score, Mean (SD)					
		Total Score	Section A	Section B	Section C	Section D	Section ABC
0-3 days	19	57.1 (12.0)	18.6 (3.5)	15.9 (6.9)	19.6 (2.2)	3.0 (7.3)	54.1 (8.5)
4-7 days	22	61.9 (12.0)	18.2 (4.0)	17.6 (7.1)	20.2 (1.6)	5.9 (6.8)	56.0 (9.2)
8-14 days	20	64.9 (9.3)	20.1 (2.6)	16.4 (5.5)	20.4 (2.2)	8.1 (7.7)	56.9 (5.5)
15-30 days	39	70.1 (11.1)	20.6 (1.9)	20.1 (4.9)	20.4 (2.2)	9.0 (8.5)	61.1 (6.0)

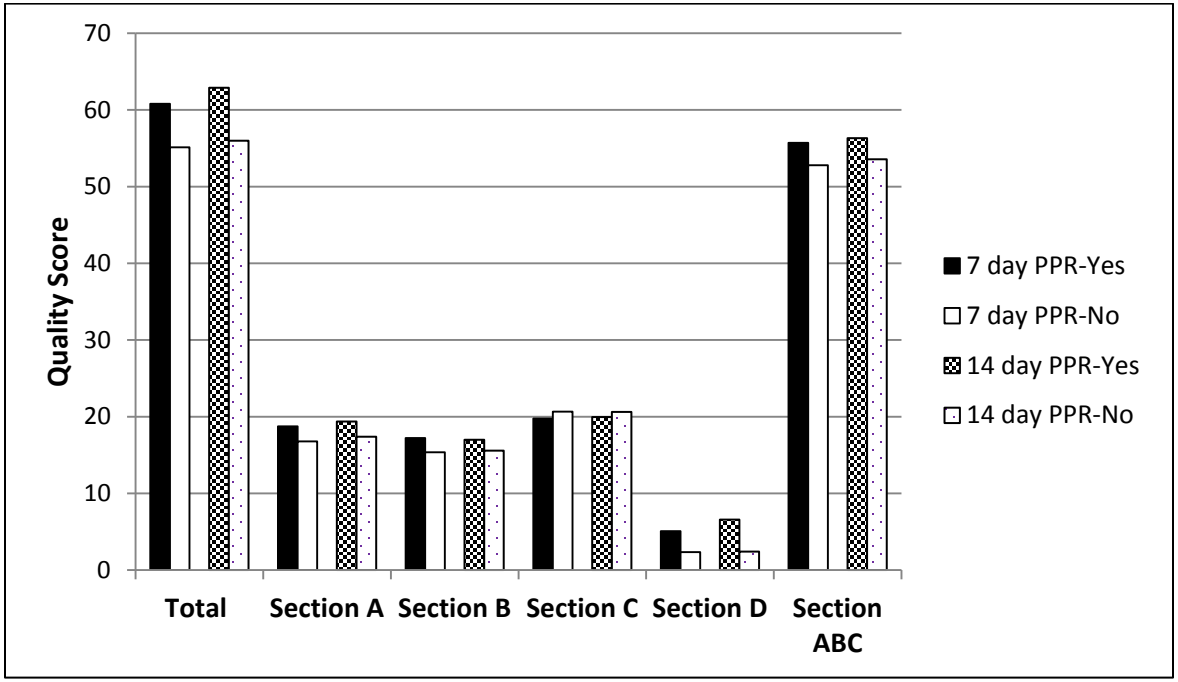
Section: A = admission work-up; Section B = in-hospital evaluation and treatment; Section C = discharge readiness/discharge planning; Section D = post-discharge period.

Total score and section score calculated using equal section weight method – totals of items within each section scaled to maximum score of 25 and summed to maximum of 100 for the four sections.

SD = standard deviation

We also examined the correlation between quality scores and time to readmission, as well as running linear regression models with time to readmission as the dependent variable with adjustment for age, gender, race, and comorbidity count. We found a significant positive association between total quality score and time to readmission ($r = 0.45$, $p<0.0001$; $r^2 = 0.25$ for model, time to readmit parameter estimate 0.33, $p<0.0001$ in the multivariate model). (This association also held when we removed Section D; $r = 0.35$, $p=0.0003$; $r^2 = 0.12$ for model, time to readmit parameter estimate 0.39, $p=0.0006$.)

Figure 1s. Quality Score by PPR Status using 7 and 14 Day Readmission Windows



Section: A = admission work-up; Section B = in-hospital evaluation and treatment; Section C = discharge readiness/discharge planning; Section D = post-discharge period.

Total score and section scores calculated using equal section weight method – totals of items within each section scaled to maximum score of 25 and summed to maximum of 100 for the four sections.

See Table 2 below for information on p values and effect size.

Table 2s. Association of Quality Score and PPR Status using 7 and 14 Day Readmission Windows

Variable, Mean (SD)	7 days				14 days			
	PPR-Yes (N=33)	PPR-No (N=8)	P value	ES	PPR-Yes (N=48)	PPR-No (N=13)	P value	ES
Total Score	60.8 (11.8)	55.1 (12.9)	0.23	**0.48**	62.9 (11.3)	56.0 (10.8)	0.05	**0.63**
Section A	18.7 (3.6)	16.8 (4.0)	0.19	**0.51**	19.4 (3.3)	17.4 (4.0)	0.07	**0.55**
Section B	17.2 (6.5)	15.4 (8.8)	0.51	0.24	17.0 (6.4)	15.6 (6.8)	0.49	0.21
Section C	19.8 (1.9)	20.6 (2.0)	0.24	**0.46**	19.9 (2.1)	20.6 (1.7)	0.29	0.35
Section D	5.1 (7.5)	2.3 (4.7)	0.33	**0.44**	6.6 (7.8)	2.4 (4.8)	0.07	**0.65**
Section ABC	55.7 (8.5)	52.8 (10.2)	0.41	0.33	56.3 (7.7)	53.6 (8.3)	0.27	0.34

Section: A = admission work-up; Section B = in-hospital evaluation and treatment; Section C = discharge readiness/discharge planning; Section D = post-discharge period.

Total score and section score calculated using equal section weight method – totals of items within each section scaled to maximum score of 25 and summed to maximum of 100.

SD = standard deviation, ES = effect size

Table 3s. Association of Quality Score and PPR Status (PPR-Yes vs. PPR-No); PPR-Ineligible Cases Removed

Variable (N=92)	Odds Ratio	95% Confidence Interval	C Statistic
Model 1			
Total Score: equal section weight	1.03	(0.98, 1.08)	0.694
Model 2			
Total Score: equal item weight	1.04	(0.97, 1.12)	0.694
Model 3			
Section A Score	1.08	(0.88, 1.31)	0.706
Section B Score	1.00	(0.90, 1.10)	
Section C Score	0.98	(0.73, 1.32)	
Section D Score	1.04	(0.95, 1.13)	

This is the PRINT VIEW of FULL chart abstraction for record: PNxxx

SECTION A: DEMOGRAPHIC INFORMATION			
#	**QUESTION**	**RESPONSE**	**DATA SOURCE(S)**
A1	GENDER	○ Male ○ Female ○ Not documented	Patient Information Demographics Patient Inquiry
A2	DATE OF BIRTH	MM/DD/YYYY	Patient Information Demographics Patient Inquiry
A3	RACE/ETHNICITY	○ White ○ Hispanic White ○ Hispanic Black ○ African American ○ Native American ○ Asian ○ Not documented	Patient Information Demographics Patient Inquiry
A4	ADMISSION DATE	MM/DD/YYYY	Sample sheet
A5	DISCHARGE DATE	MM/DD/YYYY	Sample sheet
A6	READMISSION DATE	MM/DD/YYYY	Patient Admissions
SECTION A. ASCERTAINMENT OF EVENT			
A7	Was the patient diagnosed with PNA?	○ YES ○ NO, STOP abstraction & explain below	Discharge summary
A8	Was the patient admitted to an outside hospital (for at least 24hrs) with diagnosis of PNA, within 30 days prior to index admission?	○ YES, STOP abstraction & explain below ○ NO/Not documented	Admission note
A17	Did the patient have PNA treated on a prior VA admission within 30 days prior to the index admission that didn't get coded for pneumonia?	○ YES, STOP abstraction & explain below ○ NO	Admission note

A9	Did the patient have an infiltrate or consolidation on CXR	◯ YES ◯ NO, STOP abstraction & explain below	Admission note, radiology

A10	Did the patient have any of the following?	☐ New or increased cough ☐ Dyspnea ☐ Abnormal Temp (≤96.8 or ≥100 F), or report of fever, chills/rigors ☐ Leukocytosis (WBC >11.0) Value of WBC (at admission or first available) xx.x Enter -888 if not available Date of this value MM/DD/YYYY Enter 1/1/9999 if not available ☐ Leucopenia (<3.5) ☐ NO/Not documented – STOP abstraction & explain below	Admission note Discharge Summary

SA11	Was the patient discharged against medical advice (AMA) from the index admission?	◯ YES, STOP abstraction & explain below ◯ NO	Discharge summary Progress note MD Order (Irregular Discharge)

IF NO= A.7 , A9, A10 or YES=A.8, SA11, A17, please STOP abstraction and indicate why patient record was selected for abstraction in the space provided:
A11.

Explain here
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DETERMINATION OF WHETHER READMISSION WAS PLANNED			
A12	Was the patient readmitted for a *planned* test or treatment (e.g., colonoscopy, chemotherapy, blood transfusion)?	◯ YES, STOP abstraction & explain below ◯ NO	Admission note (for readmission period)
IF YES= A.12, please STOP abstraction and explain in the space provided:			

A13.

Explain here
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ADVANCED DIRECTIVES/ DO NOT RESUSCITATE (DNR) STATUS:			
A14	Was an order for Advanced Directives (DNR/DNI), written in the first 48 hours of admission?	◯ YES, Answer A15 and A16 ◯ NO	DNR,DNI note Orders
A15	If YES to previous question A14, which ADs were listed?	Check all that apply: ☐ DNR/DNI ☐ palliative care ☐ comfort care measures	DNR,DNI note Orders
A16	If YES to question A14, was it documented in the record that antibiotics were *not* used because of advanced directive status?	◯ YES ◯ NO ◯ N/A	DNR,DNI note Orders

Any special circumstance you would like to note for this section (A), please type in below.

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SECTION B. HISTORY OF PRESENT ILLNESS			
The admission history should document:			
B2	Was it documented in the admission note that patient had any of the following:	Check all that apply ☐ Diabetes ☐ COPD/Asthma, Answer B3 ☐ Bronchiectasis, Answer B3 B3: Exacerbations in the past year? ◯ Yes ◯ No / No documentation ☐ Episode of pneumonia in the past year ☐ Other lung disease, Answer B4 B4: (specify) Type in here ☐ Patient on home O_2 ☐ Congestive Heart Failure – chronic (L +/- R sided HF) ☐ Renal disease, Answer B5 & B6	Admission note/histor

B5: stage if available xxx (if unavailable, enter 888)
B6: hemodialysis prior 30days (HAP):

- ○ YES
- ○ NO
- ○ N/A

☐ Liver disease, Answer B7

B7: does the patient have any of:

- ☐ Hepatic coma
- ☐ Portal hypertension
- ☐ Ascites
- ☐ Esophageal varices
- ☐ Other sequelae of chronic liver disease, specify

Type in here

☐ Immunosuppressive state, Answer B9

B9: Check all that apply:

- ☐ HIV/AIDS
- ☐ Transplant, if yes, specify below

type in here

- ☐ S/P Splenectomy,
- ☐ Severe Malnutrition
- ☐ Neutropenia, Panocytopenia
- ☐ Other (see guidelines), Answer B10

B10: Specify

Type in here

- ☐ Chronic Corticosteroid use = e.g., Prednisone > 10mg for more than 14 days (or equivalent)

☐ Trach within prior 30 days (HAP & swallowing risk)

☐ Swallowing problems or aspiration risk, Answer B11

B11: Check all that apply:

- ☐ Recent h/o altered LOC (≤ 1 week)
- ☐ Alcohol abuse/Alcoholism
- ☐ Drug abuse
- ☐ Recent seizure (≤ 1 week)
- ☐ Stroke
- ☐ Alzheimer's Disease/ Dementia

		☐ Parkinson's Disease ☐ Achalasia / esophageal dysmotility ☐ Huntington's Disease ☐ Myasthenia Gravis ☐ Amyotrophic Lateral Sclerosis ☐ Multiple Sclerosis ☐ Cerebral Palsy ☐ Scleroderma ☐ Post-polio Syndrome ☐ Hx of swallowing problems ☐ Hospital/clinic-based IV therapy or wound care within the prior 30 days ☐ MRSA positive, answer B12 B12: Status (select one) ◯ Known history ◯ Diagnosed on admission ◯ N/A	

Any special circumstance you would like to note for this section (B), please type in below.

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SECTION C. RELEVANT RECENT MEDICATION USE			
The admission history should document:			
C1	Was there documentation in the admission note of use of antibiotics or systemic corticosteroids in the past month?	◯ YES, answer C2 C2: Check all that apply ☐ Antibiotics, answer C3 C3a: Abx Received #1 Type in here C3b: Abx Received #2 Type in here C3c: Abx Received #3 Type in here	Admission note/history

		☐ Systemic corticosteroids ◯ NO	
C4	Was the patient asked about allergies/intolerances to medications?	◯ YES, answer C5 C5: were there allergies/intolerances listed for Abx? ◯ YES, answer C6 and C7 C6: Which abx? Type in here C7: Nature of reaction? Type in here (if unavailable, enter N/A) ◯ NO ◯ N/A ◯ NO	Admission note/history Nurse's assessment
C8	Was patient asked about adherence to medication regimen?	◯ YES, answer C9 C9: Did patient adhere to the med regimen? ◯ YES ◯ NO ◯ N/A ◯ NO/Not Documented	Admission note/history

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SECTION D. SOCIAL HISTORY			
The admission history should document:			
D1	Was the patient asked if s/he is currently smoking?	◯ YES, answer D2 D2: Is the patient a smoker? ◯ Currently smoking	Admission note/history Nurses' assessment

		◯ Quit in the past 12 mos ◯ Non smoker (ex-smoker > 12 mos or never smoked) ◯ N/A ◯ NO/Not Documented	
D3	Was the patient asked about his/her alcohol use?	◯ YES, answer D4 D4: Is the patient using alcohol? ◯ YES, answer D5 and D6 D5: AUDIT C score Type in here D6: Drinks per week Type in here D15 Other description of use: Type in here ◯ NO ◯ N/A ◯ NO/Not Documented	Attending note Admission note/history Nurses' assessment
D7	On admission, was patient asked about illicit drug use/abuse?	◯ YES, Answer D8 D8: Is the patient using drugs? ◯ YES, answer D9 D9: List drugs: Type in here (if unavailable, enter N/A) ◯ NO / Not documented ◯ NO/ Not Documented	Admission note/history Nurses' assessment
D10	Was the patient admitted from a LTC facility or Nursing Home? (HAP risk)	◯ YES ◯ NO/Not Documented	Admission note/history Nurses' admission note
D11	Was there documentation that the patient had an acute hospital admission or subacute hospital admission (e.g., rehab/geriatrics) within the past 90 days, with	◯ YES ◯ NO/ Not Documented, Answer D12 D12: Did patient have an acute hospital admission within the past 90days, LOS at least 48hrs? ◯ YES	Admission note/history data range - 3 mos. previous notes Admission/Discharges

	LOS at least 48 hrs? (HAP risk)	◯ NO ◯ Unable to determine duration or timing	

Any special circumstance you would like to note for this section (D), please type in below.

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SECTION E. PHYSICAL EXAM (MD unless otherwise specified)			
The Initial Assessment should include:			
E1	Was level of consciousness (LOC) or mental status documented?	◯ YES ◯ NO/Not Documented	Admission Note HPI and PE
E2	Enter patient's most recent height and weight	a: Height: xxx (inches) b: Weight: xxx (pounds) (if any are unavailable, enter 888)	Admission Note Nurses Note Vital Signs
TESTS PERFORMED WITHIN 24 HOURS OF ADMISSION should include:			
Serum markers			
E3	Please document lab values upon presentation or first available (if not completed until later).	Lab values: (if any are unavailable, enter 888) Creatinine xxx mg/dL Date of this value MM/DD/YYYY Enter 1/1/9999 if NA eGFR xxx BUN xxx Date of this value MM/DD/YYYY Enter 1/1/9999 if NA	ER/UC note Labs: Chemistry and hematology
E4	Was (at least) one set of blood cultures performed?	◯ YES ◯ NO/No Documentation	ER/UC note Labs: Microbiology
E5	Did patient have an EKG done?	◯ YES ◯ NO/not documented (answer E6) E6: Was patient put on telemetry ◯ YES ◯ NO / unable to determine	ER/UC note Admission note/history Medicine Reports (Brief/full) Capri - procedures
E7	Was a Chest X-Ray completed?	◯ YES ◯ NO/Not Documented ◯ Done at outside hospital	Admission note Radiology

Any special circumstance you would like to note for this section (E), please type in below.

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SECTION F: DIAGNOSTIC EVALUATION			
F1	Was PNA diagnosed on admission?	◯ YES ◯ NO/Not Documented, answer F2 F2:If pneumonia not diagnosed on admission but suspected shortly after admission (≥ 24 hr), were the following done (check all that apply): ☐ Blood cultures ☐ Chest x-ray (PA & lateral if not done on admission)	Labs: Microbiology Radiology
F3	Was a sputum specimen for gram stain & culture obtained (includes endotracheal aspirate if intubated)?	◯ YES ◯ NO/Not Documented If no, was there a documentation of doc's order? ◯ YES ◯ NO/Not Documented	Labs: Microbiology
FN 3	Were any cultures positive? (check all that apply)	☐ Blood culture, please record: number of bottles drawn xx number of bottles positive xx Dates positive xx/xx/xxxx Organism xx Dates positive xx/xx/xxxx Organism xx Dates positive xx/xx/xxxx Organism xx ☐ Sputum culture Dates positive xx/xx/xxxx Organism xx ☐ Urine culture with >100,000 organisms Dates positive xx/xx/xxxx Organism xx	

		☐ Catheter tip Dates positive xx/xx/xxxx Organism xx ☐ Other culture, specify type in here Dates positive xx/xx/xxxx Organism xx ☐ No positive cultures	
F4	Was there evidence of a new or worsening pulmonary infiltrate (or consolidation) on CXR?	○ YES ○ NO	Admission note/history Radiology (first available)
F5	Was there evidence of multi-lobar disease (2 or more lobes involved) or pleural effusion on x-ray?	○ YES, answer F6 F6: Check all that apply:Multi-lobar ☐ Multi-lobar ☐ Pleural effusion ○ NO ○ No documentation	Admission note/history Radiology – First (abnormal) available
F7	Were additional diagnostic tests performed? (as directed by signs/symptoms & host factors/exposures, diagnosis uncertain, or patient not responding to treatment)	○ YES, answer F8 F8: Check all that apply: *Microbiology* ☐ Viral testing, Answer F9 F9, Specify: Type in here ☐ HIV ☐ Pneumocystis pneumonia ☐ PPD ☐ Sputum for AFB (Tb) ☐ Legionella *Imaging* ☐ CT chest	Discharge Summary Labs: Microbiology Radiology

		☐ CT angiogram *Procedures:* ☐ Bronchoscopy ☐ Pleural biopsy ☐ Video-assisted thorascopic surgery ☐ Thoracentesis ☐ Other, Answer F10 F10, Specify: Type in here If any are checked, answer F11. F11: Write in justification for test: Type in here More space if needed ◯ NO/Not Documented	

Any special circumstance you would like to note for this section (F), please type in below.

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SECTION G. TREATMENT/MONITORING			
G1	Did patient have an in-house consult for palliative Care?	◯ YES ◯ NO/Not Documented	Progress notes Labs: Microbiology
G2	ANSWER IF READMISSION WAS FOR DVT (N1): Was pharmacological prophylaxis for venous thromboembolism, administered on admission?	◯ YES ◯ NO, answer G2e G2e: Select one: ◯ Contraindicated ◯ Pt on full-dose anticoagulation ◯ Other, answer G3 G3: Specify. Type in here ◯ Not Documented	Admission note/his Orders
G4	Was the patient admitted to ICU?	◯ YES, answer G5 G5: Check all that apply ☐ within 24hrs of presentation ☐ anytime during stay	Progress notes

		◯ NO/Not Documented	
G6	Was there documentation that aspiration pneumonia was considered?	◯ YES ◯ NO/Not Documented	Discharge summar Admission note/his
G7n8	Antibiotics received in hospital (Do not include if only 1 dose received in ED)	1st abx name: type in here 1st abx dosage/dosing interval: type in here Start date: xx/xx/xxxx Stop date: xx/xx/xxxx If started >24 hours after admission, reason? ☐ Positive Blood or Respiratory culture, Answer the following Document organism: type in here Date of positive culture xx/xx/xxxx ☐ Replacing abx to which patient had reaction ☐ Worsening condition ☐ Other reason, explain type in here ☐ Unable To Determine If stopped before day of discharge, reason? ☐ Positive Blood & Respiratory culture, Answer the following Document organism: type in here Date of positive culture xx/xx/xxxx ☐ Reaction to abx during treatment ☐ Worsening condition	BCMA Admission note/history Discharge nc Labs: Microb MD progress (correspondi date- Same

☐ Other reason, explain
type in here

☐ Unable To Determine

2nd abx name:
type in here
if only 1 abx, type in "n/a".
2nd abx dosage/dosing interval:
type in here
Start date: xx/xx/xxxx
Stop date: xx/xx/xxxx

If started >24 hours after admission, reason?

☐ Positive Blood or Respiratory culture, Answer the following
Document organism:
type in here
Date of positive culture xx/xx/xxxx

☐ Replacing abx to which patient had reaction

☐ Worsening condition

☐ Other reason, explain
type in here

☐ Unable To Determine

If stopped before day of discharge, reason?

☐ Positive Blood & Respiratory culture, Answer the following
Document organism:
type in here
Date of positive culture xx/xx/xxxx

☐ Reaction to abx during treatment

☐ Worsening condition

☐ Other reason, explain
type in here

☐ Unable To Determine

3rd abx name:
type in here
if only 2 abx, type in "n/a".
3rd abx dosage/dosing interval:
type in here
Start date: xx/xx/xxxx
Stop date: xx/xx/xxxx

If started >24 hours after admission, reason?

☐ Positive Blood or Respiratory culture, Answer the following
Document organism:
type in here
Date of positive culture xx/xx/xxxx

☐ Replacing abx to which patient had reaction

☐ Worsening condition

☐ Other reason, explain
type in here

☐ Unable To Determine

If stopped before day of discharge, reason?

☐ Positive Blood & Respiratory culture, Answer the following
Document organism:
type in here
Date of positive culture xx/xx/xxxx

☐ Reaction to abx during treatment

☐ Worsening condition

☐ Other reason, explain
type in here

☐ Unable To Determine

4th abx name:

type in here

if only 3 abx, type in "n/a".

4th abx dosage/dosing interval:

type in here

Start date: xx/xx/xxxx

Stop date: xx/xx/xxxx

If started >24 hours after admission, reason?

- [ ] Positive Blood or Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

- [ ] Replacing abx to which patient had reaction
- [ ] Worsening condition
- [ ] Other reason, explain

type in here

- [ ] Unable To Determine

If stopped before day of discharge, reason?

- [ ] Positive Blood & Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

- [ ] Reaction to abx during treatment
- [ ] Worsening condition
- [ ] Other reason, explain

type in here

- [ ] Unable To Determine

5th abx name:

type in here

if only 4 abx, type in "n/a".

5th abx dosage/dosing interval:

type in here

Start date: xx/xx/xxxx

Stop date: xx/xx/xxxx

If started >24 hours after admission, reason?

- [ ] Positive Blood or Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

- [ ] Replacing abx to which patient had reaction
- [ ] Worsening condition
- [ ] Other reason, explain

type in here

- [ ] Unable To Determine

If stopped before day of discharge, reason?

- [ ] Positive Blood & Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

- [ ] Reaction to abx during treatment
- [ ] Worsening condition
- [ ] Other reason, explain

type in here

- [ ] Unable To Determine

6th abx name:

type in here

6th abx dosage/dosing interval:

type in here

Start date: xx/xx/xxxx

Stop date: xx/xx/xxxx

If started >24 hours after admission, reason?

☐ Positive Blood or Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

☐ Replacing abx to which patient had reaction

☐ Worsening condition

☐ Other reason, explain

type in here

☐ Unable To Determine

If stopped before day of discharge, reason?

☐ Positive Blood & Respiratory culture, Answer the following

Document organism:

type in here

Date of positive culture xx/xx/xxxx

☐ Reaction to abx during treatment

☐ Worsening condition

☐ Other reason, explain

type in here

☐ Unable To Determine

	If patient on vancomycin for >3 days please write in antibiotic level	Select one: ◯ trough, answer G14 ◯ random, answer G14 G14: Initial level: xxx ug/ml ◯ no level available ◯ not applicable (Patient not on this antibiotic or on for less than specifice time frame/# doses)	Labs: Chemistry
G15	If patient on aminoglycoside for >1 dose, please write in antibiotic level	Select one: ◯ On aminoglycoside, answer G16 and G17 G16: Initial trough level xxx ug/ml G17: Initial peak level xxx ug/ml (if unavailable enter 88) ◯ Not applicable (Patient not on this antibiotic or on for less than specifice time frame/# doses)	Labs: Chemistry
G18	Was patient discharged on antibiotics?	◯ YES, answer G19 G19: Specify Name, Dose and Route Type in here ◯ NO	

Any special circumstance you would like to note for this section (G), please type in below.

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SECTION H. CLINICAL STABILITY			
The patient admitted for pneumonia is ready for discharge when:			
H1	Did the patient have documented improvement in signs or symptoms of pneumonia? (e.g. dyspnea/ cough/decrease in fever)	◯ YES ◯ NO ◯ Not Documented	Progress notes

H2	Please check if the following lab values were drawn, and if so, record last two values	Check all that apply: ☐ WBC, Answer H3 -H6 H3: Last WBC before discharge xxx K/cmm H4: Date MM/DD/YYYY H5: Previous WBC xxx K/cmm H6: Date MM/DD/YYYY ☐ BUN, Answer H7-H10 H7: Last BUN before discharge xxx K/cmm H8: Date MM/DD/YYYY H9: Previous BUN xxx K/cmm H10: Date MM/DD/YYYY ☐ Creatinine, Answer H11-H14 H11: Last creatinine before discharge xxx K/cmm H12: Date MM/DD/YYYY H13: Previous creatinine xxx K/cmm H14: Date MM/DD/YYYY ☐ No Labs drawn	Lab summary Chemistry
H15	Have any of the following occurred on the day of discharge?	Check all that apply: ☐ SBP < 90 mm Hg ☐ Heart rate > 100bpm ☐ Respiratory rate >24/min ☐ Temperature >100° F ☐ O2 sats on RA <90% (inpatient, not on home O2) ☐ Discharged on home O2 and was not on prior to admission (If checked answer H15fe) H15fe: Specify O2 amount and delivery Type in here ☐ None have occurred ☐ No documentation	Vital signs Nurse/resident discharge note
H16	Did the patient have altered mental status or level of consciousness (worse than baseline) within 24 hrs of	○ YES ○ NO ○ Not Documented	Nurse/resident discharge notes

	discharge?		
H17	Is there documentation that patient was unable to maintain enteral intake (orally or other e.g., PEG tube)?	◯ YES ◯ NO	Nurse/resident discharge notes

Any special circumstance you would like to note for this section (H), please type in below.

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SECTION J: DISCHARGE PLANNING			
J1	Patient was discharged to:	◯ Home ◯ Skilled Nursing Facility ◯ Assisted Living Facility ◯ Rehabilitation Facility ◯ Other, answer J2 J2: Specify. Type in here	Discharge note Social worker note Interagency transfer note
Jn3	Did the patient complete at least 5-days of antibiotics in hospital	◯ YES, skip to J4 ◯ NO, answer J3 ◯ NOT documented, answer J3	
J3	Did discharge medications include antibiotics to complete (at least) a total 5-day course?	◯ YES ◯ NO ◯ Not Documented	Discharge instructions Discharge summary
J4	Is there documentation in the record, that the patient/family received written discharge instructions or other educational material regarding the following?	Check all that apply ☐ Discharge meds ☐ Follow-up appointment (documentation of specific information) ☐ Documentation given to caretakers (non-family members, e.g., nursing home staff) ☐ No documentation	Discharge plan/Progress notes
Jn5	Is there documentation	◯ YES	Nurses' discharge

	that patient/family understood the medication regimen?	◯ NO/Not Documented/Unable to determine	note
J7	Were plans for post discharge medical care stated in the chart and/or discharge summary?	To include: (Check all that apply) *Medication:* ☐ List of discharge meds ☐ Med reconciliation *Follow-up clinic visit:* ☐ f/u clinic visit arranged with PCP or specialist (infectious disease or pulmonology) Answer J8 and J9. First visit: J8a: Type of provider Type in here J9a: Date visit scheduled: MM/DD/YYYY (enter 1/1/9999 if unavailable) Second visit: J8b: Type of provider Type in here J9b: Date visit scheduled: MM/DD/YYYY (enter 1/1/9999 if unavailable) Third visit: J8c: Type of provider Type in here J9c: Date visit scheduled: MM/DD/YYYY (enter 1/1/9999 if unavailable) ☐ Pt advised to call PCP to arrange follow-up clinic visit ☐ NA (e.g., pt discharged to nursing home or hospice). Explain: *Recommendations for:* ☐ med changes as applicable specify or list	Discharge instructions Discharge summary

		☐ f/u of test results pending at time of discharge as applicable specify or list ☐ Additional tests that should be performed post discharge, please list:	
J10	Was the discharge summary completed by time of follow-up visit, so available to f/u provider?	○ YES ○ NO ○ Not Applicable	Discharge summary

Any special circumstance you would like to note for this section (J), please type in below.

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SECTION K. POST DISCHARGE PERIOD			
Kn 1	Was there a post-discharge phone call (contact made) to the patient?	○ YES, answer Kn3 ○ No call ○ N/A Kn3: Select one ○ Call occurred within 72 hours ○ Call occurred in between 72 hours-7 days ○ Call occurred after more than 7 days ○ Call occurred in unknown time frame K17: Check this box if true: ☐ Call occurred >72 hours post-discharge, or not at all, because of difficulty or inability to reach patient.	Telephone encounter
	K2: If there was a post-discharge phone call, did the phone call consist of (check all		

that apply):

- ☐ Patient asked about any change in condition since discharge (breathing, cough)
- ☐ Patient asked about understanding of what the medications are for.
- ☐ Review of pending clinic appts and tests.
- ☐ Reinforcement of other discharge instructions, including recommended diet & what to do if symptoms worsen
- ☐ None of the above

Kn 4	Was there a post-discharge in-person visit (home visit) to the patient?	○ YES, answer Kn7, K5, K6 Kn7. Select one: ○ Visit occurred within 72 hours ○ Visit occurred between 72 hours-7 days ○ Visit occurred after more than 7 days ○ Visit occurred in unknown time frame ○ NO ○ N/A	Discharge plan/instructions

K5, K6

If a post-discharge home visit occurred, please indicate its content (use first visit).
K5: Who made the visit?

- ○ VA provider
- ○ Non-VA provider
- ○ N/A

K6: Did the visit consist of: (check all that apply)?

- ☐ Patient asked about any change in condition since discharge (breathing, cough).
- ☐ Patient asked about understanding of what the medications are for.
- ☐ Review of pending clinic appts and tests.
- ☐ Reinforcement of other discharge instructions, including recommended diet & what to do if symptoms worsen.
- ☐ None of the above.

K8	Was there a post-discharge visit (or ER visit) with a provider (prior to the readmission)?	○ YES, answer K9 and K10 K9: Was this a (check all that apply): ? ☐ Scheduled visit with PCP, or medical specialist. Date of visit (1/1/9999) if unknown: K10 [ ]	

		☐ Unscheduled or early visit to regular provider. Date of visit: (1/1/9999) if unknown: K10 ____ ☐ Urgent care or ED visit. Date of visit: (1/1/9999) if unknown: K10 ____ ☐ Unable to determine circumstances of visit. Date of visit:(1/1/9999) if unknown: K10 ____ ◯ NO, no visit documented. Answer K16	

K16: If there was no scheduled visit with PCP, ID or pulmonary, indicate why. Check all that apply:

- ☐ The appointment was not scheduled by the discharge facility.
- ☐ The appointment was not scheduled by the patient.
- ☐ The patient missed the appointment.
- ☐ The patient was readmitted before the f/u appointment.
- ☐ Reason unclear.
- ☐ N/A.

K11	If there was a scheduled or unscheduled follow-up visit with the provider (PCP or medical specialist) that occurred prior to the date of readmission, were the following documented?	Check all that apply ☐ Patient's current functional status ☐ Medications added, Answer K12 ☐ Medications changed, Answer K12 ☐ Medications discontinued, Answer K12 K12: Were meds added, changed, or discontinued without justification? ◯ YES, answer K13 and K14 K13: Which meds? Type in here K14: Explain: Type in here ◯ NO ◯ N/A ☐ Medications reconciled	Progress notes

		☐ Provider's awareness of pending tests ☐ Provider's recognition of abnormal test results ☐ Plan for addressing abnormal test results or justification if no change in plan. ☐ No follow-up visit/ not applicable	

Any special circumstance you would like to note for this section (K), please type in below.

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SECTION M. READMISSION			
M1	Was the patient readmitted through the Emergency Dept?	○ YES, Answer M2 M2: Time of ED visit that led to readmission? 0000 (Military Time) (if unavailable, enter N/A) ○ NO, Answer M3 M3: Where? (select one) ○ Direct admission ○ Transferred from another acute care hospital ○ Transferred from a long-term care or residential facility ○ Other , Answer M4 M4, specify. Explain here ○ N/A	ED note
SECTION N. REASON FOR READMISSION (Adapted from Anderson's Hospital Readmission Inventory)			
N1	In general, why was the patient readmitted to the hospital?	Check all that apply: ☐ The primary diagnosis (pneumonia) got worse or there was a relapse of the primary diagnosis. ☐ One of the secondary diagnoses (other known medical conditions) got worse. Specify: Explain here More space if needed ☐ A new problem developed. Specify: Explain here More space if needed	Admission note ED/UC note Attending note

		Other: ☐ The patient was admitted for terminal care. ☐ The physician requested a hospital readmission. ☐ The patient was admitted with a PE or DVT (answer G2). G2: ANSWER IF READMISSION WAS FOR DVT (N1): Was pharmacological prophylaxis for venous thromboembolism, administered on admission? Source: Admission note/history orders ◯ YES ◯ NO, answer G2e G2e: Select one: ◯ Contraindicated ◯ Pt on full-dose anticoagulation ◯ Other, answer G3 G3: Specify. Type in here ◯ Not Documented ☐ Other, Answer N2 N2, specify. Explain here More space if needed	
N3	What were the specific circumstances surrounding the patient's readmission?	Check all that apply: Symptoms ☐ The patient fell. ☐ Respiratory difficulties have developed or worsened. ☐ Cardiac symptoms have developed or worsened. ☐ GI symptoms have developed or worsened. ☐ Neurological symptoms have developed or worsened. ☐ Pain has developed or worsened. ☐ The patient has developed other symptoms, Answer N4 N4, Describe. Explain here More space if needed	History of Present Illness from: Admission note ED/UC note Attending note

		Signs ☐ The patient broke a bone. ☐ Bleeding has developed. ☐ The patient has developed a new infection, or worsening of an infection that was present during the prior admission. ☐ A wound has developed or worsened. ☐ The patient's vital signs were abnormal. ☐ The patient's lab values were abnormal. Other ☐ The patient experienced problems with his/her medication. ☐ There were problems with medical equipment. ☐ The caregiver/family is no longer able to manage the patient at home. ☐ Other, Answer N5 N5, Specify. Explain here More space if needed	
N6	The patient was readmitted for (primary diagnosis):	Check one: ◯ Same diagnosis, answer N7 N7, Explain. Explain here More space if needed ◯ Other diagnosis, answer Nn8, N10, N11 and N12 Nn8, Specify. Explain here More space if needed N10: Was this problem active during the index admission (may or may not have been diagnosed but symptoms or signs were present?) ◯ Yes, answer N11 ◯ No/unable to determine Explain the answer to N10 Explain here More space if needed N11: If YES to N10, was this problem treated	Admission note Discharge Dx from codes

		during the index admission? ◯ Yes ◯ No/unable to determine Explain the answer to N11 Explain here More space if needed N12. Was this problem a complication of treatment received during the index admission? ◯ Yes ◯ No/unable to determine Explain the answer to N12 Explain here More space if needed	
SECTION P. ASSESSMENT OF PREVENTABILITY (Adapted from Oddone, JGIM 1996)			
P1.	According to the admission note (including attending note) which ***Patient Issues***were noted at the time of readmission?	Check all that apply: ☐ The patient was not compliant with his/her medication regimen ☐ The patient was not compliant with his/her dietary regimen ☐ The patient was abusing alcohol/drugs post prior discharge ☐ The patient had an acute mental health issue (Dementia excluded) ☐ The patient lacked adequate home support or required more services than could be provided at home (e.g., nursing home or home health care) ☐ Other, Answer P2 P2, Explain. Explain here More space if needed ☐ None of the above	
P3	According to the admission note (including attending note) which ***Provider/System Issues***were noted at the time of readmission?	Check all that apply: ☐ The patient had a physician/provider assessment post-discharge but did not have a change in therapy despite worsening symptoms/signs ☐ The patient had a physician/provider assessment post-discharge but did not have a change in therapy despite abnormal laboratory tests ☐ Relevant information from index admission was not	

		communicated to the follow-up provider (communication could include mentioning in d/c summary) ☐ Recommendations for post-discharge follow-up or work-up of abnormal test results occurring during the index admission were inappropriate (from index admission discharge summary) ☐ The post-discharge provider did not follow through on "appropriate" discharge recommendations ☐ The provider did not document why he/she did not follow recommendations ☐ The patient or caregiver did not receive adequate discharge education (e.g. includes confirming understanding, f/u call) ☐ The admitting physician's threshold for admission was inappropriately low ☐ Other, Answer P4 P4, Explain. Explain here More space if needed ☐ None of the above	
P5	According to the admission note (including attending note) which ***Either Patient or ProviderIssues*** were noted at the time of readmission?	Check all that apply: ☐ The patient did not have physician/provider assessment (VA or non-VA) following discharge ☐ The patient did not receive prescribed medications (VA or non-VA) ☐ The patient had a medication side effect (from a drug started during the prior admission or post-discharge, includes medication interactions) ☐ The patient was an inappropriate full code or there was disagreement on code status; if YES, Answer P7. P7, Explain. Explain here More space if needed ☐ The patient lacked advance care planning despite having advanced or end-stage disease ☐ Other, Answer P8 P8, Explain.	

		Explain here More space if needed ☐ None of the above	
P9	Do you feel this readmission was preventable? (See Guidelines)	Check the best response and explain why. ○ Preventable ○ Possibly Preventable ○ Un-preventable P10. Explain (quote from physician's notes, if possible): Explain here More space if needed More space if needed More space if needed More space if needed More space if needed More space if needed	

P11
If there are special circumstances or comments related to this case that you feel are important that were not captured in the survey, please describe them. All special circumstances that involve clinical issues must be referred to physician for possible second review.

Explain here
More space if needed
More space if needed
More space if needed
More space if needed
More space if needed
More space if needed
More space if needed

Close this form | New Record

Save

Widely used software doesn't pick up differences in care quality among hospital readmissions for pneumonia

Cases flagged by 3M as preventable received no worse care than unflagged cases, study shows

The 3M software program, increasingly used to make payments to US hospitals based on readmission rates, doesn't clearly distinguish differences in care quality—one of the key factors involved in readmission—between readmissions that are preventable and those that aren't, suggests research published online in***BMJ Quality and Safety.***

The Centers for Medicare and Medicaid Services (CMS) posts data on 30 day readmissions for three common causes of hospital admissions: heart attack; heart failure; and pneumonia.

Hospitals with high rates of readmissions are penalised financially and get less money from Medicare regardless of whether or not those readmissions could have been prevented.

In a bid to improve on the CMS measure and identify readmissions more likely to be preventable, 3M developed the Potentially Preventable Readmissions (PPRs) measure, which is now increasingly used by US state Medicaid programs for hospital payments.

3M identifies readmissions with diagnoses that are clinically related to those prompting the initial admission, to flag those patients whose readmission could have been avoided, and then generates hospital level rates of avoidable readmissions, taking account of population case mix and illness severity.

But it is not known to what extent these pairings reflect quality of care problems and which readmissions are therefore truly preventable.

The researchers therefore looked at whether readmissions flagged as PPRs by 3M were associated with poorer quality of care than those that weren't in Veterans Health Administration patients admitted to hospital with pneumonia, and readmitted within 30 days, between 2006 and 2010.

They reviewed the medical records of 100 randomly selected cases out of more than 11,000, to look at the quality of care these patients had been given while in hospital and after discharge, using processes of care derived from evidence based data and a panel of clinical experts.

Somewhat surprisingly, the quality of care among the 77 cases flagged as PPRs was slightly better than the 23 unflagged cases (total average scores of 71.2 vs. 65.8 out of 100), although this difference was not statistically significant.

And there was also little information about the quality of care after discharge for flagged and unflagged cases.

Their findings lead the researchers to conclude that either PPR flagged cases are not more preventable, or that assessment of preventability requires other data collection methods to capture poorly documented processes.

In a linked editorial, Drs Christine Soong and Chaim Bell of Mount Sinai Hospital in Toronto, Canada, suggest that: "After years of intensive research to find an objective measure of preventable readmissions, it seems as imminent as the arrival of Godot."

And they suggest that perhaps it's time to think differently about the issue. Readmission rates are too crude a measure and aren't really patient centred, they suggest.

"The time has come to shift the focus of readmissions away from hospitals to a broader health systems approach," they write. "Rather than focusing on readmissions, preventable or otherwise, time may be better spent in developing quality measures of complex disease management across a patient's continuum of care," they write.