

First Steps: Exploring Use of a Prospective, Office-Based Registry as the Foundation for Quality Improvement in Cardiology Training

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Abstract

Background Teaching practice-based learning and improvement and systems-based practice are challenging. Cardiology fellows at St John Hospital & Medical Center participate in a national registry of outpatient cardiology care.

Objective We assessed the use of the registry, hypothesizing that it could serve as an effective foundation for studying ambulatory care, identifying gaps in care, and planning interventions to advance competence in practice-based learning and improvement and systems-based practice.

Methods Starting in 2009, trainees prospectively entered data for ambulatory cardiac patients into the PINNACLE Registry database where compliance with 28 performance measures was calculated and reported quarterly. Fellows met with the program director individually and in groups to identify performance gaps and to develop and implement plans for quality improvement. Cardiology fellows were surveyed annually to assess this process.

Results Through March 2012, the fellows had completed 2400 patient visits. Participation was feasible because it was cost neutral, with data form completion averaging 5 minutes. It was acceptable, with most fellows describing positive effects on practice-based learning and improvement without significant detriment to work flow. Performance achievement for drug therapies ranged from 69% (77 of 111) of the patients with atrial fibrillation receiving anticoagulation to 99% (486 of 489) of patients with coronary disease receiving lipid-lowering therapy. Gaps in system performance included low levels for diabetes screening (5%; 20 of 422) and lipid monitoring (10%; 58 of 573). Initial quality improvement projects addressed practice gaps with straightforward solutions. Improving system performance was more challenging.

Conclusions Using a registry in cardiology trainees' outpatient practice is feasible, acceptable, and valuable. It allows for planning and studying the effects of quality improvement projects.

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Introduction

In the past decade, assessment in graduate medical education has focused on 6 competencies that define the attributes of the ideal physician: medical knowledge, patient care (clinical skills), professionalism, interpersonal and communication skills, practice-based learning and improvement (PBLI), and systems-based practice (SBP).¹ Developing effective curricula for, and measurements of, PBLI and SBP pose particular challenges for teaching programs.²⁻⁴

The PINNACLE (Practice INNovation and CLinical Excellence, National Cardiovascular Data Registry, American College of Cardiology, Washington, DC) Registry was initiated in 2008 as the first prospective, office-based, cardiac quality improvement (QI) registry in the United States.⁵ Data are collected to assess compliance with the American College of Cardiology, the American Heart Association, and the American Medical Association-Physician Consortium for

Performance Improvement performance measures for coronary artery disease, hypertension, heart failure, and non-valvular atrial fibrillation.^{6–8}

Cardiology fellows at St John Hospital & Medical Center in 2009 became the first trainees nationally to participate in PINNACLE. We hypothesized that this tool would serve as an effective foundation for studying ambulatory care, identifying gaps in care, and planning interventions to advance competence in PBLI and SBP. We present our initial findings.

Methods

Trainees prospectively completed data collection forms for outpatients treated for coronary disease, heart failure, atrial fibrillation, and hypertension. The registry form fields and definitions were available on the PINNACLE website (<https://www.ncdr.com/webncdr/>) and were reviewed with the fellows. The data were transmitted for entry into the PINNACLE Registry database where compliance with 28 performances measures was computed. Copies of all data forms were kept with the cardiology fellows for their research and review. All 12 fellows received quarterly reports of their compliance with each measure, which can be compared with the aggregate data of all 12 fellows, as well as to all participating cardiologists nationally. Annual analysis of 5 successive data-collecting forms from each fellow was performed by the program director to check for completion and accuracy.

The most recent annual survey of fellows' perceptions of their registry participation was performed in March 2012. Surveys were distributed at clinical conferences and returned anonymously to the program coordinator. All 12 fellows completed the surveys, which included 2 multiple-choice items that addressed issues related to completing the data form and 6 Likert-type items that required fellows to rate the effect of form completion on work flow efficiency (less efficient, 1–3; unchanged efficiency, 4–6; improved efficiency, 7–9) and improvement of knowledge of disease-specific therapy, PBLI, and SBP (minimal effect, 1–3; moderate effect, 4–6; and large effect, 7–9). Comments and recommendations were expressed in 6 additional questions formatted as open-answer items.

The fellows met with the program director, individually each quarter, and in groups annually, to identify performance gaps and to develop and implement plans for individual practice improvement and system improvements. Results of individual and small group projects were presented annually to the fellows and faculty.

Statistical Analysis

Summary statistics for patients' demographic and clinical characteristics were reported as means with standard

deviations for continuous variables and as proportions for categorical variables. Compliance rates for each of the performance measures were determined using aggregate proportions. The numerator for these rates was the total number of patients (or visits) that met the performance measure, and the denominator was the total number of eligible patients (or visits) for that performance measure. Descriptive statistics were employed to interpret the fellows' perception of the effect on their training on the use of the data collection forms.

The St John Hospital & Medical Center Institutional Review Board approved this study.

Results

Study Population

Fellows recorded 2400 patients through March 2012, which was approximately 0.8% of 3 million visits tallied nationally in the PINNACLE Registry. The fellows' patients were predominately male (56%; 1344 of 2400), older than 65 years old (52%; 1248 of 2400), and non-Hispanic White (75%; 1800 of 2400). Compared with the national data set, cardiology fellows at St John Hospital & Medical Center saw more African Americans (24% [576 of 2400] versus 7% [25 055 of 357 935]) and more patients with hypertension (93% [2232 of 2400] versus 83% [297 085 of 357 935]). The remaining cardiovascular risk factors were all slightly more frequent in the national practices than in the fellows' practice.

Ambulatory Clinic Census

In academic year 2010–2011, the mean number of cardiac clinic patients with at least 1 of the 4 qualifying diagnoses was 3.8, ranging from 2.1 to 4.7. In academic year 2011–2012, the average number of patients per clinic with at least 1 qualifying diagnosis increased to 4.2.

Feasibility

This intervention was cost-neutral because fellows completed the paper form themselves, faculty physicians supervised in their usual manner in the outpatient clinic, and the program coordinator faxed the results to the PINNACLE Registry as part of her duties. Data interpretation was performed by the information technology team at the central PINNACLE site. There was no charge to the fellowship program by PINNACLE.

In 2011 and 2012, the fellows averaged 5 minutes to complete each form; 90% (253 of 281) of the forms were completed within 7 minutes. On examination of 52 successive forms, 37 (71%) were completed without error, and 9 (17%) had only 1 error. The most frequent error was absence of an entry for lipid value or ejection fraction in 10 patients (19%) and absent vital signs in 4 patients (8%).

TABLE

CARDIOLOGY FELLOWS AT ST JOHN HOSPITAL & MEDICAL CENTER COMPARED WITH NATIONAL PRACTICE ON QUARTER 4 2011 PERFORMANCE WITH INDICATIONS

Performance Indicators	Fellows' Average, %, N = 281	National Average, %, N = 357 935
Coronary Artery Disease		
Beta-blocker, prior MI	94	75
Blood pressure measured	96	94
Antiplatelet therapy	92	76
Diabetes screening	5	1
Smoking query	81	81
Smoking cessation	81	35
Symptom and activity assessment	92	26
ACE-I or ARB	80	73
Lipid profile	10	24
Drug prescription for LDL	99	93
Clopidogrel after DES	71	30
Heart Failure		
LV systolic function assessment	86	51
Weight measured	91	93
Blood pressure measured	98	96
Patient education	69	70
ACE-I or ARB for LVSD	87	83
Warfarin for atrial fibrillation	69	61
Activity level	95	26
Clinical signs for ↑ volume	96	78
Initial laboratory tests ordered	27	4
Clinical symptoms for ↑ volume	99	83
Beta-blocker use	94	93
Atrial Fibrillation		
Chronic anticoagulation	69	57
Assess thromboembolic risk	59	13
Hypertension		
Blood pressure measured	96	95
Plan of care	90	35
Advance care plan	11	22
Cardiac rehabilitation referral	64	5

Abbreviations: MI, myocardial infarction; ACE-I, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; LDL, low-density lipoprotein; DES, drug-eluting stent; LV, left ventricular; LVSD, left ventricular systolic dysfunction; ↑, increased.

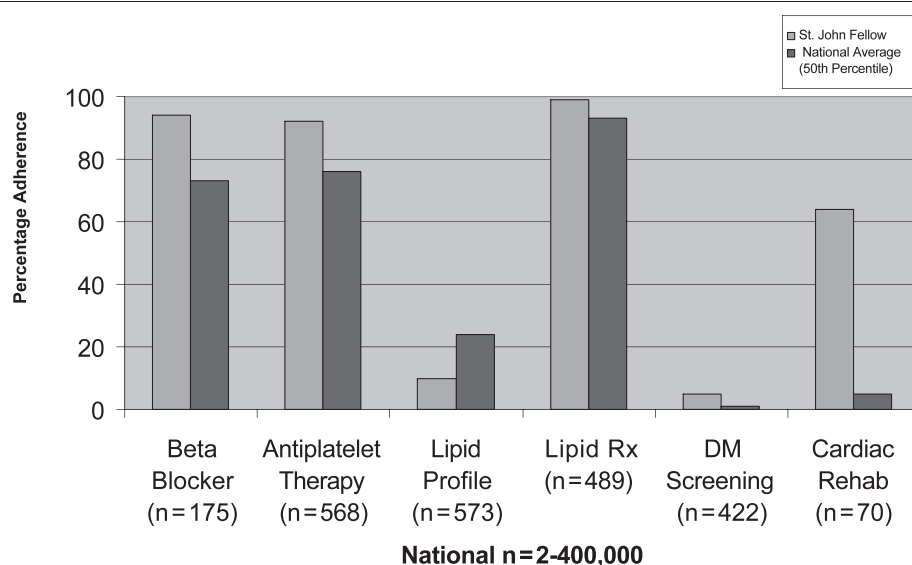


FIGURE 1

COMPARISON OF CARDIOLOGY FELLOWS AT ST JOHN HOSPITAL & MEDICAL CENTER TO NATIONAL REGISTRY PARTICIPANTS, 2011

Abbreviations: Rx, prescription; DM, diabetes mellitus.

Adherence levels of performance measures in ambulatory patients of our fellows compared with the 50th percentile of all national ambulatory practices in the PINNACLE Registry.

Acceptability

Three of 12 fellows (25%) reported less efficient work flow, including 1 fellow who scored his efficiency as 1 on a scale of 9, stating that the problem “is not about the time but the distraction from properly concentrating on patients.” Seven fellows (58%) reported unchanged efficiency, and 2 fellows (17%) reported improvement. Overall, the mean score was 4.7.

Nine of 12 fellows (75%) reported improvement in knowledge of disease-specific therapy with 7 (58%) scoring moderate improvement, 2 (17%) scoring significant improvement, and 3 (25%) scoring minimal change.

Eight of 12 fellows (57%) noted a positive effect on PBLI. The perceived benefit was mild to moderate for 5 of 8 fellows (62%) and large for 3 (38%). Eight of 12 fellows (57%) also noted a positive effect on SBP, with all 8 (100%) indicating mild to moderate benefit. Three fellows (25%) described the benefit on PBLI and SBP as negligible.

Nine of 12 fellows (75%) commented in open answers that immediate access to their own data would have a substantial effect on PBLI.

Cardiology Fellows' Compliance With Performance Measures

Almost complete compliance was found for prescribing beta blockers (94%; 165 of 175) and statins (99%; 486 of 489) for coronary disease and beta blockers (94%; 85 of 90) and angiotensin-converting enzyme inhibitors or angiotensin

receptor blockers (87%; 81 of 93) for heart failure.

Intermediate compliance was present with clopidogrel (71%; 34 of 48) for drug-eluting stents and warfarin (69%; 77 of 111) for atrial fibrillation, respectively. Results are benchmarked against the national data set (TABLE; FIGURE 1).

Gaps in compliance were present for diabetes screening, available in 5% (120 of 2400) of the patients, and in lipid profile results, available in 10% (240 of 2400) of the patients. Patients' advanced care plans were unknown in 89% (2136 of 2400) of the patients. National trends in adherence to performance measures paralleled those of our fellows.

Cardiology fellows referred 64% (45 of 70) of patients to cardiac rehabilitation after a myocardial ischemic event compared with 5% (10 317 of 191 403) nationally. Variations in individual fellow rates of referrals to cardiac rehabilitation (FIGURE 2) ranged from 0% (0 of 11) to 96% (23 of 24).

Initial Improvements in PBLI and SBP

After reviewing and discussing his Quarter 4 2011 report with the program director, the fellow with 0 referrals improved the referral rate to cardiac rehabilitation from 0 of 11 (0%) to 7 of 7 (100%) in Quarter 4 2012. Overall, the fellows improved from 64% (45 of 70) to 79% (22 of 28) during the same period.

When 3 of her patients were not reported to be on aspirin, another fellow suspected a “pseudogap” and reviewed all 22 data collection forms of her Quarter 2 2011 ambulatory patients with coronary disease. Two of the 3

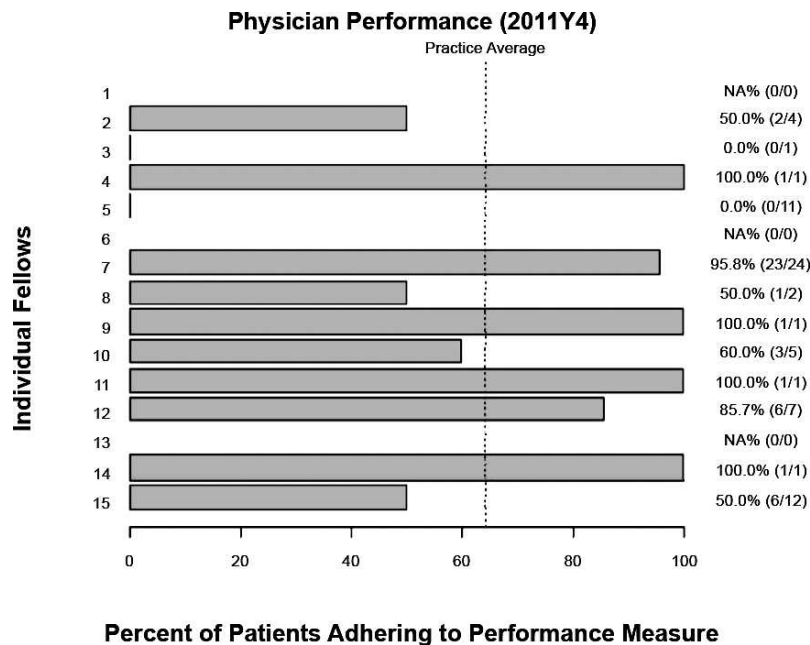


FIGURE 2 | REFERRAL TO CARDIAC REHABILITATION

Abbreviation: NA, not applicable.

Comparison of performance of fellows at St John Hospital & Medical Center, listed individually, in referring eligible patients to cardiac rehabilitation.

(67%) were taking aspirin that was not listed because of a flaw in the process for recording medications. The third patient had discontinued aspirin under the assumption that if he was not asked about it, he did not need to take it. The office process was changed, and aspirin usage is queried routinely now.

Discussion

Our results show that PINNACLE offers a foundation of data on which QI projects can be planned and studied. Most of our fellows found participation to be feasible and acceptable. We can evaluate our adherence to performance measures of ambulatory care, recognize gaps, and benchmark against national data sets.

Our efforts to date have not resulted in substantial practice-based or systems-based improvements. Lurie et al⁴ argued that current tools cannot measure individual competencies. Jones et al⁹ noted that competencies become tangible only when connected to patient care. ten Cate¹⁰ proposed entrustable, professional activity as a measure to link competencies to clinical practice.

An ambulatory registry, such as PINNACLE, is a structure that also links competencies to clinical practice. To fully test the hypothesis in our program, we must follow through with substantive QI projects that complete the cycle of plan-do-study-act.^{11,12}

Limitations of our study include that it was a single-center study of an ambulatory practice with 12 cardiology fellows, and the findings may not be applicable to other settings.

Conclusion

An ambulatory registry can provide a foundation for studying ambulatory care, identifying gaps in care, and planning QI interventions in a cardiology training program. Future studies are needed to assess the effects of this approach on enhancing performance in PBLI and SBP.

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