CONTEMPORARY SUBJECT

Preventable Drug-related Morbidity in Older Adults

1. Indicator Development

(Part 1 of a 2-part series)

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ABSTRACT

OBJECTIVE: To develop viable clinical indicators of preventable drug-related morbidity (PDRM) in older adults.

METHODS: A survey was constructed, listing the clinical outcome and pattern of care related to a number of possible PDRMs in older adults. Using the Delphi technique, a geriatric medicine expert panel of 6 physicians and one clinical pharmacist from a hospital-based health care system was asked to judge whether the outcome in each situation was foreseeable and recognizable, and whether causality was identifiable and controllable. The panel could also suggest additional PDRMs.

RESULTS: Fifty-two consensus-approved clinical indicators of PDRM in older adults were developed after 2 rounds of the Delphi technique. There was a high degree of consensus among the expert panel: all 7 members agreed on 35 indicators; 6 of 7 members agreed on 15 indicators; and 5 members agreed on 2 indicators. Only 6 outcomes and patterns of care were rejected as indicators.

CONCLUSIONS: This phase of the study showed that consensus on clinical indicators; 6 of 7 members agreed on 15 indicators; and 5 members agreed on 2 indicators. Only 6 outcomes and patterns of care were rejected as indicators.

KEYWORDS: Medication indicators, Performance measurement, Quality improvement, Geriatric pharmacotherapy

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The role of quality measurement is becoming more critical as consumers, employers, and others demand increased accountability and transparency from the delivery of health care. Health care quality indicators, or measures, are a key component in the accreditation of health plans, hospitals, and managed care organizations (MCOs). Indicators allow data to be collected in a standardized format that facilitates comparisons over time for providers and MCOs. Detecting patterns, trends, and gross variation from norms is fundamental to continuous quality improvement.

Measurement of medication costs, appropriateness, and safety are typically included in quality measurement systems. For example, the National Committee for Quality Assurance’s Health Plan Employer Data and Information Set (HEDIS) system for MCO accreditation includes several performance indicators or measures that relate to medication use, such as antidepressant medication management, treatment of children’s ear infections, beta-blocker treatment after a myocardial infarction, and others. The Study of Clinically Relevant Indicators for Pharmacologic Therapy (SCRIPT), the Joint Commission on Accreditation of Healthcare Organizations’ Indicator Measurement System (IMSystem), and the American Pharmaceutical Association’s pharmacy services benchmarking project are other examples of initiatives that include medication indicators. In 1997, the Academy of Managed Care Pharmacy published the Catalog of Pharmacy Quality Indicators to help guide MCOs in the use and selection of pharmacy and medication quality indicators.

As MCOs consider the best allocation of resources to improve medication use, 2 major areas of opportunity are medication use in older adults and prevention of drug-related morbidities (DRMs). Beers and colleagues recently described the problem of DRM in the elderly in MCOs. They concluded that medication misuse in the elderly is a significant problem, and, yet, optimal prescribing for the elderly has historically been inadequately addressed. Others have estimated that for every dollar spent on drugs in nursing facilities, $1.33 is spent on health care resources for the treatment of drug-related problems.

Some DRMs are not preventable, including those resulting from patient idiosyncrasy. However, estimates from the literature indicate that a minimum of 30%—and up to 80%—of DRMs are preventable. These preventable drug-related morbidities (PDRMs) present the greatest opportunity for quality improvement since they can, by definition, be reduced. As described by Hepler and Strand, PDRM has 4 unique elements.

Given an adverse clinical outcome, a preexisting drug-related problem must have been (1) recognizable, and the adverse out-
come or treatment failure must have been (2) foreseeable. In addition, the causes of the drug-related problem and the outcome must have been both (3) identifiable and (4) controllable.

Despite the widely documented problem of PDRM, at this time, there are no explicit clinical indicators of PDRM that could be used by clinicians and/or an MCO. The purpose of this study, then, was to create clinical indicators of PDRM in older adults.

## Methods

The literature on DRM since 1967 was reviewed for possible types of PDRM. This search was limited to those morbidities that occur in older adults. Peer-reviewed medical and pharmacy articles and referenced texts were included in the literature review.

Based on the literature review, a list of 50 clinical scenarios (representing outcomes and patterns of care that were thought to be possible PDRMs occurring in older adults) was compiled. These clinical scenarios had to meet the following inclusion criteria: (1) be well-referenced, (2) occur fairly commonly in the geriatric population, (3) result in serious-to-moderate adverse outcomes, and (4) be searchable in the electronic medical records of the health care system cooperating in the study. Clinical scenarios involving specific laboratory values or directions for taking medications were excluded as this information was not available in the electronic health records.

A survey instrument was constructed in order to evaluate whether these 50 clinical scenarios met the 4 defining characteristics of a PDRM. All clinical scenarios were listed in a similar format to facilitate reading. In this format, the outcome (morbidity) was listed first; the pattern of care that was assumed to have led to the outcome was listed second.

The survey was then reviewed by 8 survey design experts and pilot-tested to assess its content validity. A convenience sample of community, hospital, managed care, consultant, and academic clinical pharmacists from geographically diverse parts of the United States and Canada was selected for the pilot test. Before receiving the survey, all individuals were contacted by e-mail, fax, or telephone to inform them to expect the survey. The list of 50 clinical scenarios was split in half, and each half was mailed to a different set of 20 content reviewers in late 1997, along with a cover letter and instructions for use. A total of 28 content reviewers completed the survey (15 completed the first half, 13 completed the second half), made comments, and returned the survey in time for analysis, for a 70% response rate. Based on their feedback, slight modifications were made to the survey instrument. As well, based on the pilot-test results, 7 clinical scenarios were dropped from the survey, and 5 new clinical scenarios were added to the survey instrument, leaving a total of 48 clinical scenarios. All the newly added clinical scenarios had to meet the same inclusion criteria as the initial indicators.

In order to reach consensus on which clinical scenarios listed in the survey instrument were actual PDRMs, the Delphi technique was used. As Goodman explains, “The Delphi technique is a survey method of research which aims to structure group opinion and discussion. It was first developed in the 1950s by the Rand Corporation in California as an attempt to eliminate interpersonal interactions as the controlling variables in decision making, as usually happens when groups of experts interact in meetings. Its purpose is to generate discussion and enable a judgment on a specified topic to be made so that policy decisions can be taken which can claim to represent a given group’s wants and views.”

The utilization of expert panels via the Delphi technique to generate consensus on health care issues has been quite extensive. Beers and colleagues used the Delphi technique in 1991 with 13 experts to reach consensus on explicit criteria for determining inappropriate medication use in nursing home residents, and again in 1997 with 6 experts to update and expand the original criteria.

The chief medical officer of the cooperating health care system chose a 7-member panel in early 1998, with advice from this study’s principal investigator (MacKinnon) and the director of ambulatory pharmacy at the health care system. Following Duffield’s advice that the choice of panel members is critical in order for the Delphi technique to work correctly, participants were chosen based on their willingness to participate and their expert knowledge base. This panel consisted of physicians with recognized credentials in geriatric medicine, physician administrators, and a geriatric specialty clinical pharmacist at the health care system. They were opinion leaders within the health care system and had extensive expertise in geriatric medicine.

The principal investigator gave panel members an in-depth explanation of the survey before they completed it. This was felt to be necessary because commitment and understanding of the Delphi technique at the start of the study influences the time and consideration the participants give to the technique. The panel members were asked to judge whether each of the 48 clinical scenarios met the 4 defining characteristics of a PDRM. That is, the respondents were asked the following 4 questions: (1) For most older adults, should health professionals (MDs, pharmacists, etc.) be able to recognize significant problems in this pattern of care? (2) For most older adults, should health professionals be able to foresee the possibility of the outcome if those problems were not resolved? (3) Should most health professionals see how to change the pattern of care to prevent the outcome? (4) Should most health professionals actually change the pattern of care? The respondents were asked to judge a clinical scenario as a PDRM only if the criteria for all 4 defining characteristics were met.

One clinical scenario was listed twice in the survey to serve as a validity check, so the survey actually described only 47 unique clinical scenarios. In addition, there was an open-ended question at the end of the survey, where panel members could suggest any additional clinical indicators of PDRMs. Prior to the commencement of the Delphi rounds, it was decided that only those scenarios that were chosen by a majority of panel members (at least 4 out of 7 members) would be classified as clinical scenarios.
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cal indicators of PDRM. It was felt a majority of panelists would be an acceptable threshold since our standard for reaching consensus on each indicator was so high (only those clinical scenarios that met all 4 defining characteristics of a PDRM would be viewed as being a PDRM). All 7 panel members completed and returned the survey.

The round-2 survey was sent to the same 7 panel members the following month. This survey contained the clinical scenarios that had survived round 1 as well as several new clinical scenarios that were suggested by the panel members during round 1. For each clinical scenario, the panel members were given their response (yes/no) from the previous round, the total group response, and all the comments made by the panel members. (By providing comments from the previous round, consensus is reached more quickly, usually in 2 rounds.) Round 3 consisted of the results from round 2 and a letter thanking each expert panel member.

Results

The geriatric medicine expert panel developed 52 consensus-approved clinical indicators of PDRM in older adults. (Appendix A lists all 52 consensus-approved clinical indicators.) After round 1, the range of opinion was quite large, from a low of one expert who thought that only 60.4 percent of the items were PDRMs, to a high of one expert who thought that 97.9 of the items were PDRMs. After round 2, the range was 82.8% to 100%. The one clinical scenario included in the survey as a validity check received the same score from all 7 panel members for both rounds. Eleven of the final 52 consensus-approved clinical indicators of PDRM were suggested by the expert panel members and thus were not in the round-1 survey.

After round 2, a clear consensus was evident on which clinical scenarios were actual PDRMs. Of the 52 clinical scenarios deemed to be clinical indicators of PDRM by the expert panel, 35 (67%) had the agreement of all 7 panel members, 15 (29%) had the agreement of 6 out of the 7 members, and 2 (4%) had the agreement of 5 out of the 7 members. No clinical scenarios had the agreement of only 4 panel members. Throughout the 2-round process, there were 6 clinical scenarios that did not have the support of at least 4 panel members. Therefore, these 6 clinical scenarios were rejected as being clinical indicators of PDRM.

Discussion

DRM is now a widely recognized problem among older adults. However, the concept of preventable DRM has been somewhat problematic. When the term has been used in research literature, authors rarely provide explicit (reproducible) definitions of what they mean. Investigators seem to differ about exactly which DRMs are preventable. Nonetheless, the distinction between PDRM and nonpreventable DRM is critical since managed care pharmacists and physicians should be able to reduce PDRM. This study represents the first attempt to develop explicit indicators of PDRM.

This study proposed clinical indicators based on an explicit 4-part definition of preventability. Experts representing local opinion, participating in a Delphi process, reached consensus about 52 specific indicators after only 2 rounds. This validated both the general definition of preventability and the 52 indicators.

Panelists’ opinions did not vary widely between the 2 rounds. The stability of the group response to an item between Delphi rounds is important. Overall, the process did promote consensus, which is one of the chief advantages of the Delphi technique. Additionally, the expert panel was able to reach consensus on many indicators of PDRM that were proposed by the panel itself and were not on the initial survey.

The 52 indicators could have several important uses for an MCO. Hepler has proposed that indicators of PDRM could be used as a method to assess and resolve problems in the medication use system. Others have discussed the high risk for DRM in the older adult population given their high utilization of health care resources. Despite this, the problem of DRM is consistently underreported and underestimated, and, at this time, there is a lack of methods to identify and evaluate DRM. Underestimation of DRM is especially prevalent among community-living older adults, because (1) they may fail to recognize the symptoms of DRM or (2) their clinicians may attribute these symptoms to aging rather than to drugs their patients may be taking.

PDRM indicators have wider scope than most prescribing (drug utilization evaluation) indicators and may provide results that are easier to interpret and more reliable (reproducible) than results of medical record audit. Therefore, it would appear that PDRM indicators may be useful for screening, planning pharmaceutical care interventions, and medication risk management.

Indicators of PDRM also could be used to complement existing performance measures. As previously described, these indicators of PDRM include both processes and outcomes, in contrast to the HEDIS and other commonly used medication use indicators that focus on either process or outcome. Donabedian has proposed that understanding health care structures, process, and outcomes is critical. Monitoring process and outcomes are interrelated activities. Improving outcomes is the goal; studying processes can point the way to achieving that goal, and outcomes must be linked to processes if the quality of health care is to be improved. The clinical indicators of PDRM described in this study, then, help bridge the gap between process and outcome and could be used to supplement other existing indicators.

Limitations

These indicators’ advantage of being explicit is also their limitation because they can identify only the specific circumstances anticipated by their developers. Therefore, these indicators may complement rather than replace other assessment methods. They should be updated and revised as clinical practice and standards of care continue to progress. Moreover, these 52 indicators do not represent all possible PDRMs that could occur in

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older adults. As previously discussed, lab values and directions for use of prescriptions were not included in our indicators due to limitations in the health provider's database. The incorporation of these factors into future indicators should be pursued. Additionally, further research should focus on which indicators have the highest predictive value and identify the greatest number of patients that require clinical interventions.

The results of this study reflect consensus opinions of a convenience sample of clinical pharmacists and one panel of geriatricians. The results have been independently replicated with other panels in Florida and Canada.29, 30 These exercises were limited to PDRM in older persons. The results have also been replicated in a general practice population in the United Kingdom.31 Others should validate, use, and revise these indicators as has been done with other criteria for medication use in older adults.14, 16,17 In particular, these indicators (like all quality indicators) must be tested for sensitivity and specificity, as is currently being done in Canada, in order to determine their true value.30

■ Conclusion

This study has demonstrated that a panel of geriatric experts: (1) accepted the 4-part definition of preventability as the basis for a set of PDRM indicators, and (2) agreed on 52 clinical PDRM indicators. Second, the Delphi process provided a useful structure for developing consensus about explicit PDRM indicators. Further work is needed to explore application of PDRM indicators in managed care, especially continuous improvement of medication use and prevention of DRM.

DISCLOSURES

No outside funding supported this study. Author Neil J. MacKinnon served as principal author of the study. Study concept and design, analysis and interpretation of data, critical revision of the manuscript, and statistical expertise were contributed by MacKinnon and author Charles D. Hepler. Drafting of the manuscript was primarily the work of MacKinnon.

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REFERENCES

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## APPENDIX A The Consensus-approved Clinical Indicators of Preventable Drug-related Morbidity in Older Adults

<table>
<thead>
<tr>
<th>Outcome</th>
<th>POC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Use of a long-acting hypnotic-anxiolytic (e.g., flurazepam, diazepam, chlordiazepoxide, etc.)</td>
<td>fall and/or hip fracture and/or other bone fracture and/or bone break</td>
</tr>
<tr>
<td>2. Use of lithium</td>
<td>1. Use of an ACE inhibitor (e.g., captopril, enalapril, etc.)</td>
</tr>
<tr>
<td>3. Drug level not done at least every 3 months</td>
<td>1. History/diagnosis of congestive heart failure with heart block or advanced bradycardia</td>
</tr>
<tr>
<td>4. Use of an oral corticosteroid (e.g., prednisone) for at least 3 months</td>
<td>2. Use of digoxin</td>
</tr>
<tr>
<td>5. History/diagnosis of congestive heart failure and/or heart block</td>
<td>fall and/or hip fracture and/or other bone fracture and/or bone break</td>
</tr>
<tr>
<td>6. History/diagnosis of ulcers and/or gastrointestinal bleeding</td>
<td>1. Use of a long-half-life hypnotic-anxiolytic (e.g., flurazepam, diazepam, chlordiazepoxide, etc.)</td>
</tr>
<tr>
<td>7. History/diagnosis of ulcers and/or gastrointestinal bleeding and/or anemia</td>
<td>acute renal failure and/or renal insufficiency</td>
</tr>
<tr>
<td>8. Use of a sympatholytic antihypertensive (e.g., reserpine, methyldopa, clonidine, etc.)</td>
<td>1. Use of an oral corticosteroid (e.g., prednisone) for at least 3 months</td>
</tr>
<tr>
<td>9. Fall and/or hip fracture and/or other bone fracture and/or bone break</td>
<td>2. Use of an oral corticosteroid (e.g., prednisone) for at least 3 months</td>
</tr>
<tr>
<td>10. Use of a long-acting hypnotic-anxiolytic (e.g., flurazepam, diazepam, chlordiazepoxide, etc.)</td>
<td>1. Use of an ACE inhibitor (e.g., captopril, enalapril, etc.)</td>
</tr>
<tr>
<td>11. History/diagnosis of ulcers and/or gastrointestinal bleeding</td>
<td>acute renal failure and/or renal insufficiency</td>
</tr>
<tr>
<td>12. Use of an oral corticosteroid (e.g., prednisone) for at least 3 months</td>
<td>fall and/or hip fracture and/or other bone fracture and/or bone break</td>
</tr>
<tr>
<td>13. History/diagnosis of ulcers and/or gastrointestinal bleeding</td>
<td>1. Use of a long-acting hypnotic-anxiolytic (e.g., flurazepam, diazepam, chlordiazepoxide, etc.)</td>
</tr>
<tr>
<td>14. History/diagnosis of congestive heart failure and/or heart block</td>
<td>acute renal failure and/or renal insufficiency</td>
</tr>
<tr>
<td>15. History/diagnosis of ulcers and/or gastrointestinal bleeding and/or anemia</td>
<td>fall and/or hip fracture and/or other bone fracture and/or bone break</td>
</tr>
<tr>
<td>16. Major and/or minor hemorrhagic event</td>
<td>acute renal failure and/or renal insufficiency</td>
</tr>
<tr>
<td>17. History/diagnosis of ulcers and/or gastrointestinal bleeding and/or anemia</td>
<td>fall and/or hip fracture and/or other bone fracture and/or bone break</td>
</tr>
<tr>
<td>18. Status epilepticus and/or ER visit/hospitalization due to seizure activity</td>
<td>acute renal failure and/or renal insufficiency</td>
</tr>
<tr>
<td>19. Status epilepticus and/or ER visit/hospitalization due to seizure activity</td>
<td>1. Use of a long-acting hypnotic-anxiolytic (e.g., flurazepam, diazepam, chlordiazepoxide, etc.)</td>
</tr>
<tr>
<td>20. Lithium toxicity</td>
<td>acute renal failure and/or renal insufficiency</td>
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</tbody>
</table>
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APPENDIX A  The Consensus-approved Clinical Indicators of Preventable Drug-related Morbidity in Older Adults

21. **Outcome:** ER visit/hospitalization due to hyperglycemia
   **POC:**
   1. Use of an oral hypoglycemic agent (e.g., chlorpropamide, etc.)
   2. Hemoglobin A1c level not done at least every six months

22. **Outcome:** Major and/or minor hemorrhagic event
   **POC:**
   1. Use of warfarin
   2. Prothrombin time not done before therapy starts and at least every month thereafter

23. **Outcome:** ER visit/hospitalization due to hyperthyroidism
   **POC:**
   1. Use of a thyroid or antithyroid agent (e.g., levothyroxine, propylthiouracil, etc.)
   2. T4/TSH not done within six weeks after initiation of therapy and at least every 12 months thereafter

24. **Outcome:** Secondary myocardial infarction
   **POC:**
   1. History/diagnosis of myocardial infarction
   2. No use of ASA and/or a beta-blocker (e.g., metoprolol, etc.)

25. **Outcome:** Blood dyscrasias
   **POC:**
   1. Concurrent use of trimethoprim/ sulfamethoxazole and methotrexate
   2. WBC/platelets/CBC not done at least every four weeks

26. **Outcome:** ER visit/hospitalization due to a major/minor hemorrhagic event
   **POC:**
   1. Warfarin use
   2. NSAID (e.g., diclofenac, ibuprofen, ketoprofen, etc.) use
   3. PT not done within 10 days

27. **Outcome:** ER visit/hospitalization due to hypothyroidism
   **POC:**
   1. Lithium use for at least six months
   2. TSH not done at least every six months

28. **Outcome:** ER visit/hospitalization due to a major/minor hemorrhagic event
   **POC:**
   1. Warfarin use
   2. Antibiotic use
   3. PT not done within five days

29. **Outcome:** Gastritis and/or upper GI bleed and/or GI perforation and/or GI ulcer and anemia
   **POC:**
   1. Use of two or more NSAIDs concurrently for at least two weeks

30. **Outcome:** Blood dyscrasias/ thrombocytopenia
   **POC:**
   1. Use of ticlopidine
   2. CBC/platelets not done at baseline, within two weeks of start of therapy and within two months

31. **Outcome:** Rebound congestion
   **POC:**
   1. Use of a long-acting nasal spray (e.g., oxymetazoline) for more than three days

32. **Outcome:** Acute urinary retention
   **POC:**
   1. Diagnosis/history of bladder atony due to diabetes
   2. Use of imipramine

33. **Outcome:** Acute respiratory failure
   **POC:**
   1. History/diagnosis of severe COPD
   2. Use of a medium to long-acting benzodiazepine

34. **Outcome:** Acute urinary retention
   **POC:**
   1. History/diagnosis of benign prostatic hypertrophy (BPH)
   2. Use of an anticholinergic agent

35. **Outcome:** ER visit/hospitalization due to liver toxicity
   **POC:**
   1. Use of troglitazone
   2. Liver function tests not done at baseline and at least monthly for the first 8 months of therapy and at least every 2 months for the remainder of the first year.

36. **Outcome:** ER visit/hospitalization due to congestive heart failure and/or fluid overload
   **POC:**
   1. History/diagnosis of high blood pressure (over 140/90) and/or congestive heart failure
   2. NSAID (e.g., diclofenac, indomethacin, ketoprofen, etc.) use for at least 3 months

37. **Outcome:** ER visit/hospitalization due to extreme hypoglycemia
   **POC:**
   1. History/diagnosis of diabetes
   2. Use of a beta-adrenergic blocking agent (e.g., propranolol, nadolol, etc.)

38. **Outcome:** ER visit/hospitalization due to depression and/or increase in dosage of antidepressant
   **POC:**
   1. History/diagnosis of depression
   2. Use of a moderate to high lipophilic beta-adrenergic blocking agent (e.g., propranolol, pindolol, etc.)

39. **Outcome:** ER visit/hospitalization for hypokalemia
   **POC:**
   1. Use of a potassium-wasting diuretic (e.g., hydrochlorothiazide, etc.)
   2. No concurrent use of potassium chloride supplement
   3. Electrolytes not checked at least every 2 months

40. **Outcome:** Anticonvulsant drug toxicity
   **POC:**
   1. Use of an anticonvulsant requiring drug level monitoring (e.g., phenytoin, carbamazepine, valproic acid)
   2. Drug level not done at least every 6 months

41. **Outcome:** ER visit/hospitalization due to hypothyroidism
   **POC:**
   1. Use of a thyroid or antithyroid agent (e.g., levothyroxine, propylthiouracil, etc.)
   2. T4/TSH not done before therapy starts and at least every 12 months thereafter
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42. **Outcome:** ER visit/hospitalization due to systolic heart failure  
**POC:**  
1. History/diagnosis of systolic heart failure  
2. Use of a beta-adrenergic blocking agent (e.g., propranolol, nadolol, etc.)

43. **Outcome:** ER visit/hospitalization due to congestive heart failure  
**POC:**  
1. History/diagnosis of congestive heart failure  
2. Use of an antiarrhythmic agent (e.g., disopyramide, procainamide, etc.)

44. **Outcome:** Fall and/or hip fracture and/or other bone fracture and/or bone break  
**POC:**  
1. Use of an antipsychotic (e.g., thioridazine, haloperidol, chlorpromazine, etc.)

45. **Outcome:** Asthma exacerbation and/or status asthmaticus and/or ER visit/hospitalization due to asthma  
**POC:**  
1. Diagnosis of asthma  
2. Use of a bronchodilator  
3. No use of a maintenance corticosteroid (e.g., beclomethasone, etc.)

46. **Outcome:** Hospitalization/ER visit due to worsening renal impairment and/or acute renal failure and/or renal insufficiency  
**POC:**  
1. Diagnosis/history of moderate to severe renal impairment/history of kidney disease  
2. Use of a select urinary antinfecitive agent (nalidixic acid, nitrofurantoin or methenamine complexes)  
3. BUN/serum creatinine not done within 30 days of initiation of therapy and at least every 6 months

47. **Outcome:** ER visit/hospitalization due to congestive heart failure  
**POC:**  
1. Diagnosis/history of congestive heart failure  
2. Not on an ACE inhibitor (e.g., captopril, enalapril, etc.)

48. **Outcome:** Aminoglycoside toxicity (acute renal failure and/or renal insufficiency and/or vestibular damage and/or auditory damage)  
**POC:**  
1. Use of an aminoglycoside  
2. Serum creatinine not done before and after therapy (and if therapy longer than 7 days, not done at least every 7 days)  
3. At least one drug level not done

49. **Outcome:** ER visit/hospitalization due to congestive heart failure  
**POC:**  
1. Diagnosis/history of congestive heart failure  
2. Use of a calcium channel blocker (e.g., diltiazem, etc.)

50. **Outcome:** COPD exacerbation and/or ER visit/hospitalization due to COPD  
**POC:**  
1. Diagnosis/history of COPD  
2. Use of a beta-blocker (e.g., propranolol, etc.)

51. **Outcome:** ER visit/hospitalization due to hypoglycemia or hyperglycemia  
**POC:**  
1. Use of insulin  
2. Hemoglobin A1c level not done at least every 6 months

52. **Outcome:** Fall and/or hip fracture and/or other bone fracture and/or bone break  
**POC:**  
1. Use of an anticholinergic agent

**Note:** Clinical indicator #1 is in the actual format used in the study; the remainder are abbreviated here for ease of reading.  
**POC:** Pattern of Care.