CMS 2012 MEDICARE PRESCRIPTION DRUG BENEFIT SYMPOSIUM

MARCH 20-21, 2012
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Prescriber Level Variation in Potentially Inappropriate Medication Use in Part D Beneficiaries
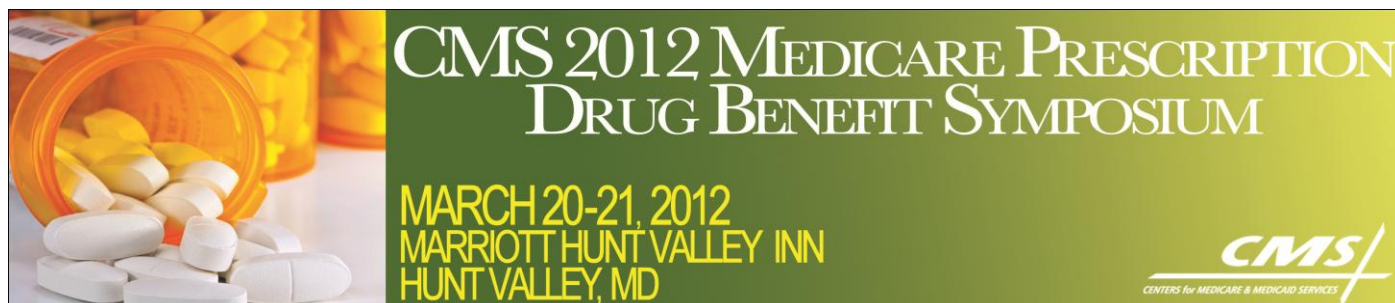
Holly M. Holmes, MD
James Goodwin, MD

Good afternoon. I appreciate this opportunity to present some preliminary results on prescriber level variation in potentially inappropriate medication use. And I want to acknowledge my co-author, Dr. Goodwin. I have a hard time seeing out there - and our co-investigators, Dr. Ruley Lowe and Dr. Yung Fing Quo. You might notice that your slides are not in your binders, so it will be one less set to recycle. But they will be available after the conference with the web materials. Dr. Goodwin and I have no conflicts of interest to declare.

The learning objectives for this talk are, number one - I'm sorry, I'm shorter than I give myself credit. Number one, to discriminate between different criteria for inappropriate medication use, and number two, to understand the strengths and limitations of administrative data in assessing provider quality. Despite many efforts to improve healthcare delivery, there continues to be wide variation in healthcare practices. And this is seen at the provider, or prescriber level, at the hospital level and also by geographic region. And this has been shown in overuse of unnecessary therapies, underuse of necessary therapies, misuse as well as errors.

And even in cases where there's small variation, some situations are meaningful enough clinically, or prevalent enough that intervening in improving variation could have a significant impact. So an example here would be improving glycemic control in diabetes, or improving anti-hypertensive medication use. Some care could be low in variability but it could be universally poor. So improving widespread care could be important. So an example here would be improving process or care measures for asthma.

We are interested in variation at the provider level. And Dr. Goodwin and his group have done numerous studies to look at provider level variation. One example was the study of men with prostate cancer receiving androgen deprivation therapy. And androgen deprivation therapy varied more by the urologist's characteristics than the patient in more than 81,000 Medicare patients who were seeing more than 1700 urologists. And in the multi-level model for the patient and urologist, which urologist you saw was twice as likely to predict whether you got androgen deprivation therapy compared to patient characteristics like age or tumor. And looking at the urologists, for example, urologists who had no academic affiliation were 1.83 times more likely to prescribe androgen deprivation therapy compared to urologists who had a major academic affiliation.

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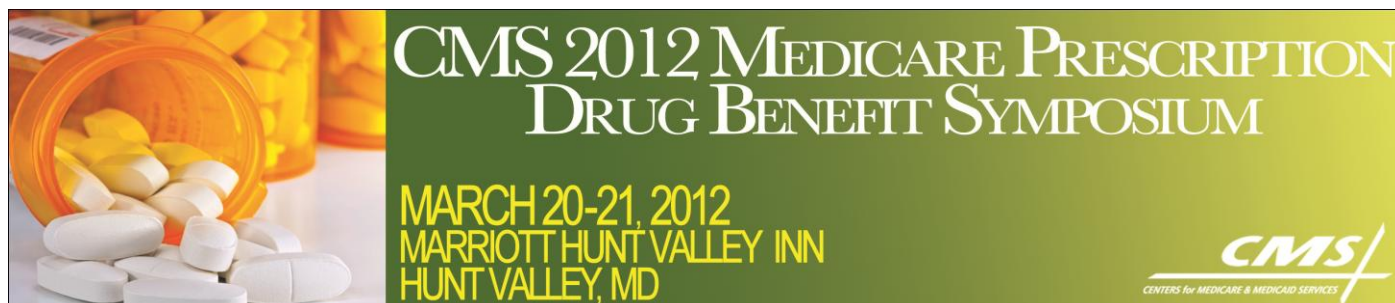
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So the study that we want to present today is nowhere near this level of sophistication. But this is an example of the kind of thing we want to be able to do using Part D data. We wanted to be able to use a measure of prescribing quality and see whether Part D data would allow us to look for variation at the provider level. With Part D, we have an opportunity to have large numbers of patients and large numbers of providers. And we can link their records without patient and inpatient data. It's important to consider medication quality in Part D. It's possible that increasing access to medications could increase the use of inappropriate therapies. So Part D gives us an opportunity to explore these provider level variations using some kind of indicator of prescribing quality.

So we chose inappropriate medication use as an indicator of prescribing quality. And just some synonyms: it's called inappropriate medication or potentially inappropriate medication, potentially inappropriate prescribing. These terms are out there in the literate. And I'm going to use PIM from now on. Generally, PIMs are medications that have been deemed high-risk, low-benefit. And they're defined for older populations. PIMs are drugs that are associated with increased risk of adverse drug events, increased risk of drug-drug interactions, increased numbers of adverse health outcomes, higher cost, or increased healthcare utilization.

There are a number of tools or criteria that have attempted to identify PIMs. There are explicit lists of drugs. So one example here is the Beers List, which I will talk about a little bit more in a moment. And then there's the McCloud Criteria, also called the Canadian Criteria. This is actually based on the Beers List. And then a subset of this is Improving Prescribing in the Elderly Tool, IPET. So both of these are explicit lists of drugs that are subsets of the Beers List. And there's a newer criteria, called the Stop Start Criteria. It contains many over-the-counter medications that cannot be assessed using Part D data, unfortunately.

There are a number of implicit criteria and algorithmic approaches. So these are criteria that drugs or patients should satisfy for the prescribing to be appropriate. The most common of these is the Medication Appropriateness Index. And it has a very fairly robust amount of data to support its validity. There's also the Good Palliative Geriatric Practice, or GPGP, algorithm, again a list of tests that a drug should satisfy to be appropriate. Unfortunately, these are for the use in administrative data. These are highly individualized, and require a lot of clinical information that cannot be obtained from administrative data. So prescribing quality cannot be measured in Part D data using these two tools. And then there are medications that cause the majority of adverse drug reactions. Those are Warferin, Digoxin, Insulin and oral hypoglycemics.

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So the Beers Criteria is a list of medications that was developed by expert consensus using Delphi Methodology originally in 1991 to apply to nursing home patients over 65, 65 years and older. It was updated in 1997, in 2003 and then it's been updated again this year. The 2003 list contains 48 medications, or classes of drugs, that are considered inappropriate in the elderly. Some of these are only inappropriate at certain dosages or for certain unacceptable durations of therapy. It also contains 20 drug and disease condition combinations that should be avoided in the elderly.
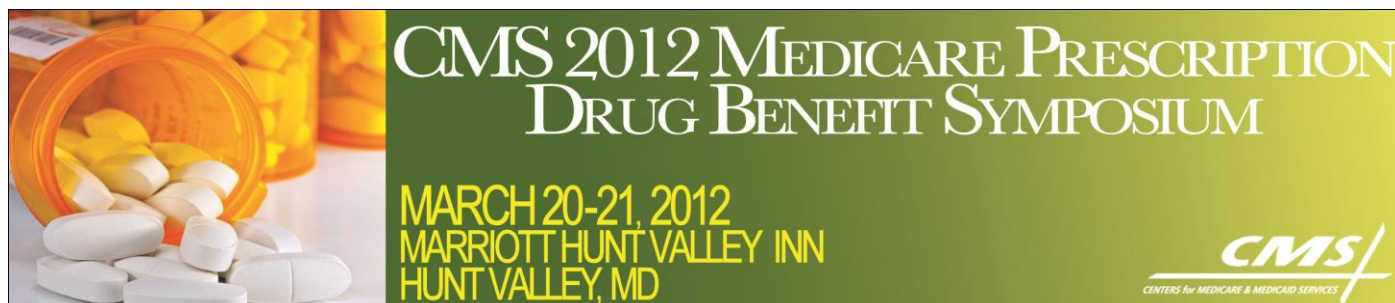
And the Beers List has been advocated as a prescribing quality indicator. It's contained in HEDUS measures of prescribing. And it was also quality indicator for nursing home prescribing. In some studies, although not universally, it has correlated well with MAI scores, so scores of inappropriateness according to an implicit list.

There is some evidence that the use of PIMs is associated with the provider or the prescriber. I tend to use those interchangeably. In more than 493,000 patients in 348 U.S. hospitals, the use of Beers drug PIMs varied by physician specialty and cardiologists were higher than others. There was wide geographic variation in PIM use, and there was variation by the hospital characteristics as well.

Another study showed that there was a variation in the number of drugs, or poly-pharmacy, as well as Beers PIMs across 589 nursing homes in Ontario, Canada. And finally, there was a study showing that PIM use ranged between 20 to 46 percent of patients receiving a PIM across 71 general practices in Scotland.

So in this study, we first and foremost wanted to investigate the utility of using Medicare Part D data to describe provider-level variation in medication use. And then we specifically wanted to do this by evaluating the variation in PIM use according to Beers criteria in Medicare Part D beneficiaries at the provider level, controlling for patient characteristics that are associated with getting a PIM.

To accomplish this, we used 100 percent Texas Medicare claims, and Part D event files for 2007 and 2008. We wanted to select enrollees who were 66 years and older in 2008, so that we would have a year look-back for comorbidities in 2007. They had to have 12 months of Part A, B and Part D enrolment without any HMO enrolment in 2008. After selecting these patients, we also wanted them, the prescribers, to be physicians, so M.D. or D.O., who had ten or more beneficiaries per prescriber. We defined inappropriate medications according to the Beers 2003 criteria. And we only used the list of medications or drug classes. We did not use the drug-disease combinations. And again, we cannot assess over-the-counter medications. In the Beers Criteria, there are several over-the-counter antihistamines as well as non-steroidal anti-inflammatory drugs.

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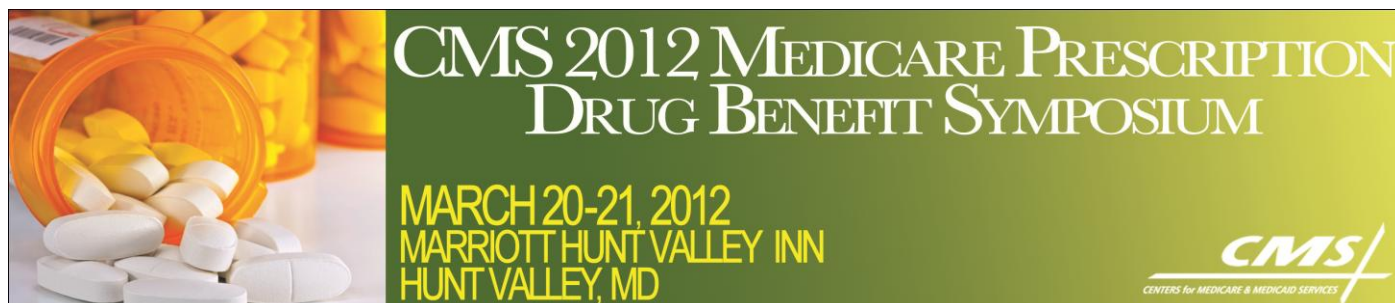
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So for patient factors, we used the Part D denominator file to get age, sex, race, ethnicity and state buy-in, or low-income subsidy eligibility. We defined comorbidities according to Elixhauser's Index. And we used the 2007 outpatient carrier file and Med Par input records to determine comorbidity. We determined hospitalization in 2007 from Med Par files. And we defined PIM use as getting any PIM, according to the Beers List, in 2008 using PDE files. For prescribers, we had credentials which are - include M.D. or D.O. And we had specialty as well as sub-specialty from the PDE prescriber characteristics file.

So our plan was to look at patient and provider characteristics that are associated with PIM use by patients. And we did bi-varied analysis to look at those associations. And then we constructed a multi-variable model for patient factors that predict PIM use. And then finally, we constructed a multi-level model for the prescriber, controlling for the patient level to predict PIM use in 2008.

And I want to highlight something else in our study flow chart. So starting with Texas Medicare Part D beneficiaries who were 66 or older at the beginning of 2008, we had over two million to start with. And then we defined our enrolment based on A, B, and D, and no HMO in 2008. We also chose people who had at least one claim for medication in the PDE files in 2008. And then, once we chose people who were associated with prescribers having ten or more beneficiaries per physician prescriber, we were left with a sample of 677,580 beneficiaries. And that resulted in 24,561 prescribers.

I just want to highlight here that when we cut off at ten beneficiaries or higher per prescriber, this is what we're looking at. And if you look to the right of the red arrow, we're really interested in those people in the tail. And that's a lot of people. The people in the tail represent general practitioners. We're interested in family medicine, internal medicine and general practice as the primary prescribers for people who might receive PIMs. The people to the left of the red arrow, those are likely the specialists who have few beneficiaries per provider. Overall, we found that 31.9 percent of our study sample received a PIM in 2008. And the vast majority of prescribers, 85 percent, prescribed at least one PIM.

This shows the patient characteristics and also shows the percent getting a PIM across each category. So if you look across different age categories and sex and race and ethnicity, PIM use increased with increasing age, and it differed between sexes. So 35 percent of women received a PIM in 2008, as opposed to 26.2 percent of men. And it also varied across categories of race and ethnicity. Asians had a 22.9 percent receiving PIM compared to the other categories you see there. And continued patient characteristics, if you look at low-income subsidy eligibility, having LIS eligibility was associated with getting a PIM. Hospitalization in 2007 also was associated with a PIM. And I show a select number of comorbidities here, but across all comorbidities, having that comorbidity was associated with PIM use.

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And if you look at the whole sample, the average number of total medication claims for the year 2008 was 39.2. But among those getting PIMs, the average was 52.2.

So looking at unique numbers of prescribers, 73 percent of beneficiaries had more than one prescriber for all their prescriptions, PIM or no PIM. And PIM use increased considerably with increased numbers of unique prescribers. So if you look at people who had just one unique prescriber, 19.2 percent of those go at PIM. But those who had four or more unique prescribers, 48.1 percent of those had PIM.
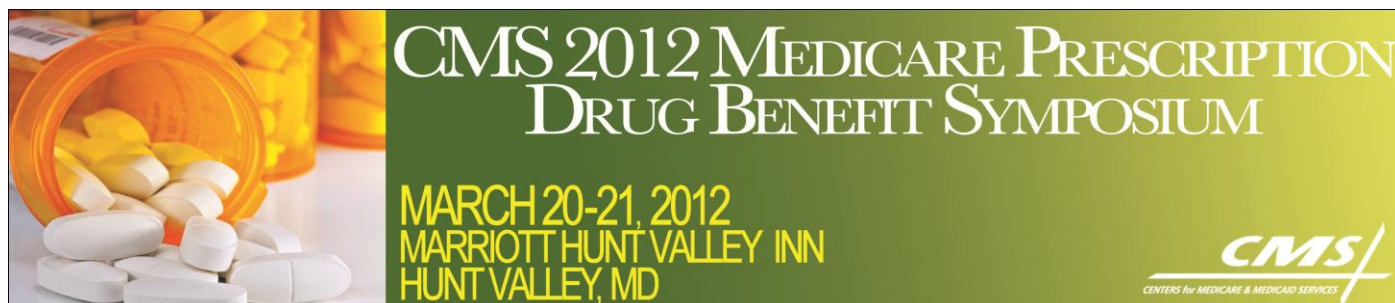
Looking at prescriber characteristics including credentials M.D. versus D.O. and then across different specialties, I'm showing just to highlight here. You can see that there was variation across prescriber characteristics. And so, for example, 14.4 percent of all beneficiaries who got a prescription from an M.D. go at PIM from that M.D.

This shows the ten most commonly prescribed PIMs. And I, of course, need to highlight that Propoxyphene was removed from the market in 2010, I believe. And this was from 2008, and it was the most commonly prescribed PIM at the level of the beneficiary. The most common PIMs also included an antibiotic, an anti-hypertensive, muscle relaxants, tricyclic anti-depressant, alpha blocker, Amiodarone, and GI anti-spasmodic.

So when we looked at a multi-variable model for the odds of PIM use in 2008, you can see here that patient age was no longer a major predictor of PIM use. Began a woman was still a significant predictor of increased risk of PIM use. Having low-income subsidy eligibility was also associated with increased PIM use. And there are differences across race, ethnicity categories. But Asians had less risk of PIM use. Hospitalization is still significantly associated. And most comorbidities are no longer statistically or clinically significantly associated with PIM use.

In that same multi-variable model, we included the numbers of unique prescribers. So we included whether someone had one, two, three or four plus unique prescribers. And the increasing number of unique prescribers remained a strong and independent predictor of PIM use. And this is a really nice monotonic trend. So if you see people would had two prescribers as compared to people who only had one unique prescriber, had 1.42 times the likelihood of getting a PIM. People who have four plus unique prescribers had 2.92 the odds of getting a PIM in 2008, compared to people who only had one unique prescriber.

Now, to be able to look at the prescriber level and then to look at their PIM rate, we constructed a multi-level, multi-variable model. So in this model, we have the prescriber level, but we control for all those patient factors that we have in the prior multi-variable model. We did not control for number of

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unique prescribers, and we did not control for number of medication claims. But we controlled for all other patient variables, including hospitalization and comorbidity.

So, to explain how the next several graphs are going to look, across the middle is a blue line that shows the adjusted mean percent of PIM use among the beneficiaries who received prescriptions across all prescribers. And then at the bottom, you see the individual prescribers. And there are people in red on the left and people in red on the right. On the left are the people whose percent PIM use, adjusted percent of PIM use for the beneficiary, is significantly below the mean. And on the right is the adjusted percent PIM use that's significantly above the mean for that prescriber.
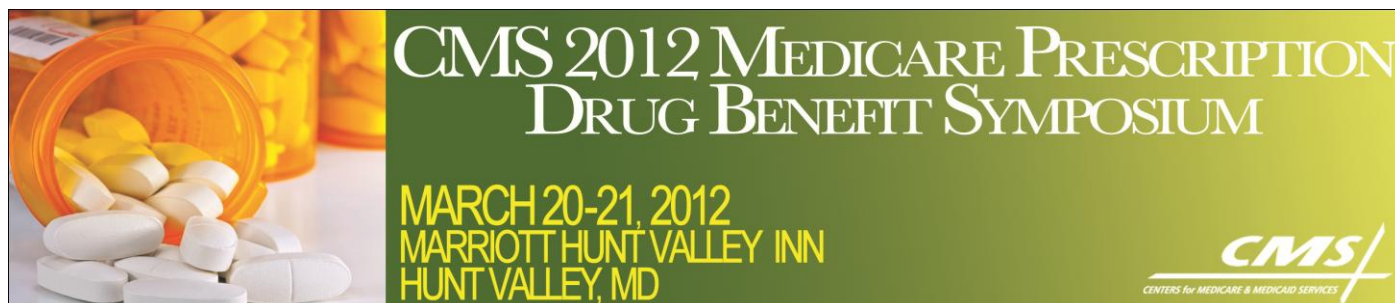
So, for all prescribers in this type of multi-level model, we had to match the beneficiary with a predominant prescriber. We did not match the beneficiary for every prescriber for their prescriptions. So across all prescribers, using that method, we had 10,747 prescribers. And you can see that the mean adjusted percent of PIM use if 21.1 percent, 5.7 percent are below the mean, and 10.4 percent of the prescribers are above the mean for adjusted percent of PIM use. The 10th percentile is 13.4 percent of PIMs, the 90th percentile is 30 percent PIMs.

So we wanted to look across generalists. We're especially interested in family medicine, internal medicine, general practice. And again, you see the nice variation across prescribes with 6,326 generalists with the mean rate being 24 percent of patients on PIM. And 4.6 percent are blow the mean, 7 percent of prescribers are above the mean.

We broke this out into general internal medicine. With more than 2300 prescribers the mean percent PIMs, adjusted, is 23.7 percent. And again, you can see those that are below and above the mean. Family medicine, the adjusted percent PIMs mean rate was 24.4 percent. And again, you can see those that are below and above the mean at both tails. Internal medicine specialties, the adjusted percent of PIMs, the mean adjusted percent of PIMs, is 13.6 percent. And here, you can see that 3 percent were below, 9.1 percent were above the mean for prescribers, and the 50th percentile is 7.5 percent of patients getting a PIM. The 90th percentile is 22 percent of patients getting a PIM.

We're geriatricians, so I was confident that we would be profoundly better on PIM use than anyone else. The adjusted percent of PIM use for geriatricians is the same as family medicine and internal medicine with 24.6 percent. And again, there's a smattering that are below and above the mean.

There was a high use of PIMs in this study. The rate was 32 percent. This could be due to a number of factors, but I want to point out that in other studies using administrative data, whether its Medicare claims or even survey data or other administrative databases the PIM use is usually around 20 to 25

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percent in the general population. But in the nursing home population, PIM use is probably closer to 40 to 50 percent.

So there could be some reasons for our high PIM rate of 32 percent. We selected only from a population that actually received prescriptions. We included nursing homes residents and we did not identify them.

But we found that there were significant variations in PIM use among prescribing physicians. And this was across generalists and specialists. We conclude from this preliminary work that Part D event data represents an important new tool to be able to look at provider level variation in care.
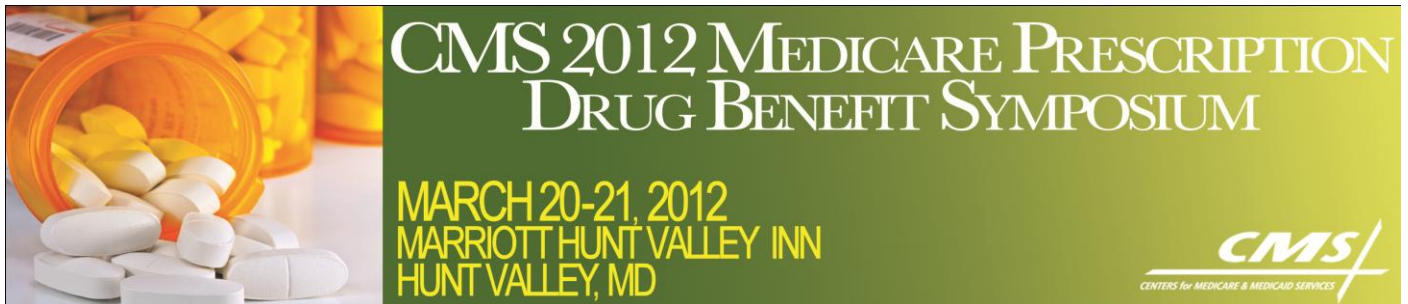
There were some issues that were raised by this study. We want to be able to better characterize prescribers, and we need linkage to AMA data to do that. It would also be helpful to be able to link prescriber data to Medicare Part D - I'm sorry, Part B data - to better characterize the role of the prescriber. How often does the prescriber see the patient? What's the duration of that relationship with the beneficiary? What's the site of care? Part B data would have given us a better denominator for each provider. The denominator we used was all the patients that the prescriber wrote a prescription for, rather than all the patients that that prescriber saw.

In our multi-level model, we assigned each patient to a predominant prescriber. We need to be able to use cross-classification models so that each patient could be clustered within several providers. And we plan to do that.

And just issues related to PIM use, nursing home patients, as I mentioned, he a known high rate of PIM use. We didn't identify them. We've developed algorithms to identify them using Part B data, but linkage with MDS data would be very helpful for this. And it would also help us better characterize those patients and risk factors for PIM use.

We haven't looked at the amount of exposure of drug, so we don't know, beyond the Beers Criteria drugs that are based on dosage, we didn't investigate dosage. We didn't look at duration of prescriptions or refill history. And then we need better measures of actually inappropriate prescribing as opposed to what's potential inappropriate medication use.

So, our future directions include the need to examine the stability in these estimates of PIM use over time using Part D data for subsequent years. We want to further explore prescriber characteristics using AB and AMA data. And we want to look at variation at the prescriber level and other types of medication use. So, for example, underuse of necessary medications, other quality indicators for prescribing like the use of ACE inhibitors in diabetes. And we want to focus on actual drug interactions,

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real ones that are associated with adverse outcomes, rather than theoretical interactions that are based on pharmacokinetic properties of drugs. And we do want to look at outcomes that are associated with PIM use. So, for example, increased risk of ER visits, increased falls, increased risk of fracture.

It's time to conduct the assessment. Please get out your ARS response cards. We would encourage all of you to participate. As a reminder, if you are seeking CPE credit, you must respond to all assessment and evaluation questions. After the questions and responses are read, you will have ten seconds to respond. You will see the timer on the screen. And everybody's on channel 41.

Okay, which one of the following criteria for inappropriate medication use cannot be evaluated using administrative data? Please vote now. You have ten seconds. The poll is closed. Let's look at the results. Okay, excellent. GP/GP algorithm. The IPET tool is a subset of the Beers Criteria.

Which of the following indicators of prescribing quality cannot be assessed using administrative data? Number one, a prescription of Beers Criteria medications; number two, prescription of NSAIDS in persons with heart failure; number three, appropriate dosing of Lorazepam; number four, duplication in therapy with two proton pump inhibitors. And please vote now. You have ten seconds. The poll is closed. Hmm. It's the end of the day. We don't have to go over this. Well most NSAIDS are over-the-counter and can't be evaluated in Part D data. Appropriate dosing of Lorazepam, we won't go there.