All right cost to charge ratios...everybody is here right, calculating cost to charge ratios. Okay so the objective of this segment is to define what a cost to charge ratio is, examine the uses and types of cost to charge ratios, provide formulas, identify costs and charge variable locations within the cost reports themselves, review an example and outline the steps you would need to take in order to calculate and apply cost to charge ratios. So it is...what it says it's a ratio of the cost divided by the charges generally used with acute inpatient or out patient hospital services and the following types of cost to charge ratios can be calculated from the cost report so total hospital that means all payer, all patients total cost. You can do this at a hospital level by itself or you could look at the cost centers, you can also pull out Medicare specific and you can do that at the hospital level or you can do it at the cost center level. Again for other types of facilities they don't break out costs and charges in the same way as a hospital cost report for skilled nursing facilities, they break out for ancillary and out patient services only and they do they...otherwise it would be calculated as a cost per diem. Home health report costs per visit, hospices report costs per day, renal dialysis report cost per treatment and rural health clinics are reporting cost per visit. So what are the uses for the cost to charge ratios, Medicare uses it for calculation of out-liar payments so you'll find cost to charge ratios in the impact file, I think yesterday you talked about the payment impact file right and so you'd find operating and capital cost to charge ratios that are Medicare specific in the impact file. It also is used for DRD cost weighting. The researchers use cost of charge ratios as a method to convert charges to cost. So this gets into a little bit more detail of the different types of cost to charge ratios at the cost center level, you'd find it in the data itself. Hospital over all you can find it in the data of course but you can also find it one of the reports that we down loaded this morning or looked at called costs and charges. The Medicare specific cost to charge ratio you can get in the downloadable data or you can get out of the impact file and again it's the capital and operating cost to charge ratio found in the impact file. Formulas for calculating for all payer total costs, cost to charge ratio, cost over charges, work sheet C, parts 1, column 5, 6 and 7. So I'm providing a formula of how to calculate the cost to charge ratio. The Medicare specific cost to charge ratio someone had asked me earlier about this and it is found within the manuals, I've got a link to the specific...this is for the impact file. For the claims processing manuals, Chapter 3 there's a specific section that goes through in detail exactly which variable is used in calculating the Medicare specific operating and capital cost to charge ratio. It would be found in worksheet D and you can also get it out of the payment impact file. Has anybody ever used the impact file before...I know there's a... [inaudible] you had used it. Has anybody else ever used it, what you'll notice when you pull information out of the payment impact file is that it pulls data from cost reports that could be two or three years old. So just keep that in mind when you're using it, it's easy to use, it's there it's nice and clean and easy but you do need to be cognizant that it is pulling data from three potentially two or three years ago. So looking at an example from the literature so I wanted everybody to have internet access to take a look on line at an example in the literature of looking at hospital costs and care, quality of care and readmission rate from Chen [phonetic] and I

wanted to look at page 341 of this article. So if you could navigate yourself to the let's see, I have within the segment there should be a Word document and within that Word document there is this link so that you can just click on the link to get to the free article that's available. So again it's within the workshop folder, it is segment 19 and then the Word document and it will give you the link to the Chen article. I'd like to take five minutes, I'll let you take a look at the data section and the hospital cost model section. Then just examine, I just wanted you to examine the name of the file that they use to calculate the cost to charge ratios and then the cost model which variables identified could possibly be found in the cost report data. So after everything that we've talked about today, if you could make some guesses about what you might find in the cost reports. And then this is just a summary of what they did, the impact file was used to adjust the charges, operating plus capital when I looked at the impact file the range of cost to charge ratio by hospital the range was .12 to .96. So then another question might be well what's the difference between how much of a difference is there between hospital Medicare specific cost of charge ratio and a total all payer hospital level cost to charge ratio that you would get from the worksheet C. So this is an example that I had pulled so 01 it's a hospital in Alabama and it happens to be 0005 and the total cost to charge ratio that I came up with was .21 total all payer for the hospital and then the Medicare specific was .36. Now I haven't tested or done any statistical analysis to tell you whether or not this is a significant difference. Just wanted to show you that you know they're not going to be the same. So the point is they're different. For another provider the total cost to charge ratio was .33 and the Medicare specific was .23 so they're all over the place as far as the cost to charge ratios. Another...we had talked about this before with the impact file and related to the Chen article, the data are two to three years old in the impact file so you may need to keep that in mind even though it says a fiscal year 2013 files is pulling data from 2009 or 10 for calculating the cost to charge ratios. But the good news is, I mean this is another source it's easy to apply, it's already available in an Excel spreadsheet, so I like easy. So I want everybody else to know where that lives. Now we're getting into, I wanted to go and move into steps to applying a cost to charge ratio to charges. So getting back to applying the cost to charge ratios really there's only five steps right so to apply the cost to charge ratio it should be easy right, we're just going to clean up the cost reports, easy, calculate hospital specific cost to charge ratio, either for the hospital or the cost center, check for missing or extreme values, create a revenue center to cost center cross walk and multiply the cost to charge ratio times the charges to get cost, easy. So first step cleaning up the cost reports. So if you haven't been here all day you know maybe the easy part you'll be saying are you kidding me, I don't even know that I'm going to get this far so I think I stopped at about 10:00 this morning deciding whether or not I'm going to continue. Maybe that's also a good learning experience too right coming some place to understand what the limitations are to know that no I don't know if I want to continue with this exercise but so if you did want to continue and you were looking at cost to charge ratios we'll lay it out here as far as what kind of steps you need to think about when you're going to do this so identify hospitals with multiple cost reports, we talked about that this morning, what would you do with them trying to

figure out do you want to use a 12 month cost report, evaluate partial year cost reports, put it all together to calculate total costs and charges so you'll have to decide how you want to handle those. We had a question this morning about duplicates and I had put this hear but I have a caveat that this happens very...it just doesn't happen so this is not something that...it's something you should do as a normal of cleaning your data but you shouldn't expect to see this. Determine which cost to charge ratio you want to calculate. We talked about total all payer or cost center level and then use the formulas to calculate the cost to charge ratio. So again work sheet C here's the favorite worksheet, part 1 and where you would find it, cost and charges, the resource document hospital cost codes is also helpful with helping us determine the cost center levels and locations of where we would find them, gives us the lines. Here are examples that were taken from the fiscal year 2011 data from the...so I've just pulled out the hospital provider numbers and calculated for adult and pediatric cost center, what the cost to charge ratio and so you can see they kind of very they are all over the place by hospital of course. So then check for missing or extreme values so for...is there just one person...is there one person or are there more than one of you that have already done this exercise of calculating a cost to charge ratio using the cost report data? So then you can...I'd like you to chime in and speak up about what you're finding when you do it. You're going to find missing cost to charge ratios so what do you do, you could use last years if it is there, use the over all hospital or eliminate the provider. You also find extreme values and as I mentioned CMS general uses three standard deviations from the mean. If you are talking about the impact file or calculation for out-liars CMS replaces those extreme values with a statewide average, now I don't really know how you know...it's interesting that that is a statewide average is selected because I'm not exactly sure how that applies, you know how that would work with the hospital but why they don't use the previous year instead but CMS uses a statewide cost to charge ratio when they're working with out-liar payments and trying to figure those out and replacing extreme values. So for this table I was looking at cost center specific, trying to illustrate well how often are you going to run across missing or potentially extreme values. So if there was a zero cost to charge or I wasn't able to calculate a ratio because one of the two either costs or charges were missing for adult and pediatrics that happened with 18 percent of the providers. The less than 10, it should be 80 percent, it should be 79.7 percent, so about 80 percent are less than 10 and this is not again I wasn't calculating for standard deviations and seeing which ones fall outside. I picked 10 arbitrarily as one of the highest cost to charge ratios found for adult and pediatrics. Then there was 2 percent that were larger than 10 for a cost to charge ratio. So this again is just to illustrate kind of where are all these cost to charge ratios, what am I going to find in the data file especially what do I do with missing values, so you know for operating room It's 28 percent and anesthesia 55 percent and you may ask well why is this like don't most hospitals have surgery and would be needing anesthesia so why can't you calculate a cost to charge ratio. Another thing that providers have the liberty to decide where their costs and charges are put so it's possible that a hospital decides that anesthesia gets lumped in with surgery and therefore all of their either costs or charges wind up in surgery and so they have missing values for anesthesia even though

they do have anesthesia it's just they didn't report the information in that cost center. So that's another little glitch. The next step is to create a revenue center to cost center cross walk. So earlier we talked about cost centers and the cost reports and revenue centers are in the claims data which we talked about yesterday. In order to be able to map these things up together to get a cost if you are doing this you have to develop a cross walk and you heard me talk earlier about the fact that providers tell CMS how they map these things. It's provided on a form that's proprietary which means that CMS can't tell us what each provider, how they mapped it, how they mapped their cost centers to revenue centers. So researchers are left with how do we map cost centers found in the cost reports to the revenue centers found in the claims data and there isn't one standard way in which to do that. There are resources out there, there are companies for profit companies that have taken cost reports and have come up with their own mappings and they make it public and so that's a resource. CMS for the out patient PPS payment system also has a cross walk it's for out patient cost to charge ratios though but it does give you an idea as to how CMS might map them. But the main point is that revenue centers don't equal cost centers and so there's not a one to one mapping. So I've included a definition of what revenue centers and cost centers are and someone in the accounting world could probably do a excellent job of explaining it but the moral of the story again is just that revenue centers and cost centers that are reported in the cost reports are not equal. So to give you an example of what that might look like in the inpatient claim file you looked at revenue centers so you might see something like 0141 private room medical/surgical, the MedPAR groups it they provide it in revenue center groups and that grouping would be equal to private room charge. In the hospital cost reports the closest thing that I came up with would be adult and pediatrics which is the different...the call center 03000. And again similarly with the claim file looking at pharmacy you've got 0258, you've got a MedPAR group amount and then the hospital cost reports, I picked drugs charged to patients so you would need to look at the revenue centers and the cost centers and come up with your own mapping. I'm giving an example here, this is just more detail of the types of revenue centers you might see in the claims data and what it might map to in the cost reports for a cost center. Step five is multiply the cost of charge ratio times charges to obtain cost. So you have to link it based on the provider number and then multiply the charges by the cost of charge ratio. And again if you're doing this at the cost center level you have to do it based on the hospital provider number and the cost center number. So MedPAR again has the revenue center group cost which you would total up the charges, apply the cost to charge ratios for the inpatient you could get to the revenue center number itself, multiply it by the ratio. This was an example of analysis I did using the 2002 MedPAR file to give you an idea of what it would look like. So for one provider we have two different cases, both cases are looking at anesthesia, blood and cardiology, the revenue center charge amounts are listed and then the cost to charge ratios that were applied and then estimated cost. But notice how there were charges in the revenue centers for blood administration but there was a zero cost to charge ratio so it ended up being zero costs. So then what do you do with that, apply a different number, exclude that...this here I had taken a look at the MedPAR estimated cost and I had calculated the cost using the cost groupings. I also took the same cohort for the

inpatient file to get a sense of how much of a difference will there be in cost if I'm estimating using the cost to charge ratio method but different files. So again I'm not including any significants testing here but just the numbers that's 3,000 dollars difference in the cost depending on which file I use. So in summary there is a lot of work that you would need to do if you wanted to cost services at a cost center or revenue center level and I would say that you really have to think hard whether or not the benefits that you would gain by doing this method is worth the time and effort that needs to go into it. then also considering are there other options or easier options for you to arrive at sum result that might be...that might work for you, like a total hospital cost to charge ratio that you could get from the impact file or from one of the reports. So I know a lot about the cost report data and what it takes to arrive there but I think it's a considerable amount of effort and a lot of nuances to the data and for most research I really question whether or not all that effort is going to yield results that are significant for the research.