Appendix
Representative Quotes from Answers to Interview Questions Regarding CDS in Community Hospitals

Customization (questions 9-10)

- A lot of what we build on our own because we have pediatric subspecialties, even some of the pediatric content that's out there isn't relevant for us (Shriners)
- In some areas they do things differently, different regs, different laws, things like that (Shriners)
- Initially all of our order sets were created across the system by corporate staff with input from workgroups

Measurement and monitoring (question 12)

- We collect alert override rates for our drugs
- For any new order set that's being created, we require that they identify a metric, that they will measure pre and post
- On a monthly basis I track raw numbers of orders, whether they're placed through CPOE, by a physician, someone entering it if they're placed verbally by phone. . . both raw numbers and then percentages so that I could make nice pretty graphs and show how good we're doin'
- We do monitor performance measures, which are one of the functions that the clinical reminders perform for us (VA)
- They're using all kinds of metrics to see the productivity and also the lab, how many tests we are conducting, and drug interactions. The number of orders put in by the physicians, so they're presented to the leadership on a monthly basis, how we are progressing, and how many orders have been put in through the CPOE
- We look at usage every month on every alert. For trouble shooting, if this alert is now behaving differently we have to investigate to see why
- We monitor the percentage of orders that are entered, then we monitor the number of telephone versus verbal orders, and then we sporadically monitor other things
- For CPOE, we certainly collect on a physician-by-physician basis, the number of orders that are entered via CPOE and those that are entered via non-CPOE. We have tracked turnaround times for orders, particularly med orders. . . I mean, how much faster was it when a physician entered it via CPOE than when he wrote it on a piece of paper
- We do collect metrics and we collect how many were fired, how many were overridden and then of course you can go down to physicians or diagnosis code

Governance (question 13)

- An oversight group, the main component that does the review and approval process for any new order set that's submitted
- Our chief of staff was a big proponent. . anytime anybody was reluctant to embrace CPOE, he was excellent about sitting down and working with them
- There's a clinical care committee, the information and data management committee, there's a local VISN clinical informatics council, there's many different ones. And physicians are involved in all of these (VA)
- On updates, we're not really doing the best process. If it's a core measure it's gonna get a lot of attention, and it's constantly being evaluated, but if it's a basic order set it may not be updated, that's why I.T. is really pushing to partner with a third party provider 'cuz a community hospital just doesn't have the staff and resources
- Primarily three committees. What we call the Clinical Technology Advisory Group, which is the oversight group, multidisciplinary. There's a CAT group, Clinical Advisory Technology group, and then there's the CAG which right now I forget what it stands for
- We have a multidisciplinary committee that meets on our main campus weekly and it consists primarily of nurses and a few interested physician users, an informatics group that makes the tools and they bring them to that oversight committee. Who originally describes the specification for the tool are committees that are focused more on global problems than specifically on CDS. So, in other words, we have a sepsis group, we have a DVT group

New Roles (questions 14-15)

- The risk management department has a new position up there who only does CPOE and CDS stuff
- We've hired a lead clinical applications coordinator for the entire ten hospitals (VA)
- CMIO—it's me, myself, and I. We do also have some nursing informatics staff. We have a separate ambulatory system so there's support for that as well
- We don't have a full-time knowledge engineer on our staff, but that's a piece of what X does. . . we've recently added a physician liaison trainer position to the department. . our clinical analysts are all nurses
- I have a director for nursing informatics, that's been new
- We created some nursing analyst roles, they work part-time just to maintain their clinical credibility with the providers and their fellow nurses, and then they work part-time as clinical analysts. . . in pharmacy, we developed a clinical analyst, a pharmacist. We did the same thing in radiology
- When we embarked on the process of deployment of CPOE, or more importantly for us it's not CPOE, it's the digital environment of which CPOE is a component, we created the Department of Healthcare Informatics as well as defined the role and recruited for a CMIO

- Our Physician Informatics Committee would be the primary new role. We also have our hospitalist group
- We've got the physician informaticist and we've also developed a clinical informatics department, and there are nurse informaticists but they also provide the training for physicians
- We have a manager of informatics and that person has three people reporting to her that manage and support CDS and we have a whole team that does the CPOE

Feedback (question 16)

- Issues tracking software that we use to track all of our problems and issues with the system. . . and a liaison at each hospital. . . and the chief of staff, or our physicians contact the CMIO and bend their ear
- If we've created a new order set or a way for them to do things, we present it at their meetings, provider meetings, and if they want something changed, they notify us, so there's a give and take between the medical staff and the informatics staff
- We really don't get a lot of feedback any more. . . back in the hospital's early years launching the product, getting it out there, and it's the first year you've gone live, you probably would have quite a bit of focus on asking for feedback. But after 12 years, you know, we've kind of gone through that phase of it
- We survey our physicians, as well as we have a very involved information technology department that gives us lots of feedback

Confidence in data (question 17)

- We're somewhat confident. . . when we evaluate anything new we always go into our system and evaluate the data. . if there's a need to improve that we include that as part of the training for whatever it is we're rolling out. . and sometimes we create initiatives based on the fact that we're realizing that data elements are being omitted
- I'd say probably 90 percent confident in the quality of the patient data. We've been doing it for so long everybody knows exactly how to document and how to fit it in
- They're very confident in it and I fear they get over confident in it. . .
- Decision support based on lab values or medication orders, for example, that's pretty concrete, so I think the quality is very high. Anything that could be entered by a person, a weight, for example, or a blood pressure, we try to set parameters so you can't enter things outside what a normal human range should be
- [I worry about] the absence of something, depending on what your triggers are. If it's not in the system for it to trigger, you're not gonna know about it
- Whenever we design and test new alerts, one thing we always look at is the data that we're relying on, you know, is it free text? Or is it drop down lists, or mandatory check boxes or buttons? And we stay away from anything that's free text. . . we look for where the user couldn't make a

typo. We're careful about the design where we really won't pursue one if the data can't be restricted and limited to something we can all feel good about, that is gonna be accurate, and we're not gonna miss things because somebody typed it wrong

- We're pretty confident of the quality only because there's so many QA checks done at so many levels and they care about patient quality. . I.T. is just part of that QA process, so I think we're really confident in the quality of the data. We use a tool called the criteria engine, we can actually use that criteria engine to validate the quality of the data
- The lab, the radiology reports, etc. are pretty straightforward, the allergies and medications everyone is struggling with
- To feel confident with data, you have to drill down into the detail, which we do on a regular basis. As well as part of process improvement, we always look at root cause analysis
- Very confident. It's an integrated system, so lab, pharmacy, CPOE, EMAR, they're all integrated in the same system. It's not different systems tryin' to interface with one another
- It depends on what the area of interest is. . .There are some areas where there's data issues from source systems, other systems. There's issues at times with duplicate medical record numbers and duplicate physician identifiers that sometimes could have a negative impact on CDS

Facilitators (question 18)

- I think you have to determine what CDS is relevant to the specific providers, realize quality and not quantity
- You need to make it so that the person that sees the message is the one that it's pertinent to
- If they can prove that outcomes are better by using some kind of clinical decision support, I think that would definitely be a facilitator
- Definitely we are a HIMSS stage 6 analytics hospital so we very much value information management. . [we stress that we are] dealing with evidence-based practice
- New risks and warnings come out and we say 'hey, we need to address this'. . . We always look for what can the computer system do to help support any changes in policy
- When we say 'evidence based medicine' they [the medical staff] hear 'cookbook medicine.' I had a conversation today with one of our lead physicians who's always said 'my patients are unique,' and we were talking about creating a data warehouse where we can go back in and do population-based studies, to look at best practices, so he's even starting to buy into the whole idea
- Physicians, the more they use the computer system, the more they realize that the use of order sets can save them time. Because, literally, with a couple of clicks, they can order a bunch of tests
- It's important that you have certain standards and the ability to normalize the data

- We really spent a fair amount of time upfront looking at what triggers it, when it should be suppressed, who it goes to, what role, just to really do due diligence. . extensive process
- As we are employing more and more physicians, I think the job is somewhat easier because, as in the military, we tell them 'this is what you need to do' and that's going to help us, I think, evolve more quickly
- I would say, having quality involved, the quality arm of your organization, is a facilitator
- Taking into consideration not just your best technological users of the systems but even some of those who aren't as technology facile because sometimes they have some of the best suggestions on how to enhance the system
- The driver behind CDS is always a specific clinical need. We have a very, very broad quality program, which I run, and if there is a specific clinical need, there's a process metric that's off track, or if there's something else that is not right, then that would be the primary driver behind a CDS tool

Barriers (question 19)

- We did it backwards. We started with CPOE instead of starting with results feeder systems like labs and radiology
- Keeping current. My co-worker and I, we try to keep everything current and it's a big part of our job to just try to keep everything up to date
- I'm trying to be politically correct I think. . . you can have as many CDS systems in place as possible, but it doesn't necessarily mean people use them
- The biggest challenge is to avoid alert overload. . the balance is what can you do to get the right information to the right person in a timely manner, and it's pertinent enough that they go, 'OK, I did need to know this,' vs. 'you're just botherin' me and you're in my way'
- Managing the order sets once they're in place, and we don't have any internal mechanism to do that other than manually, so we're looking at some third party products
- The struggle we have is when we couple our efforts with quality improvement, people have to understand the capabilities and limitations of CDS. . . they come to us saying 'oh, the computer will solve this problem, can you build it?' And we know at our end that's not gonna work, it's a training issue or it's a workflow issue
- Knowledge management is another barrier that's associated with CDS, just there's so many rules, there's so many alerts out there now, and we really don't have a way to understand which ones are working, which ones are truly evidence based, which ones are most beneficial
- Semantics, what do we mean by this clinical decision support? Just the view of the medical record is a type of decision support that no one really puts much thought into 'cuz they just inherit whatever the vendor gives them, but one of the biggest needs of our users is a concise review of the patient

- Those physicians that only come a couple times a year when they're on call, so they're not here often enough to maintain familiarity with our system, so that's a barrier
- The change in workflow, just change in general. And [doctors] who don't necessarily use the CPOE every day, so they tend not to use it when they're called over here
- Our physicians are not employees, they're primarily customers, so we have to keep our system as efficient as possible, and any of the disruptive CDS—obviously not all CDS is disruptive and in fact more of the CDS tools that we have implemented are of the non-disruptive variety. But anything that's disruptive gets a lot of pushback, right up to the Board of Directors of the organization because we're trying to keep it lean and mean for the doctors

Collaboration (question 20)

- We do collaboration for new CDS initiatives or any modifications by developing multi-disciplinary teams
- Follow some sort of project management guidelines in order to bring in all of the appropriate people who begin to work on whatever it is that's being requested (VA)
- Our informatics committee tries to have participation from all the sites [in the system], we collaborate across the sites. . having different [EHR] systems doesn't mean sites can't work together. . we think we should standardize our process and then use our local tool, so even the site that's on paper can participate because the process itself should be the same
- We have the advantage of having an enterprise-wide [EHR] system so that actually our communication with the vendors is enhanced by our whole [system wide] information services department
- It was all taken over by corporate so they're doing it over there and they have a huge I.S. team now and previously we were managing that
- We'll probably try to transition more over to the quality resources department, right now it's I.T. but I.T. doesn't make decisions in a vacuum, we have our Physician Review Board and our Clinical Informatics Council
- You can make a request [of the vendor for changes]. Then for some more influence they have kind of limited invitees go for like two days to a special product design workshop. . . sit in a room with product design programmer people and say, 'the pharmacy module works OK, but here's ten things that it really needs to have in order to be a more robust product'
- There's plenty of forums to have conversations 'cuz it's part of our culture of patient safety. So when we talk about patient safety, we're including our electronic health record and CPOE
- This is not an IT project, this is a clinical project IT just happens to facilitate
- We've found it of benefit to have formal collaboration between vendors and our hospital. . . we get much better results if we look at it as a collaborative, almost an R and D project, as much as it is just a 'get it

installed' project. . . we're workin' on this together in a kind of investigative manner

- We really work primarily with the vendor on conference calls, they have a conference, a users conference, it's in a web format, but previously it was an actual conference
- In the contract for the upgrade, for which [the vendor] parachuted in a team of about ten people, we actually held money at risk and demanded that they build tools to use the system to improve outcomes, and they did. That was an example of collaboration. . . we sort of both had skin in the game

Anything else? (question 22)

- Their [the doctors'] goal is to get the job done in the manner that they see to be the highest quality for that patient. . . they will do whatever it takes to get around what they perceive as a barrier and they perceive having to work with the EMR, at this point in time anyway, still as a barrier
- You definitely need a strong physician champion . . . and then training, training, training
- We have several New England user groups for different types of thing, so particularly from a community hospital level, joining in on regional efforts is extremely helpful. . . I'm in nursing informatics, and there's a New England Nursing Informatics Consortium and we meet and discuss things
- When we look back on our 10-, 12-year journey now, at the end of the day, the clinical decision support piece really, truly is where you begin to impact patient care in a positive way [laughs]. But I mean, you know, CPOE's a great piece but I mean, clinical decision support is just kind of where the rubber meets the road
- We've been at this for a long time, for other reasons than meaningful use. And so now that meaningful use is here, it's like, 'oh, OK, there's about $4,000,000 in incentive payments for us on the table', so we feel like our hard work all these years, and our struggle, is now like 'OK, we're ahead of the curve'
- You need people to maintain all the stuff and help it to grow and get refined and that should all be considered in the budget when you're moving forward with systems
- CDS is not always disruptive, synchronous stuff that makes you stop doing what you're doing. Sometimes it's actually almost invisible support that makes it easier for you to do your job effectively, and creates a good plan for the patient
- I actually have admitted patients to this hospital as recently as last weekend. . .we had a pathway and a protocol in the computer that made it very easy for me to get the orders in, and the orders were constructed in such a way as to have sort of a shared decision-making process between me and the nurses. . . and so it was a really effective form of decision support that got the patient onto a pathway. . my orders got in fast, I could move on to the next patient. . the protocol was really a strong protocol

that was evidence-based, and the patient got good care, and it was all without pop-up windows