VCU Medical Center

Virginia Commonwealth University

MCV Hospitals and Physicians

Senate Finance Committee Hearing

Health Information Technology: Using it to Improve Care

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Chairman Baucus, Ranking Member Hatch, and Members of the Committee, thank you for the opportunity to discuss our work at the Virginia Commonwealth University Medical Center (VCU) in Richmond, Virginia, related to our successes in the arena of health information technology (HIT).

My name is Dr. Colin Banas and I am the Chief Medical Information Officer (CMIO) for the VCU Medical Center. VCU Health System and the health sciences schools of Virginia Commonwealth University comprise the VCU Medical Center, one of the nation's leading academic medical centers. As the region's Level 1 Trauma Center, VCU Medical Center has 865 patient beds, more than 600 physicians in 200 specialties, the area's only National Cancer Institute designated cancer center, the VCU Massey Cancer Center, and a full-service children's hospital, Children's Hospital of Richmond at VCU. U.S. News and World Report has ranked VCU Medical Center a number one hospital in Virginia and the Richmond metropolitan area for the second year in a row, reflecting two programs, nephrology and orthopedics, in the national top 50. Virginia Commonwealth University is a major, urban public research university with national and international rankings in sponsored research. Located in downtown Richmond, VCU enrolls more than 31,000 students in 223 degree and certificate programs in the arts, sciences and humanities. Sixty-eight of the programs are unique in Virginia, many of them crossing the disciplines of VCU's 13 schools and one college.

I have been with VCU since 2002 and am proud to have received my Internal Medicine residency training there as well as my Master of Science in Health Administration just a few years following. I am an actively practicing Internal Medicine Hospitalist and Associate Professor of Medicine in addition to overseeing our informatics team and electronic medical record (EMR) in my collaborative role as CMIO of the medical center. In my short career I have been fortunate to experience (or suffer through) the care of patients using a multitude of health information systems, including paper based, vendor based, and even the federally created Veteran's Administration system.

The VCU Medical Center has a singular vision and goal statement for improving health care quality, simply put, "To be America's safest health system with zero events of preventable harm to patients, employees, and visitors." The Medical Center has a proud history of leveraging health information technology (HIT) to improve patient care and outcomes, having used

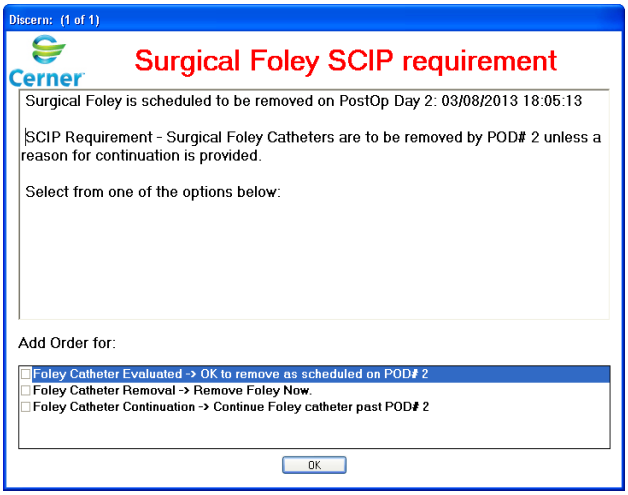
computerized physician order entry (CPOE) for over 25 years on a legacy system before making the health system-wide conversion to a modern electronic medical record platform in 2004. In our unrelenting journey to improve patient safety, VCU has made great strides towards total digitization. We benefit from near 100% CPOE adoption in the inpatient setting and fully electronic clinical documentation for all providers, including both nurses and physicians, in our inpatient and outpatient settings. Our system supports over 90,000 chart opens per day and facilitates 10,000 medication orders, 14,000 laboratory orders from over 5,000 unique users. This framework has now set the stage for realizing next order benefits for improving the lives of our patients, specifically in the form of clinical decision support at the point of care.

If I may, I'd like to share a number of VCU HIT success stories, framed in three core categories of next order benefits: Clinical Decision Support, Handoffs, and Innovations, all of which are made possible by the foundation of data ubiquity and fluidity and of course a very talented team. These successes are the byproduct of the tireless commitment of VCU leadership and staff and were augmented by applied information technology. Most of these represent years of effort in improving people and process workflows. It is only after the processes had been refined that the application of technology became the secret sauce to improving outcomes. In fact the premature application of technology can have very detrimental results which can harm our patients and erode the trust of our patients and providers. These success stories can be directly linked to improvements in patient outcomes, cost reduction, and improved efficiency of care.

Clinical Decision Support

VCU employs a number of clinical decision support methodologies in the support of patient care. In the traditional sense, we have over 650 customized rules and alerts to help guide appropriate care plans, avoid adverse drug events, and promote delivery of best clinical practices. In the arena of Core Measures we have improved our compliance rate with deep venous thrombosis prophylaxis protocols to near 100 percent through automated and actionable prompts, order-set integration, and dashboards, with a corresponding reduction of in hospital embolic events of 67 percent. This represents a process improvement that has literally been years in the making and highlights the need for multi-faceted interventions. We enjoy similar success in the arena of removing urinary catheters in a more timely manner to prevent hospital acquired infections in surgical patients. We are now at a point where the EMR recognizes urinary

catheters placed in the operating room and automatically schedules its safe removal while also prompting clinicians in real time to consider appropriate earlier removal or to document justification for the ongoing catheter need. Years of education and process improvement yielded compliance in the 80 percent range for these Core Measures. It was the thoughtful integration of technology laid upon a robust infrastructure that finally pushed VCU to the 98 to 99 percent compliance level. I cannot stress this enough: it is the triad of people, process, and then technology that proves to be the recipe for success.



Earlier this month we deployed a rule to detect the inappropriate usage of intravenous, and comparatively expensive, acetaminophen (Tylenol). The rule will offer the clinician appropriate, alternative, and less expensive oral forms of the drug within the alert. We have projected that this single rule will save the health system over $170,000 in annual drug cost, and this is but a single example of what robust analytics and decision support can offer in terms of cost savings and promoting best practices. VCU Medical Center has numerous others.

Using our EMR's clinical data repository, we are now able to identify and provide influenza vaccination to over 99% of our elderly and other high-risk patients through the automated detection of appropriate populations and generation of vaccination orders. We have achieved similar success through our electronic process to improve the reconciliation of medications at time of discharge transition from our hospital, which now occurs for 100 percent of our patients.

For our patients with congestive heart failure, VCU struggled in years past to ensure appropriate patient education and transition instructions as well as appropriate pharmacotherapy. Again, despite intense training efforts and manual, real-time audits we were unable to exceed 70 to 80 percent compliance with these Core Measures. It was only through the additional leveraging of our HIT platform that we were subsequently able to hardwire these practices directly into the clinical workflow in such a way that we were providing highly accurate and highly actionable information to our teams. We now achieve 99 to 100 percent compliance with appropriate patient education and heart remodeling drug therapy for our congestive heart failure population.

Handoffs and Data Fluidity

VCU launched its patient portal in December of 2012 and in just 7 months we have already enrolled over 11,000 patients who now have access to core elements of their electronic medical record including medication and problem lists, educational materials, and most importantly, a means to asynchronously communicate in a bidirectional manner with their providers. An interesting phenomenon has occurred in our outpatient practice sites; the phones in the nursing pods have gone nearly silent. Inefficient phone tag has been replaced by an "e-exchange" between patients and providers, and we've just started to scratch the surface using this tool. While the patient portal was always an institutional vision on our HIT planning roadmap, it was the Meaningful Use program that gave it the much needed activation energy and directional framework for success.

Integrated into our EMR is direct access to the Surescripts database as part of our electronic-prescribing functionality. This tool allows our providers to view all medications prescribed by any clinician and filled at almost all retail pharmacies in the United States. Thus, providers can more accurately reconcile and manage patients' prescriptions regardless of who prescribed them. It also allows monitoring of medication compliance by allowing providers to view the refill history for a patient's medications. As a result, our clinicians have been able to identify non-adherent patients and engage them in meaningful discussions about their care. We have also been able to identify patients who see multiple providers and who have received prescriptions from multiple providers for controlled medications. This has helped to cut down on fraud and abuse and augments such vital efforts as the Virginia Prescription Monitoring

Program. Thus, by integrating external data repositories into our EMR, we have made patient data more fluid and placed important clinical information at the fingertips of providers that previously was not available in any venue.

Earlier in 2012 we also launched our own referring provider portal, VCUHSConnect.org. Here we offer our community providers online and intuitive web based access to our electronic medical record. This was our first step to answer a commonly heard complaint from our community providers, namely "we refer our patients to you and they come out on the other side of the VCU expertise machine, but we can't tell what went on!" To date we have over 1,000 community accounts created with our heaviest users accessing the system hundreds of times per month. An unintended, but much appreciated, benefit has been a real reduction in record requests that our Health Information Management department must fulfill. In the near future, we look forward to partnering with the Commonwealth's health information exchange, ConnectVirginia, to seamlessly share our data with all enrolled providers throughout the state and beyond.

Innovations

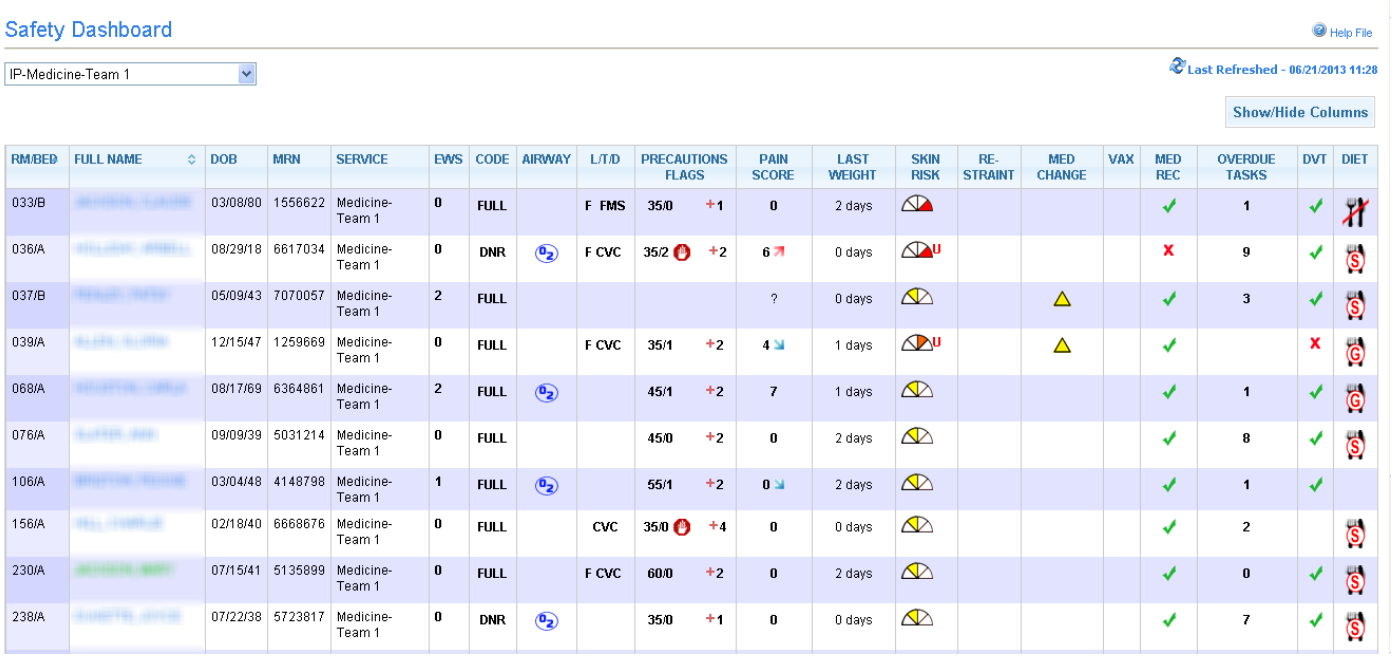
Our substantial and robust investment in HIT provides VCU the opportunity and flexibility to innovate to benefit our patients. Three such success stories center on our ability to create *custom linkages* and real time *dashboards* to better manage patient populations at the level of the clinical team, the inpatient unit, and the hospital service. The value of custom linkages and dashboards to clinical providers lies in their ability to provide rapid access to patient information and to aggregate and re-present large amounts of data in an easy to consume graphical, icon based, and interactive manner. As a result, custom linkages and dashboards help our providers deal with the "information overload" that is increasingly common as the data stored in electronic medical records grows. Presenting the right data to clinicians at the right time in a useful format reduces distractions and improves provider focus and ability to identify important indicators or trends in their patients' health status.

VCU has a fully deployed radiology PACS (picture archiving and communication system) allowing clinicians access to digital films from anywhere, even from offsite. This system, which pre-dates and is separate from our core EMR, previously required providers to

minimize their EMR session, launch the PACS module and log in, and enter the patient information to pull up needed images. In concert with our interface team, we were able to craft a "quicklink" from within our core EMR system that allows the user to go directly to the patient's images in our PACS system without exiting or additional login. While it sounds so simple, this single custom linkage has saved our frontline clinicians an estimated 9,000 hours per year simply by introducing a process efficiency made possible through technology. That's 9,000 hours we are able to give back to patient care. Similar "quicklinks" have been developed to allow rapid access to view patient electrocardiograms and scanned documents, and perform other clinical functions such as paging colleagues and even reporting safety events through our patient safety event reporting tool.

A second example of innovation to improve patient care is the VCU Safety Dashboard, first deployed in 2010 and now in its third iteration. In nearly a decade of laying the aforementioned EMR foundation, we found ourselves awash in a sea of data from multiple sources including lab values, orders, pharmacy data, vital signs as well as documents from nurses, physicians, therapists, and other clinical providers. The new challenge was to tease out key pieces of information from this mountain of data to tell the patient's story, and merge it with best practice standards to deliver more consistent, higher quality care. Enter the VCU Safety Dashboard, displaying on a single screen for all patients on a nursing unit, key indicators of a patient's care and health status such as fall risk, need for physical restraints, orders for appropriate prophylaxis (or lack thereof), presence of intravenous lines, urinary catheters, and surgical drains (all of which increase the risk of infection) and any overdue tasks, orders, and vaccinations; all face-up and contained within a single view. The dashboard has capability to interact and if desired, drill into additional detail without exiting the screen. Clinicians, especially nurses, flocked to this tool and quickly incorporated it into their scheduled safety huddles and handoffs, using the information to initiate appropriate interventions. The dashboard is accessed over 300 times per day and the core indicators that are displayed therein have shown measurable improvement. For example, we have shown a 50 percent reduction in patient falls with injury as well as a 50 percent reduction in the use of physical restraints. The dashboard also contributes to system wide successes previously mentioned in the areas of deep venous thrombosis prophylaxis, inpatient vaccination, and pressure ulcer reduction. The problems we tackle in healthcare are complex and require complex, multi-pronged solutions. Again, our

approach at VCU has been to selectively integrate health information technology with excellent personnel committed to delivering quality care using solid process design.



RM/BED	FULL NAME	DOB	MRN	SERVICE	EWS	CODE	AIRWAY	L/T/D	PRECAUTIONS FLAGS	PAIN SCORE	LAST WEIGHT	SKIN RISK	RE-STRAINT	MED CHANGE	VAX	MED REC	OVERDUE TASKS	DVT	DIET
033/B		03/08/80	1556622	Medicine-Team 1	0	FULL		F FMS	35/0 +1	0	2 days					✓	1	✓	
036/A		08/29/18	6617034	Medicine-Team 1	0	DNR	O2	F CVC	35/2 +2	6	0 days	U				✗	9	✓	
037/B		05/09/43	7070057	Medicine-Team 1	2	FULL				?	0 days			△		✓	3	✓	
039/A		12/15/47	1259669	Medicine-Team 1	0	FULL		F CVC	35/1 +2	4	1 days	U		△		✓		✗	
068/A		08/17/69	6364861	Medicine-Team 1	2	FULL	O2		45/1 +2	7	1 days					✓	1	✓	
076/A		09/09/39	5031214	Medicine-Team 1	0	FULL			45/0 +2	0	2 days					✓	8	✓	
106/A		03/04/48	4148798	Medicine-Team 1	1	FULL	O2		55/1 +2	0	2 days					✓	1	✓	
156/A		02/18/40	6668676	Medicine-Team 1	0	FULL		CVC	35/0 +4	0	0 days					✓	2		
230/A		07/15/41	5135899	Medicine-Team 1	0	FULL		F CVC	60/0 +2	0	2 days					✓	0	✓	
238/A		07/22/38	5723817	Medicine-Team 1	0	DNR	O2		35/0 +1	0	0 days					✓	7	✓	

The third and perhaps most exciting example of the effective leveraging of IT to improve care is our homegrown dashboard, the Medical Early Warning System and Pediatric Early Warning System (MEWS/PEWS). Inspired by one of our own critically ill pediatric patients, we recognized a need to give our front-line clinicians and rapid response team (RRT) a real-time monitoring system that continuously measures patient acuity and severity. We crafted MEWS/PEWS to identify our most ill and trending ill patients and then use that information to provide interventions before their decline. The results in just one year of use have been remarkable; the dashboard is accessed over 100 times per day and has been adopted by our RRT as their "compass" to guide them to the bedside of our sickest patients. The RRT no longer waits to get the call from a nurse or doctor with a patient in distress. Instead, they are accessing the dashboard on mobile devices and arriving at the bedside to assess and intervene, sometimes ahead of the primary team and nurse. Since launching these tools, our analysis has shown a 5 percent reduction in in-house mortality and a significant reduction in cardiopulmonary arrests outside of the intensive care unit.

Concerns

The landscape and requirements for HIT are constantly and rapidly changing. We are drowning in a sea of competing priorities and clinical needs to ensure that the EMR remains usable and meaningful. The combined tsunami of the ICD-10 mandate collides precisely with our medical center's need to attest for the first year of Meaningful Use Stage 2. The talent pool for the mountain of work that faces our industry has become sparse. For the first time in my short career I am noticing a legitimate inability to onboard the talent requisite to make these initiatives successful. Literature and personal experience has shown that implementations must be thoughtfully planned and executed rather than just "slammed in" to ensure adoption and usability. What's more is that these mandates are exclusive of some of the truly needed innovations and optimization efforts that have been described here. For example, the clinical quality measures (CQMs), requirement embedded in the Meaningful Use program is a good direction; however, a thoughtful, clinician-driven approach needs to be applied to the selection of measures that are meaningful and measurable given the current state of EMR maturity, as well as to the merging of Meaningful Use quality measure requirements with other existing quality measurement programs.

What's more, I think there is opportunity to reduce some of the potentially unnecessary administrative burden forced upon providers and leadership related to measurement and attestation for the Meaningful Use program. Finally, I would be remiss if I did not share concerns over the costs for this level of technology. These systems are expensive to implement but even more expensive to maintain and sustain. Thankfully the Office of the National Coordinator (ONC) remains receptive to feedback such as this and continues to make needed and thoughtful changes as we progress in this journey together.

Closing

My message in sharing these success stories is that they take time, sometimes years of constant and iterative refinement. In the example of our congestive heart failure patients there was a need to improve and capture key data elements (such as the heart's relative strength as measured by the ejection fraction) that did not previously exist in our EMR. While we are a proud user of a vendor platform that is employed medical center wide, best of breed ancillary systems (such as the PACS system described above) still exist either from legacy or because they

succeed in fulfilling a highly specialized niche that the larger vendors have not yet tackled. Thus, thoughtfully bringing necessary data together, even within our own four walls, is often a daunting task.

I do wish to applaud the ONC and the Meaningful Use program for the successes to date, there is a real and tangible excitement in our field as we are starting to see levels of EMR adoption explode at an exponential rate. I credit the program with helping to provide our industry a shared vision and roadmap as well as providing the activation energy to help accelerate the journey. A sincere thank you for their leadership is indeed warranted and offered here.

There is good news, I am proud to be a part of the training of the next generation of care providers who do not know a non-digital healthcare world. There are students and residents who have never written an illegible paper prescription or scrawled onto paper the "chicken-scratch" progress note. This next generation has come to expect and demand a safer digital healthcare world and will prove to be a valuable asset in continuing to push the industry and our nation forward into digital success.

We are standing on the shoulders of giants. The forefathers of informatics started on this journey over five decades ago. The iterative successes they have enjoyed and subsequently shared and contributed to the realm of informatics also help to illustrate my point and the VCU Medical Center experience. This is a journey, a long one, and quite honestly it will never be "done." As my CEO John Duval likes to state regarding the VCU Medical Center journey towards high reliability and patient safety, "We are halfway there, and in 5 years we will be halfway there." It is thoughtful nod toward the need to constantly raise the bar and never rest on past successes.

Thank you for the opportunity to testify before you today. Virginia Commonwealth University Medical Center stands ready to serve as a resource and work with this Committee and all Members of Congress to improve the quality of healthcare in this nation. Thank you for your leadership on this critical issue.