ROUNGHLY TWO YEARS AGO, the Armstrong Institute embarked on a project that may have sounded quixotic: to eliminate harm in intensive care units.

Called Project Emerge, it has been a massive undertaking, bringing together clinicians, systems engineers, human factors experts, bioethicists and others. In summer 2014, we began piloting an elegant solution that we hope will transform outcomes, culture and workflow in the intensive care unit. A new app gives clinicians a single window on seven potential harms that a patient might suffer and alerts them when evidence-based steps are missed.

This is but one example of how we at the institute are thinking big about improving care, at Johns Hopkins Medicine and beyond. As we look back on our third full year, we see other examples of how our faculty and staff, in collaboration with colleagues, are constantly pushing the boundaries of this exciting field.

- **Hypertension**: We are working on a national project with the American Medical Association that seeks to rein in blood pressure for the 30 million Americans who have hypertension despite having ready access to medical care.
- **High reliability**: We are adapting the safety practices of high-reliability organizations—such as nuclear power and aviation—to proactively identify and mitigate risks in health care.
- **Operational excellence**: We are discovering the structures and accountability systems that hospitals—including those at Johns Hopkins Medicine—need to engage their entire organizations in meeting quality and safety goals. We must treat these goals with the same high levels of discipline and rigor that hospitals already bring to meeting their financial targets.

The problems facing health care—preventable harms, less-than-optimal outcomes, and waste—require ambitious solutions and new ways of thinking. As you read this report, we hope you see how we are striving to meet these challenges.
Improving Patient Outcomes and Experiences

Armstrong Institute researchers first gained national recognition for their success in reducing infections in critically ill patients. Today, our work goes well beyond the intensive care unit, even beyond the hospital. Our projects focus on such diverse challenges as improving blood pressure management in clinics, advancing knowledge about what it means to deliver patient- and family-centered care, and combining quality and cost into measures of value.
A PLAYBOOK FOR PATIENT-CENTERED CARE

Project identifies strategies for delivering a high-quality patient experience.

WHEN A PATIENT at Sarah Bush Lincoln Health Center presses the call light, it calls a cellphone carried by his or her nurse, rather than to a central nursing station.

At Castle Medical Center, the shift report includes a review of existing and new medications with the patient and family member, as well as the reasons for each one.

And Massachusetts General Hospital created the role of “attending nurse”—a person responsible for coordinating the patient’s plan of care from admission to discharge and serving as the main point of contact for the patient and loved ones.

These are a few of many strategies for delivering patient- and family-centered care that Armstrong Institute researchers discovered as part of a project funded by the Agency for Healthcare Research and Quality and and Betty Moore Foundation.

The project’s goal was “to identify United States hospitals that have the highest performance on patient experience surveys, uncover the best practices for providing patient-centered care at those hospitals, and disseminate that information as widely as possible,” says the study’s principal investigator, Hanan Aboumatar, an Armstrong Institute core faculty member and advisor for patient- and family-centered care improvement work across Johns Hopkins Medicine.

To identify these hospitals, the Armstrong team mined the national database of the Hospital Consumer Assessment of Healthcare Providers and Systems survey (HCAHPS), which is sent to patients after discharge about their hospital experiences. Of the 3,000 hospitals taking part in the nationally distributed survey, the team identified 176 hospitals that had achieved top rankings or made remarkable gains in key survey domains, such as communication, staff responsiveness, discharge planning and pain management.

Through an anonymous survey to multidisciplinary leaders from 57 of these hospitals, the Armstrong team learned more about the strategies credited with their organizations’ HCAHPS achievements. Many of these hospitals later submitted abstracts to present talks or posters at the Best Practices in Patient-Centered Care conference, hosted by the institute in September 2013. In the end, 57 presentations were accepted for the two-day event in Baltimore, which was attended by more than 150 hospital executives, quality improvement and service excellence professionals, frontline clinicians, and patient-family advocates.

Aboumatar and colleagues continue to analyze the study results. Initial findings, she says, are that successful hospitals are using many different tactics at the same time and that they have many tactics in common. (See sidebar for more details.) Aside from these interventions, organizations also demonstrate a commitment from leadership at the board level, effectively communicate their targets and feed performance data back to the organization.

Aboumatar’s team seeks to use its findings to develop a tool kit on patient-centered care based on the successful strategies of hospitals around the nation.
We are going to be looking at the big picture, which is whether what has worked in hospitals to improve care can translate well to primary care practices.

“Through this initiative, the AMA aims to extend lives and improve quality of life by reducing strokes and heart failure, and lower health-care costs associated with these conditions,” said Robert M. Wah, president, American Medical Association.

Yet hypertension, which affects roughly one-third of the U.S. adult population, is a stubborn problem. About 90 percent of the individuals with uncontrolled hypertension report having a usual source of care, have health insurance and received health care in the previous year.

Efforts led by Lisa Cooper’s center show that it can be done, however. “We are taking what we already know works—including improving blood pressure measurement, simplifying medication regimens and using communication strategies that enhance patient engagement—and trying to see how we can increase its uptake in actual practice,” she says.
Cheryl Dennison Himmelfarb is helping patient safety specialists have an impact beyond the hospital.

**BRIDGING THE GAP**
An “embedded researcher” helps staff to advance the science of safety.

**FRONTLINE STAFF MEMBERS** are frequently the innovators of patient safety improvement. Yet typically they lack the resources to give their work a broader scientific impact, because they often are not trained in such areas as designing studies and measuring the impact of their interventions.

Through a pilot program that embeds a patient safety researcher within hospital-based patient safety teams, the Armstrong Institute hopes to overcome those barriers. Cheryl Dennison Himmelfarb, associate professor in the Johns Hopkins University School of Nursing and an Armstrong Institute core faculty member, is determined to better enable hospital staff members to understand how to successfully disseminate what they have learned.

“This is a great opportunity for us to learn,” says Dennison Himmelfarb. “If a project has been very effective on one unit, we will be able to share that throughout Hopkins and other institutions, so we can have an impact on patients on a much broader scale.”

Since early 2014, Dennison Himmelfarb has devoted about eight hours a week to the “embedded researcher” duties. These include conducting a manuscript-writing series for patient safety and quality practitioners who want to learn to present their work in academic journals. She also offers a research consultation service, to help in such areas as designing studies of interventions and identifying metrics. She is working with patient safety leadership to prepare applications for grants.

Part of the excitement is helping operations staff members see how what they are doing is groundbreaking. Melinda Sawyer, assistant director of patient safety for the Armstrong Institute, sees a plethora of work that is worthy of sharing.

“We do amazing things at Hopkins, and people need to benefit from that,” Sawyer says. “Other people, other hospitals and other countries want to learn from what we do.”

**Paula Kent**, a patient safety coordinator at The Johns Hopkins Hospital, is energized by the opportunity to share what she has learned over 30 years. For example, under Dennison Himmelfarb’s guidance, she is working with a colleague to develop a manuscript about how to debrief clinical areas on the results of their patient safety culture surveys so that they can develop action plans for improvement.

Kent, who has always felt more at ease giving talks to thousands of people than she does sitting at a desk to write a journal article, says that Dennison Himmelfarb’s coaching has helped her overcome that discomfort. “We’ve benefitted in a huge way from Cheryl having dedicated time to help us advance the science of patient safety.”

**TAKING STOCK**
A communications campaign creates excitement for new Patient Safety and Quality Dashboard.

Two other measures—compliance with evidence-based practices known as core measures and results of a national survey of hospital experience of care—were also part of the initial dashboard. Additional measures will be added on a regular basis.

To get employees excited about the dashboard, the institute kicked off a communications campaign entitled How Do You Measure Up? Designed to create friendly competition between units and departments across the Johns Hopkins Health System, the campaign encourages employees to find out how their work areas compare to others in the quality and safety indicators featured in the dashboard. As part of the campaign, a website provided resources for improvement.

This multifaceted campaign reflects the importance that the institute attaches to effective strategic communications as an intrinsic component of patient safety and quality interventions.
Research and Improvement Projects

Surgical Site Infections
More than 250 hospitals across 37 states are participating in CUSP for Safe Surgery, a four-year project that aims to reduce surgical-site infections and other complications. Funded by the Agency for Healthcare Research and Quality (AHRQ).

VAP Prevention
A cohort of hospitals in Maryland and Pennsylvania pilot-tested a new bundle of evidence-based interventions to prevent ventilator-associated pneumonia (VAP) among mechanically ventilated patients in intensive care units. A separate project, called CUSP 4 MVP-VAP kicked off in January 2014, seeking to reduce ventilator-associated harms across the nation. Funded by the AHRQ and the National Institutes of Health’s (NIH) National Heart, Lung and Blood Institute (NHLBI).

Ventilator Safety
A research team is working to improve the recovery of acute lung injury patients and reduce their long-term physical and mental health conditions. Funded by the NIH and NHLBI.

Performance Measurement
We are advising the Leapfrog Group on methodologies used for two hospital quality and safety assessment initiatives (Hospital Survey and Safety Score) and managing the research base of performance measures from them. Funded by the Leapfrog Group.

Advanced Care Planning
We are developing a video to help patients with pancreatic cancer and their families make informed decisions about aggressive surgical cancer treatment. Funded by the Patient-Centered Outcomes Research Institute (PCORI).

Discharge Process Improvement
We are developing a transitional care program to help patients with chronic obstructive pulmonary disease and their family caregivers learn how to effectively manage and cope with this disease once they leave the hospital. Funded by PCORI.

A SPOTLIGHT ON VALUE
A new team develops simple measures that combine quality and cost.

IN THE POST-HEALTH CARE reform world, there is a growing emphasis on paying for value rather than fee for service. But there’s a hitch: There is no clear definition for value.

The Armstrong Institute’s value analytics team, led by Ken Lee, seeks to advance this science. Just as the S&P 500 provides a snapshot of the United States stock market’s performance, Lee and colleagues are fine-tuning an index that depicts health care value as a single number. Patients might compare the value index for different hospitals in the same procedure to make decisions about where to get surgery.

Initially, Lee is prototyping this measure for joint replacement surgery. The measure combines short-term quality factors, such as patient satisfaction, infections, length of stay and readmissions, into an index of quality. This number is then divided by cost information to reach a measure of value. Ideally, long-term quality measures, such as patients’ recovery from surgery, would also be taken into account for a broad range of measures, but such data are not easy to find or collect at this time.

Recognizing that the cost of care is different for providers, payers and patients, different versions of the value index would be created for each of these groups.

“Ultimately, we would like to share our methods and collaborate with other stakeholders on industry wide standards for measuring value,” says Lee.

While that is a vision for the future, teams across Johns Hopkins Medicine are already tapping the expertise of the value analytics team. For example, Lee’s group is partnering with the institute’s clinical communities and the health system’s supply chain experts to improve value by developing integrated data analytics services that focus on quality and cost measures. Through this approach, value analytics can guide these larger groups to make decisions that find the “sweet spot” between being financially wise and being the best for quality of care.

Lee’s position is a unique hybrid, split between the institute and the health system’s finance department. He says his background—he worked in health system finance while completing a doctorate degree in health care management—allows him to bridge two worlds that typically don’t collaborate. He sees great promise in adapting the rigorous methods from well-established infrastructure, standards and processes in finance to the task of measuring and enhancing health care value and quality.
A VEHICLE FOR ORGANIZATION-WIDE CHANGE

Clinical communities promote the spread of solutions across Johns Hopkins Medicine.

WHEN SURGEONS AT The Johns Hopkins Hospital a few years ago noticed that patients undergoing colorectal surgeries had higher than expected lengths of stay, they first addressed the problem by acting to reduce wound infections, says colorectal surgeon Elizabeth Wick. But emerging evidence suggested that by adopting the care pathway of the Enhanced Recovery After Surgery (ERAS) Society, they could do better.

Working with anesthesiologist Chris Wu and the nursing team, they revamped the care of colorectal surgery patients to be more patient-centered, to empower patients to take control of their care and to use a multimodal approach to pain management while reducing the use of narcotics, which can slow respiration and recovery of bowel function. The result: Together, they shaved two days off hospitalizations for colorectal surgery patients, from an average of 6.5 days to an average of 4.5 days, and patient satisfaction scores jumped from the 27th to 97th percentile. Now, through a clinical community of surgeons across Johns Hopkins’ five Maryland and Washington, D.C., hospitals, they’re looking to standardize more of ERAS’ guidelines regarding surgery preparation and recovery systemwide.

In the past, a successful quality improvement initiative at one of Johns Hopkins Medicine affiliates often occurred in isolation, without being spread to other affiliates. Through the clinical communities, however, frontline clinicians and staff from across the health system have a forum to meet monthly, set goals, identify what works and roll out solutions on a larger scale.

Martin Paul, chairman of the department of surgery at Sibley Memorial Hospital and co-leader, with Wick, of the Surgery Clinical Community, is excited about the prospect of using ERAS to reduce hospitalization time.

Ideally, says Paul, “We want to get hospitalizations down to a three-day stay after surgery, and in some cases even shorter,” so patients can recover at home where they can better rest.

Over the past three years, 15 clinical communities have been launched through the Armstrong Institute. A 16th community, bringing together patient-family councils from all Johns Hopkins-affiliated hospitals, launches in October 2014, says Senior Quality and Innovation Coach Lois Gould.

Founded on the understanding that quality improvement work should fully engage clinicians rather than be “done” to them, the communities typically decide what to focus on, while receiving core resources from the Armstrong Institute in such areas as measurement and performance improvement methods.

Johns Hopkins Medicine is also tapping several clinical communities to support an organizational priority: reducing costs for supplies while streamlining the procurement process. To do this, the communities are working with in-house supply chain management experts, as well as the institute’s value analytics team, to identify where costs can be reduced without compromising quality. For instance, the surgery community might look to pare down the wide variety of different suture brands that are used across Johns Hopkins Medicine.

The evolving Patient Safety tool-kit

Online tools put the latest science in the hands of hospitals nationwide.

YEARS AGO, Armstrong Institute researchers demonstrated that simple paper checklists could be a powerful weapon in the fight against preventable harms. By translating the medical evidence into a set of straightforward steps, checklists brought the science of safety to clinicians across the United States and overseas.

Today, the institute continues to provide hospitals with the latest science, but with the addition of sophisticated online tools. Hospitals participating in national collaborative projects log in to the institute’s improvement initiatives portal and enter or upload data about the steps that are taken with each patient to prevent harms such as delirium. They can then produce reports showing their aggregate performance over time and how it compares to other hospitals in the project. Other tools allow them to upload outcomes data, such as infection rates, and results of safety culture surveys.

“A fundamental attribute of successful efforts to improve care is their focus on measuring and feeding back data,” says Sean Berenholtz, principal investigator on three large-scale improvement projects and a core faculty member with the institute. Yet, he says, most hospitals do not have the infrastructure to collect this information.

For example, a growing body of research has established the dangers of post-intensive care syndrome, which can include depression, anxiety and reduced capacity to walk or perform everyday tasks. The steps for avoiding these downstream effects—such as getting patients moving and walking earlier—have yet to gain a foothold in many hospitals. But by using the Daily Early Mobility tool, project participants focus on these often-overlooked steps and see how they are performing.

While such tools primarily benefit hospitals’ efforts to improve quality and safety, they also provide a trove of data for research, says Ting Yang, senior biostatistician with the institute. For instance, the researchers might examine the practices of top performers to see what steps they are doing differently.
DEFINING THE FORMULA
The institute creates a blueprint for organization-wide improvement.

FOR THE SECOND consecutive year, most of Johns Hopkins Medicine’s acute-care hospitals in Maryland and Washington, D.C., received honors for their performance in delivering evidence-based practices known as core measures.

The Delmarva Foundation’s 2014 Excellence Award for Quality Improvement recognized The Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center and Sibley Memorial Hospital for their achievement in measures related to heart attacks, heart failure, immunizations, pneumonia and surgical care. To qualify for the award, hospitals must follow certain practices, such as delivering recommended vaccinations, at least 96 percent of the time. Before last year, no Johns Hopkins-affiliated hospitals had made the cut.

Consistently delivering evidence-based care is a victory in itself, but leaders at the Armstrong Institute and Johns Hopkins Medicine see a broader benefit to this work. Through these efforts, they have developed a model for organization-wide improvement that they can apply to meet a wide range of quality goals.

Since 2009, the number of hospitals in Johns Hopkins Medicine has doubled, from three to six, expanding the health system’s reach into the Washington, D.C. area and Florida.

“As we have grown, we’ve needed to develop systems and structures to support safety and quality work to improve patient outcomes,” says Renee Demski, senior director for the institute. “It’s vital to get our entire organization to commit to goals, to align interventions to root causes, and to hold itself accountable for meeting our targets. It’s also critical to share lessons learned and best practices to drive performance results.”

To meet this need, Johns Hopkins Medicine created a new governance structure for quality and patient safety. New committees were formed that, for the first time, brought together executives from all the health system’s entities. Together, they set the organization’s goals and continue to track progress toward them.

With the institute’s guidance, the organization also created an accountability system that requires escalating levels of review for each consecutive month in which a hospital does not meet a quality goal. Local performance improvement teams activate when measures do not meet goal for one or two months, and measures move to increasingly higher levels of the organization for review if they continue to fall short of the goal.

“The model creates accountability from the board to the bedside,” says Tiffany Callender, quality and innovation project manager with the institute. “Its escalating structure ensures that stakeholders at every level are aware of measures below target, and are engaged in efforts to improve patient care.”

Following its achievements on core measures—which also included three hospitals receiving the Joint Commission Top Performer on Key Quality Measures Award in fall 2013—Johns Hopkins Medicine seeks to make headway on other targets, such as improving the patient experience and reducing surgical site infections.
PreAdIng the methods
for any patient safety success across
a hospital, health system or region
can be a daunting task. When the
intervention focuses on the hard
work of changing culture, attitudes
and behavior, the difficulty level gets
even higher.

Such is the case with the Compre-
hensive Unit-based Safety Program
(CUSP), created more than a decade
ago at The Johns Hopkins Hospital.
A five-step program that engages
frontline caregivers to identify and
tackle patient safety hazards on their
units, CUSP for years had grown
within Johns Hopkins Medicine in
a very deliberate manner. As of 2011,
there were roughly 33 active CUSP
units at the hospital.

But with demand for this program
increasing across Johns Hopkins
Medicine, Armstrong Institute
patient safety specialists knew that
they could no longer roll out the
program unit by unit, three to five
units a year, as they had. Leadership
at Sibley Memorial Hospital, for
instance, wanted to have CUSP in
all of its 28 clinical areas in a matter
of months.

The increased demand and growing
organizational commitment to CUSP
led to CUSP Cohorts, the Armstrong
Institute’s approach for launching the
program on a large scale. Now, every
three months, a new group of 25 or
more clinical units join a cohort, with
the goal of each CUSP team becom-
ing self-sufficient within a year. Some
participants include members of
long-running CUSP teams who had
never been through formal training.

As of June 2014, there were already
119 CUSP teams across Johns
Hopkins Medicine, notes Melinda
Sawyer, Armstrong Institute
assistant director of patient safety.
“This cohort model provides an
efficient structure to reach many
more individuals,” she says.

The cohort process begins with unit
champions taking part in intensive
CUSP training from the institute;
initially a two-day workshop, it now
consists of online modules followed
by a daylong interactive workshop.
Then, every six weeks for 12 months,
the champions participate in one-
hour coaching webinars, discuss-
ing various improvement tools and
how to confront barriers. Along the
way, each team receives help from a
facilitator who is an expert in CUSP.
On the coaching calls, the champions
also have a forum to network, review
workshop content and share their
struggles and solutions.

“That training helped us have every-
thing in place before the kickoff in
early 2014,” says Kim Connolly,
the unit-based champion on the Zayed 3
prep and post anesthesia unit at The
Johns Hopkins Hospital. “We learned
what had worked, what had not
worked and methods to foster staff
engagement to promote a successful
team.” Early after launching CUSP,
Connolly’s team focused on 14 safety
hazards identified by the staff. Several
were rectified quickly, reports Con-
nolly, who credits staff members for
taking ownership of these challenges.

The institute plans to broadly offer
the cohort program to hospitals
outside of Johns Hopkins Medicine
beginning in late 2014.
FORGING A CHAIN OF ACCOUNTABILITY

Demonstration project helps hospitals connect leadership to front lines.

AT THE BEGINNING of every shift at Jennings American Legion Hospital, staff nurse Brooke LeBoeuf creates a list of the patients who need to be screened or re-screened for venous thromboembolism (VTE), as well as those who do not have prophylaxis ordered. Then, as physicians round on her patients, she’s ready to let them know who needs their attention to prevent these dangerous blood clots.

Her actions reflect the organization’s top-to-bottom focus on preventing VTEs. Highly visible scorecards display how different units—and the hospital as a whole—are performing on screening and prevention. Front-line caregivers know that the eyes of the entire organization—medical staff, performance improvement teams and the board of trustees—are closely following this measure.

Clear goal-setting and performance feedback are among the steps that helped the Louisiana hospital to drastically boost its adherence to VTE prevention measures, as part of an eight-month demonstration project led by the Armstrong Institute in 10 hospitals across the country.

The Leadership Model of Accountability project, supported by the VHA Hospital Engagement Network, sought to help hospitals connect the often-disparate pieces of their safety improvement efforts into a “chain of accountability” that unites the front lines with top leadership in pursuit of the same goals.

“We have taken a really detailed looked into what an effective organization is,” says co-principal investigator Michael Rosen, a human factors psychologist with the institute. “We understand the importance of balancing top-down leadership with creativity from the bottom up.”

As Rosen explains, hospitals may have several of the pieces in this accountability chain but fail to connect them. For instance, hospital leaders may commit to patient safety goals but do a poor job of communicating them to the front lines or letting staff members know what is expected of them. Performance improvement specialists may track safety-related measures, but have few vehicles to feed back performance. Clinicians may be engaged in reducing preventable harm but have scant opportunity to share their successful strategies with other teams.

To help hospitals link these moving pieces, Rosen and colleagues developed a six-part tool-kit that led participants to closely scrutinize their own leadership practices, organizational infrastructure for safety and resources for creating change. For instance, participants use tools to consider what knowledge, skills and attitudes are needed by staff at each level of the organization for safety efforts to succeed.

Each participating hospital used this tool-kit while focusing its efforts on a selected harm, such as surgical site infections or falls. After a daylong site visit from the Armstrong team, the hospitals participated in six monthly webinars with the cohort, plus six monthly individual site coaching calls with Armstrong faculty. Additionally, up to three members of each organization participated in the institute’s online Patient Safety Certificate Program, covering essential concepts and skills to be an effective patient safety champion.

LEADERSHIP MODEL OF ACCOUNTABILITY

The VHA project focuses on linking leaders at all levels of health care organizations with a shared understanding of their roles in quality improvement, and making sure that they have the tools and autonomy to fulfill their responsibilities.

According to preliminary results, more than 90 percent of the participants believe the project has positively impacted their organization, with 92 percent reporting improvement in their targeted harm areas.

“But they also made dramatic progress in all the aspects of improvement that are more generalizable—leadership, goal-setting and accountability,” says co-principal investigator Sallie Weaver, an industrial-organizational psychologist with the institute. “All those things translate to preventing other types of harm.”

On the heels of the successful demonstration project, which ended in early 2014, the institute has launched a second cohort of hospitals. Phase two extends the project to another group of hospitals who will follow the same concentrated model as the first cohort, and also expands it—making a “light” version available to all 182 hospitals participating in the VHA Hospital Engagement Network.
FROM DATA TO DECISIONS

Advanced analytics program helps trainees make sense of mountains of data.

FOR NEARLY ALL hospitalized patients, getting moving and out of bed as soon as possible brings a host of benefits: decreased odds of readmission, reduced delirium and a swifter return to full strength and function.

Yet not all patients require the help of physical and occupational therapists, the clinical experts on mobility. In many cases, nurses or even family members can assist patients.

So when Kelly Daley and Anna Duerr began a training program in advanced clinical analytics, they decided to focus their attention on making sure that Johns Hopkins Hospital therapists spent time with the patients who needed their services most. Pulling data from different sources, cleaning the data and analyzing it, they have produced a dashboard that can identify “hot spots” needing attention. And they instantly found one—a group of patients for whom physical therapy consults had been requested but who were able to walk around independently or with minimal supervision.

“We want our staff of over 100 therapists best used across a 1,000-bed hospital,” says Daley, a clinical analyst in the Department of Physical Medicine and Rehabilitation.

Such projects exemplify what Armstrong Institute leaders had envisioned when they created the Analytics Leadership in Patient Safety (ALPS) program. Over nine months, ALPS fellows are trained in the technologies at Johns Hopkins Medicine for analytics as well as the theories and methodologies related to health care data compilation, analysis and use. They also work closely with a mentor to complete original projects.

The first class, which wrapped up in May 2014, included 20 fellows who devote about 10 percent of their full-time jobs to ALPS lectures, projects and other activities.

The program taps into a need to leverage clinical analytics—the identification and communication of accurate patterns of data—to drive better health care decision-making. ALPS Director Paul Nagy, associate professor of radiology, says that there are likely more than 1,000 employees across Johns Hopkins whose work includes clinical analytics at some level. Often their duties entail reporting in finance, operations or quality-related data activities—such as hospital readmission rates.

But these analysts may have the opportunity to dig deeper using more advanced clinical analytics—for instance, to understand which patients are at risk of readmission and take steps to prevent it. That’s where ALPS comes in.

“Everyone who applies to the ALPS program wants to do something beyond what their individual job description requires,” says Brandyn Lau, the program’s associate director and an instructor in surgery. “It’s a class of people who want to make a measurable difference to improve patient care, patient satisfaction and patient outcomes.”

Among other benefits, the program has fostered a greater sense of community among analysts, who were unfamiliar to one another when the class first met in September 2013. This is not surprising as analysts are embedded throughout the health system. Through the program, they learn about the tools and strategies that others are using.

“We have stellar analysts at Hopkins, and this program enables them to discover how much more effective they can be working as part of this community,” says Nagy.
the morbidity and mortality conference is a time-honored fixture of modern American medicine, an opportunity for physicians and trainees to review and learn from patient cases that did not go as planned. But from Tina Cifra’s perspective, the traditional M&M, as it’s known, focuses too heavily on individual actions when it could seek to analyze and fix the flawed systems that led to harm.

The traditional M&M “is often very blaming,” says Cifra, a pediatric intensive care specialist. “The attitude is, It’s your patient. You should have done everything possible to deliver the best care. It doesn’t consider that the physician works within the system or that everything works together to affect the outcome.”

So when Cifra began the Armstrong Institute Resident Scholars (AIRS) program, a yearlong training opportunity in patient safety for residents and fellows at Johns Hopkins Medicine, she decided to apply her new knowledge to developing a better M&M conference in the pediatric intensive care unit at The Johns Hopkins Hospital. Following a growing trend for multidisciplinary M&Ms, she helped convert the conference from a physician-driven affair to one that also includes nurses, respiratory therapists, pharmacists and unit staff. She also implemented a standard, structured case review process that guided participants to identify contributing factors of adverse events, weigh possible interventions and conclude with clear plans of action. Later, they check to ensure that these steps were actually taken.

“This might sound very obvious [to ensure that actions are taken],” Cifra says. “But in fact, we did a survey of pediatric intensive care units across the country to see what they do with M&M’s, and they don’t do anything.”

She credits the AIRS program with providing mentorship from experts in quality improvement who shared their experiences and wisdom, including how to garner physician buy-in for new processes, motivating teams to accomplish common goals, tracking quality metrics and sustaining change.

With 18 participants in 2013, the elective program included 160 hours of education in areas such as:

- improving patient safety culture
- identifying and reducing harm
- eliminating waste

Students find this program deeply rewarding, because they learn tools and techniques not taught to them in medical school or residency on how to fix broken health care systems,” says Paul Nagy, AIRS director and associate professor of radiology.

Cifra found that not only did her revamped M&M conference increase the number and quality of interventions for patient safety, but it also served as an effective surveillance system for adverse events, complimenting traditional models of error reporting. Additionally, it has provided direction for her career. In summer 2014, Cifra took her training and experiences to University of Iowa Hospitals and Clinics, where she will be on faculty in the Department of Pediatrics.

“They are quite enthusiastic to improve performance and quality in their pediatric intensive care unit and realize that they need champions who know the tools and processes to make this happen,” Cifra says.
EMOTIONAL FIRST AID
The RISE program cares for caregivers in stressful situations.

THE PROBLEM HAS long hidden in plain sight: Health care professionals are often traumatized after medical errors, unanticipated patient deaths and “near misses” but have scarce resources to tap for help coping with such events.

The Armstrong Institute-sponsored RISE (Resilience in Stressful Events) team was created to respond to this unmet need. Any Johns Hopkins Hospital employee can contact RISE 24 hours a day and reach a trained peer responder for nonjudgmental, nonthreatening and confidential support. Now, with this program firmly planted at the hospital, RISE is sharing its approach, beginning with Johns Hopkins Medicine affiliates and other organizations in the Mid-Atlantic Region, so that they can effectively support their staff through difficult times.

“We’re building a unique tool kit—an educational package for training peer responders in health care—to help other hospitals meet this critical need,” says Cheryl Connors, the team’s co-director.

The anguish of stressful patient-related events can lead caregivers to second-guess their skills, quit their profession and even harm themselves. RISE aims not only to avoid such outcomes, but also to improve the overall quality of patient care. “Caring for caregivers is a necessary component of a comprehensive system to understand and improve quality and safety,” says RISE co-director Albert Wu, an Armstrong Institute core faculty member who coined the term “second victim” to refer to the problem of caregivers who are traumatized by patient cases. “RISE provides timely support that allows health care workers to cope effectively and continue to thrive in their own caring for patients.”

RISE began in 2011, when a group of nurses, physicians and social workers collaborated with the Department of Pediatrics to develop a pilot program. From those beginnings, the program expanded to the entire hospital in June 2012.

As RISE has gained a foothold at the hospital, the team has deepened its understanding of how best to prepare peer responders to assist troubled employees after stressful patient-related events. With a grant from the Josie King Foundation, the RISE team began developing and evaluating an advanced training curriculum that pieces together several proven approaches for peer support and stress management, with the ultimate goal of spreading the program to medical centers nationwide.

Through collaboration with the Maryland Patient Safety Center, Connors, Wu and colleagues have developed a “road-map” to help other hospitals implement similar peer support programs in their facilities. Johns Hopkins Bayview Medical Center is the first Johns Hopkins affiliate, and Greater Baltimore Medical Center is the first external organization to adopt RISE.

Megan Hirsch, a patient experience specialist at The Johns Hopkins Hospital, was among the first to sign up for the peer responder training. “I’ve seen firsthand the effects that a traumatic and stressful patient experience can have on the staff,” Hirsch notes. “I’ve also seen the difference that can be made by talking about the experience, sharing feelings and emotions, identifying coping techniques, and learning in the face of tremendous challenges.”

Wu is gratified by the positive feedback he has received on RISE. “All organizations should have this in place. There is very much a pent-up demand for such emotional first aid.”

→ The RISE team has responded to more than 50 calls and served more than 200 employees at The Johns Hopkins Hospital, as of July 2014.

“Caring for caregivers is a necessary component of a comprehensive system to understand and improve quality and safety.”
RESPECT, EQUALITY AND PATIENT SAFETY
The institute will collaborate with three African countries on improvement efforts.

LIKE THE Johns Hopkins Hospital, Liberia’s Jackson F. Doe Memorial Regional Referral Hospital is a recognized quality leader in its country. The 4-year-old facility has the country’s sole CT scanner and the distinction of being the country’s first hospital to perform neurosurgery. Patients from across the West African nation are transferred there for more specialized care.

Yet the hospital faces patient safety risks that the United States takes for granted. Counterfeit medications make up an estimated 60 percent of all drugs there. The country once ran out of HIV test kits, which help ensure the safety of blood products. And in 2014, an Ebola epidemic ravaged the country.

Such issues might sound worlds away from Johns Hopkins’ gleaming medical campus. Still, the Armstrong Institute and delegations from three African nations believe there’s much they can learn from each other while enhancing patient safety.

In early 2014, the institute became one of the first U.S. institutions to join African Partnerships for Patient Safety, a World Health Organization program that pairs African hospitals with those in other parts of the world. Together, the participants craft sustainable patient safety improvement efforts using available resources. The program now works with more than 20 African countries and their partners in Europe and North America.

Kiwoko Hospital in Uganda and Kuir Mayardit Women’s Hospital in South Sudan are also working with the institute.

“Our collaborations in Liberia, Uganda and South Sudan will start with one hospital in each country, but the intent is for the initiatives to spread to other hospitals in their countries,” says Nancy Edwards Moteff, the Armstrong Institute lead for the partnerships program.

Delegations from the three nations visited Johns Hopkins in summer 2014 to build relationships, discuss hospital and regional cultures, and identify challenges they might face. They co-developed principles for their work together that will act as a compass for what they hope will be years of collaboration.

At Kiwoko Hospital, poor supply of alcohol-based hand sanitizer poses a hurdle to infection control efforts. Local systems to supply and even manufacture sanitizers can be put in place, as has been demonstrated in other African hospitals working with the partnerships program.

The visit concluded with each delegation developing work plans for its first two-year-long program engagement. Efforts will focus on areas such as hand hygiene, medical waste management, and infection prevention and control. The Ebola emergency highlights the relevance of this work.

“This is an opportunity that we all yearn for, and it has become a reality,” says Francis Kateh, medical director and CEO of Jackson F. Doe, during his visit to Baltimore.

Shams Syed, the World Health Organization lead for the partnerships program, says that while developed countries bring the latest in science of safety, the benefits of collaboration go both ways, based on relationships of equality and mutual respect. “We have found that there’s a huge amount of benefit that flows back to the so-called developed world,” he says.

This is an opportunity that we all yearn for, and it has become a reality.

The nuclear power industry had Three Mile Island. Space exploration had the Challenger disaster. Aviation had a spate of crashes. Following catastrophe, each of these industries became models for high reliability through their preoccupation with identifying their vulnerabilities and preventing future failures. Health care has yet to broadly adopt these strategies, but the Armstrong Institute is working on multiple fronts to inject them into how it approaches the potential for harm.
Because of his critical medical needs, a patient at The Johns Hopkins Hospital’s Emergency Department began receiving treatment before he could be identified. But, later in that visit, when he was admitted to the hospital, his temporary “John Doe” patient record could not be merged with his permanent file in a new electronic medical record system. This would have tipped doctors off to his complicated medical history, including a bone marrow transplant, requiring ongoing anti-rejection treatment and a special transfusion plan.

Fortunately, says pediatric oncologist Allen Chen, physicians caught the error and averted a crisis. But there’s no guarantee that would happen in other such cases.

Patient identification is one of several areas within Epic, the new electronic medical records system being rolled out across Johns Hopkins Medicine, where Armstrong Institute faculty and staff are working diligently to improve patient safety. Though not heavily involved in Epic’s initial rollout, they jumped on board to help manage emerging patient safety concerns.

In the emergency department, for example, a registrar began meeting the ambulance upon arrival to extract as much detail as possible about the patient’s identity to improve registration. In analyzing these issues, they are applying principles used by high-reliability organizations such as airlines and nuclear power facilities. Chief among them is a preoccupation with the potential for failure, which “goes against what we in health care have historically done, by always assuming the best,” says Lori Paine, director of patient safety for the institute and The Johns Hopkins Hospital. Near-misses and other events involving patient identification point to the need to anticipate how workflow must change before going live with a new record system, she says.

Other areas of focus include safe prescribing. In pediatrics, for example, “We realized the whole dosing library for electronic prescriptions was insufficient,” says Marlene Miller, director of quality and safety initiatives at the Johns Hopkins Children’s Center. A work group of pharmacists, physicians and nurses culled records across Johns Hopkins Medicine for any medications prescribed more than 10 times. They compiled a list of 1,500 medications in Epic’s prescribing function for outpatients and are finishing validating and testing.

The group has installed a bevy of other system fixes, such as setting maximum doses for high-risk medications so that children cannot mistakenly be prescribed adult doses.

“We want to ensure the system is safe for ordering and prescribing medications for children,” says Miller, a core faculty member of the Armstrong Institute. “When we go live on the inpatient side, there probably will be another 3,000 medications to consider.”

Another high-reliability concept embraced by Armstrong is deference to expertise, such as the expertise of frontline staff. To help The Johns Hopkins Hospital’s pediatric emergency department prepare to use Epic in August, human factors specialist Nana Khunlertkit extensively analyzed the department’s workflows and surveyed seasoned Epic users at Howard County General Hospital. She then worked with the multidisciplined emergency department team to ensure there were mitigation strategies for the safety and workflow concerns identified before implementation.

Through these and other efforts, says Chen, “I’m very hopeful that patient safety will be vastly improved.”
A NEW WINDOW ON PATIENT HARM

Project Emerge pilot begins, with an eye toward revamping the intensive care unit.

CRITICAL CARE PHYSICIAN

Mark Romig scanned a tablet computer, displaying a grid of his patients. Instantly, he noticed that one was highlighted with a red X, indicating a risk of harm.

Romig tapped the patient’s name and a new screen opened. A large, red-shaded cell quickly pointed him to the source of concern: The patient had not received heparin to prevent potentially fatal blood clots, known as venous thromboembolism.

“We talked to the resident and nurse caring for the patient and verified that there was no reason not to give heparin,” says Romig. Soon, the patient began receiving the anticoagulant drug.

This experience, in Romig’s very first minutes using this new app, hints at the promise of Project Emerge, an Armstrong Institute-led effort to reduce intensive care unit harm.

Rather than scavenge the medical record, devices and elsewhere to make sure that patients receive evidence-based care, clinicians can tap the tablet, which pulls that data into one location and shows which steps may have been missed. Clinicians may not ask this question every day, and discovering how long the catheter was inserted can be tedious. They had to enter the patient’s electronic medical record, find a flow sheet that records catheter use and trace it back day by day to find the first day in which the catheter was no longer in the record.

Critically ill patients. While a growing number shows how many days each has been in. It prompts users daily to ask whether the line can be removed. Critical care physician Adam Sapirstein says the display has already prompted him to remove or replace several catheters.

For vulnerable intensive care unit patients, errors or missed steps can be deadly. Yet there are up to 200 steps that must be completed every day for safe, high-quality care.

Romig estimates that it would take two hours simply to figure out if these steps have been taken for all of his patients—and that’s just to check once. But with Emerge, that information is continuously updated on the app’s Harms Monitor, a doughnut-shaped diagram for each patient that is divided into seven sections, each showing the status of a harm type. Green indicates that all interventions are up to date, while yellow means that an item needs attention and red shows that steps may have been missed. Clinicians can drill down into each harm type and see a condition-specific display, revealing the status of various interventions needed to prevent that harm.

Like Romig, SICU physician Adam Sapirstein reviews patients’ Harms Monitors during rounds. “I’ve seen almost immediate impact from using it,” says Sapirstein, co-investigator on Emerge. “We’re discovering issues that we didn’t know about the patient.”

More than a technology solution, the clinician app is a tool for changing work flow, culture and behavior. For example, by focusing on intensive care unit-acquired weakness as one of the seven harms, it aims to change attitudes and behavior about the importance of early mobility in critically ill patients. While a growing body of research has established the short- and long-term benefits of early mobility, many patients may not receive the appropriate therapies each day. The Emerge app helps keep the issue front-and-center, by tracking each patient’s progress and displaying how that progress compares to that person’s mobility goals.

When a patient does not move, “We want physicians and nurses to look at that in the same way as not getting an ordered medication,” says Paul Ricard, rehabilitation team coordinator at The Johns Hopkins Hospital who has collaborated with the Emerge team. “I would love for the medical teams in rounds to look at this tablet and say: What is this person’s activity for today and what are the barriers we need to overcome?”

Project Emerge has taken an expansive view of what harm means: Among the seven harms targeted are misalignments between the patient’s goals and the goals that clinicians have set. Through the patient and family portal—a new Emerge app that started piloting in September 2014—patients and their loved ones can state their goals, whether it be to avoid suffering or to go back to work. If clinicians’ goals do not match those of the patient and family, the harms monitor turns red, prompting a discussion.

“We don’t need every family meeting to be an end-of-life family meeting,” says Cindy Dwyer, a surgical intensive care unit nurse clinician who is coordinating the pilot. “We want to identify those misalignments before they come up.”

The patient and family portal, found on a tablet at the bedside, also lets family members share concerns, provide details about the patient and participate in care activities, such as oral care.

With the sophisticated Emerge platform up and running after two years of development, the focus will shift to getting and measuring results, Sapirstein says. “The emphasis is now on using the system to improve performance and outcomes and engage patients and families.”

To learn more about Project Emerge, visit: hopkinsmedicine.org/armstrong_institute/improvement_projects/project_emerge.html
SEEKING A LEAN TRANSFORMATION IN THE AMBULATORY SETTING

New method seeks to find troubled clinical units before major harm

FOR MIGRAINE SUFFERERS, the wait for treatment at Johns Hopkins Bayview Medical Center could be a bit of a headache in itself. It took nearly 42 minutes, on average, for patients to get Botox injections at the new neurosciences clinic. So when a triad of leaders from the clinic—a physician, department administrator and senior administrative manager—took the Armstrong Institute’s two-day Lean for Healthcare workshop as part of a management training program, they decided to apply their skills to reducing this wait. Stopwatches in hand, they measured how long it took staff to perform each step for treating patients with migraines, and tracked the time patients spent in different stages of their visit.

The biggest time drain resulted from the fact that, for each patient, a certified medical assistant had to walk to a pharmacy in another building to pick up the Botox vials. That round trip took more than 11 minutes and diverted these staff members from patient care processes.

The team worked with the department of pharmacy to revamp the process so that they could get a batch of the vials each morning, based on expected patient needs. Migraine patients’ total visit time dropped by 41 percent.

Donna Gavin, neurosciences administrator, says the Lean tools were easy to use. “We can now apply these methods to any inefficiency that we identify.”

That was the idea when John Flynn, vice president and chief administrative officer of the Office of Johns Hopkins Physicians, created the 4.5-month Ambulatory Management Program. While teams learn about change management, human resources and other topics, the program’s cornerstone is using Lean to transform ambulatory care delivery.

Rich Hill, a senior quality and innovation coach who led the workshop along with Bob Hody, says the Ambulatory Management Program highlighted a key lesson in improvement work. By having three representatives from each clinic go through the training together, there are fewer barriers to adoption. “They speak a common lingo and make improvements together faster,” he says. “It’s a beautiful thing.”

PRE

POST

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<th>TOTAL BOTOX ADMINISTRATION PROCESS</th>
<th>41.8 minutes</th>
<th>24.5 minutes</th>
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Some of the time savings included:

- **Pick up Botox from Pharmacy**
  - 11.3 minutes → 0 minutes
- **Triage Patients and Take Vitals**
  - 8.2 minutes → 5 minutes

41% overall reduction in time required to administer Botox injections to migraine sufferers

A PLACE FOR PROTOTYPING

Collaborators can envision the future of health care in the new Innovation Lab.

IMAGINE IF AN aircraft manufacturer built a new jetliner and installed landing gear that couldn’t send a signal to the cockpit to let pilots know if the wheels were up or down. Instead, the pilots would need to somehow determine whether the gear was really down before landing.

Planes aren’t designed this way, of course. Manufacturers require that all of the components communicate and work together for passengers’ safety.

Yet when a hospital needs an intensive care unit, it must cobble together medical devices, equipment and information technology systems that rarely communicate with each other. The result: an underengineered environment that relies too heavily on clinicians to prevent harm and deliver quality care, rather than one that leverages technology to ease their work.

Why can’t the principles used to design aircraft be applied to creating an intensive care unit? That’s the challenge for the institute’s new Innovation Lab.

The lab is a design space where a host of collaborators—clinicians, systems engineers, medical device companies, students and even individual inventors—can gather to prototype the intensive care unit of the future.

Peer to Peer Support

Two of the world’s most respected medical institutions—The Johns Hopkins Hospital and Massachusetts General Hospital—are giving one another patient safety checkups.

For two days in spring 2014, a multidisciplinary team from the Armstrong Institute visited Massachusetts General to conduct a systematic patient safety review. The Boston hospital then sent an assessment team to Baltimore in late July. Both visits focused on reducing central line-associated bloodstream infections and improving hand hygiene compliance.

Their strategy, known as a peer-to-peer assessment, is adapted from the nuclear energy industry, in which teams visit other facilities for transparent discussions about hazards, direct observation of patient care processes, sharing of best practices and concrete improvement plans.

“This is a wonderful opportunity to learn from each other in an area where there should be no competition—patient safety,” says David Thompson, core faculty member with the Armstrong Institute. “We hope to build a relationship with Massachusetts General to have continual learning, with a long-term goal of having more hospitals participating in peer-to-peer assessments.”

The Innovation Lab Vision

→ Create design requirements for the ideal intensive care unit.
→ Prototype solutions for reducing preventable harm and improving care.
→ Engineer and integrate the system in laboratory and simulated settings.
→ Transition to production by identifying partners to produce the intensive care unit and take it to the market.
COMING TO AN EARLY RESCUE
New method seeks to find troubled clinical units before major harm occurs.

HOW DID WE MISS the signs? Could we have done something?
Such refrains are common after all manner of tragedies—school shootings, automobile recalls and, of course, preventable patient harm. Too often, the warning signs were there, but the risks often went unrecognized or were not fully understood.

Patient safety practitioners at the Armstrong Institute have devised a method that they hope will identify clinical areas with an environment that poses a risk to patient safety, even if those areas have had no major adverse events. In devising this approach, the institute is applying lessons from high-reliability organizations, which show a preoccupation with identifying and mitigating harm.

“It’s about being proactive and looking for signals,” says Lori Paine, director of patient safety for the institute and The Johns Hopkins Hospital. “Some signals might be weak. But in some cases there’s a consistent signal for a small set of units that suggest they’re in need.”

The method begins by “triangulating” patient safety culture scores, employee engagement survey results and patient satisfaction scores. Analyzing this information, Paine and colleagues find a small percentage of units that are consistently at or near the bottom.

With these initial results, they seek other sources of information, such as patient complaints, as well as the opinions of risk managers about what they see as the most vulnerable units.

Content analyses of free-text comments in the safety culture survey help to tease out common themes.

The first application of this new process at the hospital identified three units in need of help.

Paine says there’s no set remedy for units on the list. In some areas, the solution might involve creating a better quality structure or launching unit-based safety teams.

“We’re not seeking someone to blame,” she says. “It’s about knowing where the risks are and asking units to help manage it.”

At a Glance
A statistical snapshot of the Armstrong Institute’s activities in Fiscal Year 2014.
Health care researchers, clinicians, private industry and other stakeholders come together in September 2013 at the Forum on Emerging Topics in Patient Safety to explore new approaches for accelerating improvement in the field. The institute organized the three-day conference in Baltimore in conjunction with the World Health Organization.

Hospitals across the United States converge in Baltimore in September 2013 to present their successful strategies for improving the patient experience at the two-day Best Practices in Patient-Centered Care conference, organized by the institute. (See article p. 4)

In September 2013, the institute receives a $2.1 million contract to develop, implement and study a program that better supports people with chronic obstructive pulmonary disease following hospitalization—a period when patients are especially prone to rehospitalization. The three-year project is funded by the Patient-Centered Outcomes Research Institute.

In April 2014, the Johns Hopkins Medicine Patient Safety and Quality Dashboard is released, helping employees see how their unit, department or hospital is performing in several key performance measures. (See story p. 9)

In February 2014, fifty-seven hospitals across 10 U.S. states take part in the first cohort of CUSP 4 MVP-VAP institute-led project to reduce ventilator-associated harms. A $7.3 million contract from the Agency for Healthcare Research and Quality (AHRQ) is supporting the three-year project.

In June 2014, The Johns Hopkins Hospital’s surgical intensive care unit begins a pilot of Project Emerge, an ambitious Armstrong Institute-led effort to eliminate harm in the intensive care unit. (See story p. 30)