Emerging topics in health care
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The health care world is changing. And data has a role to play in that change.

Traditional health care systems are becoming more accessible and convenient, while also offering lower priced options. Proactive care – rather than reactive – is expected, including a shift from disease management to disease prevention. Likewise, a greater emphasis on personalized delivery, including understanding populations, has led to increased precision in holistic care management.

Combining conventional data sources with data from previously untapped data sources – such as electronic health records, wearables, social determinants, social media, genetics and diagnostics – creates new possibilities for understanding the patterns, relationships, and predictors of wellness and health.

Keep reading this e-book to discover how health care leaders are generating new opportunities for innovation and transforming how care is delivered.
Using data to stop illness

Who it affects, why and what defines personal data
Data has, of course, been part of the medical landscape for some time. Most patients in the developed world, for example, are likely to have electronic medical records (EMRs): a collection of their health data that is easily shared between physicians and updated often. There is a direct relationship between a country’s income and its use of electronic health care information systems.

EMRs are, therefore, far more common in the developed world; however, developing countries have also been moving toward the adoption of EMRs. Such a move is prompted by the significant benefits these records deliver, including improving the speed and efficacy of treatment. Doctors can make better-informed decisions using the holistic view of the patient that EMRs provide, saving time and resources while improving health outcomes.

Today’s physicians have an increasingly powerful instrument in their clinical toolboxes: Data use. Alongside their stethoscopes, MRIs, experience and intuition, doctors are using patient health data and its analysis for a range of applications, including to more quickly and accurately diagnose and respond to patient health events.
For example, health information systems can alert doctors when proposed medications could lead to complications for a particular patient; such systems also allow clinicians to better manage essential screenings, such as those for breast cancer. But as data sets get bigger and richer, we’re fast approaching a place where analytics, through the deployment of complex algorithms, will afford truly dramatic improvements in patient care.

**Machine learning in health care**

With the introduction of machine learning, for example, high-quality data can be deeply and accurately mined by computers that learn based on experience, bringing the potential uses of data in the health care setting to a whole new level. An algorithm’s pattern-recognition capabilities, beyond that of even the most seasoned of doctors, will now draw out previously unrevealed correlations that can improve the practice of medicine. For example, these algorithms can identify correlations between the types of sutures used on specific kinds of injuries and the likelihood of infection. Such pattern recognition also flags potential health problems at the individual patient level before a problem actually manifests.

While in the longer term it may prove possible to use the complexity of this type of predictive analytics to forewarn of still inadequately understood illnesses such as dementia, analytics is already being put to impressive predictive use. The four hospitals of the Assistance Publique-Hôpitaux de Paris, for example, are crunching the numbers to give hour-by-hour predictions of expected admission levels. In the United States, Carnegie Mellon and Pittsburgh universities’ Big Data for Better Health Project is using a supercomputer to analyze and model large volumes of diverse data on cancer patients to produce more accurate predictions of patient outcomes.

San Francisco-based health care provider Dignity Health is going further still, using analytics to pioneer what it calls a “bio-surveillance” system that can generate high-probability, real-time alerts. This system allows clinicians to head off sepsis—a type of infection that affects 6 percent of patients admitted to hospitals in the US and carries a high risk of mortality, between 25 percent and 50 percent, depending on the severity.

“By nature, clinicians don’t like to take advice from a computer, but, slowly, the use of bio-surveillance is gaining credibility” says Colorafi.

**“There are two ways of providing data output to clinicians: reactively, in, say, a monthly report, or proactively, by using it in real time to identify issues before they become big problems.”**

Dr. Joseph Colorafi
Dignity Health’s Chief Medical Information Officer

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Seeing into the future

There are three reasons for such growing acceptance. First, Colorafi and his team have set a high bar for the statistical validation of sepsis warning signs, meaning that the bio-surveillance system does not interrupt already harried clinicians unless there is a high-probability risk. Second, the system features a self-service “Sepsis App” that makes it attractive to clinicians: The skills of a data analyst aren’t required to access or understand the data. And finally, more than anything, clinicians adopt the bio-surveillance system because it works, doing what no clinician could consistently: see into the future.

As Colorafi notes, analytics offers the kind of insights that “nobody could see without looking at the data of all patients all day – inputs change minute-to-minute, so nobody could put the moving pieces of the puzzle together repeatedly. Spotting those patterns is what the machines are good at.” Indeed, by giving medical staff an hour—even just a few minutes—to act before sepsis sets in, Dignity’s bio-surveillance assists in saving an estimated 400 lives per year.

Given this success, it’s not surprising that Dignity Health is now exploring bio-surveillance to reduce the rate of hospital readmission and to tackle the danger of opioid over-sedation. The longer-term impact of analytics on the wider medical world is expected to be considerable, perhaps even revolutionary. It will certainly make medicine more personalized to the individual and more economically efficient. It may well radically change the design of hospitals and how medical insurers assess their customers, perhaps even the very nature of how medicine functions. Prevention, it has long been said, is better than cure. Analytics may make this the norm rather than the exception.

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Can data sharing help cure cancer?

Collaborative analytics reveals hidden answers in clinical trial data
A new scientific study, using crowdsourced data from multiple pharmaceutical companies, has helped reveal that a simple blood test can be used to tell almost immediately if a treatment is fighting off the disease in prostate cancer patients.

Dr. Howard Scher, an oncologist at Memorial Sloan Kettering, led the research that analyzed crowdsourced data from the Project Data Sphere initiative. Scher is Chief of the Genitourinary Oncology Service at the Sidney Kimmel Center for Prostate and Urologic Cancers.

“We’ve identified a very particular cell type which has a specific pattern,” says Scher. That pattern is visible in the blood and can show sensitivity to cancer treatment. “It’s incredible. If you have those cells in your blood, you can know just by doing a blood test, long before anything else has happened, if the treatment is working. You no longer have to wait until your scans show progress. And that’s very exciting.”

Project Data Sphere, an independent, not-for-profit initiative of the CEO Roundtable on Cancer’s Life Sciences Consortium, was designed for sharing, integrating and analyzing historical, patient-level data from phase three cancer clinical trials. Scher’s team was able to use the de-identified data from multiple phase three trials to compare blood samples across treatments.

The goal of the Project Data Sphere cancer research platform is to spark innovation by opening up new research possibilities, like Scher’s research, which was published recently in The Lancet Oncology.

To support these efforts, SAS hosts the research platform and provides access to analytics technology at no cost to researchers. The data in the platform is de-identified and consistent with industry requirements.

“It’s incredible. If you have those cells in your blood, you can know just by doing a blood test, long before anything else has happened, if the treatment is working.”

Dr. Howard Scher
Oncologist Memorial Sloan Kettering
Why data sharing matters
Clinical research generates a lot of data, but each new clinical trial is designed to answer a specific question or to address an explicit hypothesis. For example:

- Does this new treatment cure the disease faster?
- Does it save lives?
- Does it reduce cancer cells?

Even when the answer is “no” to these primary questions, researchers can learn a lot from negative trials, and the results will inform further research. Once a trial is over and that one result is recorded, however, the data is archived and researchers move on.

But what if you could take data from dozens of trials conducted by different pharmaceutical companies and academic medical centers and discover something new that helps prevent prostate cancer? Or more quickly cures breast cancer?

Until those data sets are dusted off, tossed together and re-explored, we’ll never know. And that’s exactly why efforts like PDS are important. They bring to the surface a gold mine of undiscovered potential, and until that information is explored, we can only guess what answers lie inside of it.

Results like those from Scher and his team are just the beginning. When more data is added and analyzed from even more trials, researchers can collaborate to find answers no one would even consider asking within the scope of a single trial.

Patient advocates support data sharing
But how do patients feel about using clinical trial data for purposes beyond the trial? According to patient advocates who’ve signed A Resolution to Share Legacy Cancer Clinical Trial Data, cancer patients are informed about the risks of data sharing and eager to see researchers do more with their data.

After all, most cancer patients enroll in clinical trials for two reasons:

1. They want access to new treatments that could benefit their health.
2. They have a sincere interest in moving the science forward to save the lives of other patients.

“It’s not easy to get on a trial, to find one that fits where you are in your treatment and fits the cancer you have. Those who get on trials are very motivated. They really want to do it for themselves and for other patients,” says Patty Spears, a breast cancer survivor, a research scientist and patient advocate.

“One of things I was impressed with at the beginning of the Project Data Sphere initiative is that it got multiple companies to come to the table. Just getting them together allows them to form relationships and meaning behind the data.”

Patty Spears, Researcher and Cancer Patient Advocate

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Some clinical trial patients put a lot of time and effort into their participation in clinical trials. For example, Spears traveled from Raleigh, NC, to Seattle monthly for a trial she participated in after she was treated for cancer in 1999.

“The trial system takes so long to complete one trial to test one drug,” says Spears. “If you can pool that data to get an inkling of where to go next, maybe there’s something to glean from that. Patients are very collaborative. Using data regardless of the outcome of the trial would be amazing.”

Spears says the patients she works with want their data to be used as much as possible. One man told her, “I don’t care if you put my genome on the side of a bus. If it helps cure the next patient, I’m all for it.”

Sometimes, there’s benefit not just in bringing the data together - but also in bringing people together. “One of the things I was impressed with at the beginning of the Project Data Sphere initiative is that it got multiple companies to come to the table,” says Spears. “Just getting them together allows them to form relationships and meaning behind the data.”

Spears says she’s seen more openness and meaningful conversations between companies that are normally seen as competitors as a result of breaking down barriers through PDS.

Moving the science forward

Clinical trials serve many purposes. For pharmaceutical companies, they’re an important tool for bringing new drugs to market. For cancer patients, they offer hope for improved health and access to new treatments. For all of us, they help move medical science forward - with the ultimate hope of curing and preventing disease.

As the science becomes more complex, especially in the age of precision medicine and genomic testing, the more data we have to apply to the problem, the better.
Keeping an open mind about open analytics

What if we stopped arguing over which analytics software is best, and decided instead to use them all?

Alison Bolen, SAS Insights Editor
Today’s data scientists come from many different backgrounds, and they bring a wide range of skills to the job. If they have access to a variety of analytics tools, along with a system to govern and deploy models consistently, they have more options for solving complex problems.

Cleveland Clinic and Cox Automotive are two organizations that have benefited from this realization. As a result, their data science programs are thriving – and so are their larger organizations.

“We have employees who are trained in multiple languages and technologies. We want to enable people to access and use languages they’re comfortable with but using a common approach,” says Chris Donovan, Executive Director of Analytics for Cleveland Clinic.

Cleveland Clinic hopes to grow analytics maturity across the whole health care system, says Donovan. Instead of centralizing analytics skills and capabilities in one team, they’re building a broad program across the enterprise. “Having a platform that enables that is critical for analytics to be successful.”

This focus on analytics has helped Cleveland Clinic transform, along with the industry, from a focus on palliative care to preventive care. Donovan explains: “How can we move away from just taking care of you when you show up as an individual patient in the ER or the doctor’s office, to looking at a population of patients and thinking about how to prevent people from getting sick in the first place?”

**Becoming ‘code agnostic’**

At Cox Automotive, SAS Viya is the glue holding the analytics organization together, says Shawn Hushman, Vice President of Decision Sciences for Cox Automotive. “It removes the different political debates between the source systems, so we can focus on the modeling itself, the versioning of the models and the delivery of the models. The open platform allows everyone to use their code, leverage open source opportunities, and it opens everyone up to new code bases.”

In particular, Hushman praises the ability to integrate disparate code, processes, and information into one hub that provides consistent delivery of information.

Hushman’s team includes people around the world who code in Python, R and SAS. “We have people programming in multiple interfaces, and they’re using different ways to collaborate on model development. They have different ways they like to publish and show the output and different ways to deploy the models. SAS allows us to stitch it all together.”

The solution allows Cox Automotive to be “code agnostic,” says Hushman. Instead of debating over a preferred code base, everyone can discuss the best solution for a problem together.

“We don’t care about your code preferences,” he says. “Let’s look at frameworks that can bring real change to the organization, instead of battling over which package I’m going to use for modeling.”

“SAS has the ability to bring together the data scientist community like no other solution can.”

**Shawn Hushman,** Vice President of Decision Sciences, Cox Automotive
With that mindset, Cox Automotive has been able to make the most of its data as it transitions offline businesses like Autotrader and Kelley Blue Book to the online world.

“SAS has the ability to bring together the data scientist community like no other solution can,” says Hushman. “We think of model management as the center of our hub, because that’s where we can be agnostic and make sure everything connects.

“Our responsibility is to deliver results efficiently and make it seamless,” he says. “We want all the goodness that comes with the diversity of different algorithms, and then we bring alignment around our delivery.”

Opening analytics to executives

At Cleveland Clinic, giving more people access to analytics is also a priority. Beyond data scientists and programmers who are adept at writing code and doing advanced analytics, Donovan and other leaders at Cleveland Clinic want to make data easily available to executives and managers with drag-and-drop capabilities and simple interfaces.

“Our leaders may not know how to build a predictive model, but they need to be able to use data to make better decisions,” says Donovan. “Not everyone is a data scientist. But everyone needs to be able to interact with data at their level.”

Donovan says Cleveland Clinic is redefining what an analyst is and working to create a common entry point for all levels of users. “Before, we had data everywhere and multiple tools, but we’re trying to invert that. Instead of taking the data to the people, it’s bringing the people to the data. We believe that if we create a world-class platform, that will draw the people to the platform – which will drive consistency, build communities of practice, and link people across the organization to find standard approaches.”

Opening your business strategy with analytics

Hushman also emphasizes the importance of analytics across the organization at Cox Automotive. “I prefer to view analytics as the heart and soul of our organization and the foundational element of everything we do. Analytics is improving all our products, driving new products, and growing revenue across all our product suites. Analytics doesn’t drive our business; it is our business.”

Broadening the use of analytics to support all users is more than a technology tactic. It’s a business strategy. “Analytics is not just a capability that supports your core strategy,” says Donovan. “It has to be a core strategy of its own. You need to become an analytically mature organization, and you need to be world-class in that space or people will leapfrog you.”

“Analytics is not just a capability that supports your core strategy. It has to be a core strategy of its own.”

Chris Donovan
Executive Director of Analytics, Cleveland Clinic

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Analytic simulations

Using big data to protect the tiniest patients
A small, fragile life hangs in the balance. From hours-old premature newborns weighing less than a pound to months-old infants still struggling with medical conditions, neonatal intensive care units (NICUs) have to be ready for everything. That’s why doctors, nurses and medical administrators in NICUs need every possible advantage to provide the best care possible to the most vulnerable patients.

But imagine having to make the decisions that affect your ability to actually provide care. How many beds do we need? How many nurses do we need? Which critically important quality improvement initiative do I tackle first? Where are our greatest opportunities to both improve outcomes and simultaneously reduce costs?

In the past, the primary way of answering these questions was through research, study and trial-and-error implementation. However, medical professionals like Dr. Chris DeRienzo, a neonatologist and Chief Quality Officer at Mission Health System, are looking at data on patients to provide a virtual way of testing different methods and approaches.

Simulating the NICU environment

“We worked with SAS to create an analytics-based model of a NICU,” DeRienzo says. “The model actually creates simulated babies who work their way through a simulated NICU environment including simulated beds, which is even staffed by simulated nurses.”

The model uses a vast resource of data to simulate the experience of patients, their conditions and staff responses in a computerized environment. In a study led by SAS and Duke University Health System and published in the Journal of Perinatology, the research applied a discrete event simulation model to predict outcomes and costs using pre-existing NICU data. DeRienzo first joined the research team during his neonatal fellowship at Duke, where his mentor, Dr. David Tanaka, was the impetus behind the model’s development.

Identifying which variables could save a life

“We spent the first 18 months in data exploration trying to find the most significant characteristics to model,” DeRienzo says. “For example, we found that an infant’s gender was not a particularly significant factor in determining resource allocation. However, gestational age - meaning how many weeks a baby was able to spend inside his or her mother before being born prematurely - was (as expected) very significant.

“...the model actually creates simulated babies who work their way through a simulated NICU environment including simulated beds, which is even staffed by simulated nurses.”

Dr. Chris DeRienzo
Neonatologist and Chief Quality Officer,
Mission Health System
“Next we evaluated the various complications that NICU babies can experience, like bloodstream infections, bleeding inside their brains and severe intestinal conditions. We then modeled the effect of these conditions both on a baby’s immediate acuity at the moment the complication happens as well as how each complication affects overall length of stay.” All of these attributes ultimately affect the global condition of each patient over time which, when combined across all patients, dictates the amount of resources a NICU needs to care for its population.

By simulating a variety of situations like this, DeRienzo and his colleagues could see how shifts in staffing affect a NICU’s broader ability to provide care. For example, when a patient experiences a critical complication, a nurse who normally covers three patients may have to focus on just that one, transitioning her two other patients to the care of other nurses. Modeling how frequently this happens in a virtual environment under multiple different scenarios can allow a NICU to optimize its staffing to be prepared for inevitable emergencies while maintaining day-to-day operations.

However, staffing isn’t the model’s only use. Since the simulation covers the entire environment, it can be used to ask and answer difficult questions about the relationships among things like financial metrics, operational metrics and clinical outcomes.

**Saving lives and reducing costs**

In their most recent publication, DeRienzo and his team showed that NICUs do not have a uniform correlation between length of stay and total cost of care. While it sounds odd, the simulation showed that NICUs with the best published clinical outcomes (meaning, the fewest deaths and lowest rates of complications) actually had longer average stays than a NICU with the worst published clinical outcomes but markedly lower costs.

“In our model, the simulated NICU based on the best possible outcomes we could find published had a three days longer average length of stay compared to a unit with the poorest published outcomes,” DeRienzo says. “But interestingly, despite a longer average length of stay, the costs in the ‘best’ NICU were over $3 million less.

“This finding is critically important to health system leaders because it means a laser-like focus on length of stay as a uniform driver of resource utilization doesn’t paint the full picture. We must balance that focus with an equal emphasis on the clinical outcomes that drive total cost of care.”

Results like these will be critical to increasing the level of care for patients in the future.

“For us, it’s all about delivering better outcomes for our patients and their families, which then has a number of positive ripple effects,” DeRienzo says. “I think health care in 10 years will necessarily look very different from health care now, and we’re right in the middle of that transition. This project is just one example of how health care leaders can use innovative analytics tools to improve not only the ways we provide care but the actual care we provide.”
Machine learning and artificial intelligence in a brave new world

How the latest advances in AI will revolutionize business—and beyond.
For some, a mention of artificial intelligence summons images of robots running amok as humans valiantly try to put the genie back in the bottle. But the reality is that today’s AI—the ability of machines to learn from experience and perform tasks once only possible for humans—is already a reality and full of possibilities to enrich and improve human lives.

Machine learning, one of the key building blocks of AI, has been a part of the technological world since the 1950s, when the earliest programmers asked computers to make sense of large sets of data. Programmers have increasingly refined the ability of machines to study data in order to detect patterns that allow computers to then organize information, identify relationships, make predictions and detect anomalies. Today, modern applications of AI have already given us self-driving cars and virtual assistants and have helped us detect fraud and manage resources like electricity more efficiently.

Today’s machines are now capable of performing narrowly defined tasks with great precision, but—and it’s an important caveat—that precision is only as good as the quality and, in some cases, the quantity of the data that drives the model. The current state of play in machine learning will, with the input of carefully considered data, make possible countless enhancements to existing products and, eventually, the development of free-standing AI, although not the fully autonomous AI devices of the “robots running amok” kind.

But as machine learning gets deeper, we are embarking on the next step toward increasingly sophisticated AI: deep learning.

**Deep learning and neural networks**

The sophisticated analysis of deep learning is achieved through “neural networks,” so called because they loosely mimic the interconnected structure of the human brain to provide a many-layered functionality.

These neural networks are so sophisticated, in fact, that the path a machine takes to reach its conclusion is not yet readily understood. Deep learning uses huge, self-improving neural networks—only possible and more widely accessible because of recent advances in computing power—to achieve extremely complex pattern spotting like recognizing speech or images.

Today’s machine learning tasks are tackled in four primary ways through:

1. Machines that need to be taught by example before they can apply the resulting insight to similar tasks.
2. Machines that can extrapolate from a general pattern and apply it to other data.
3. Machines that can, unsupervised, study data to find patterns, getting better with experience (though never autonomous).
4. Machines that can work with and exploit a given set of rules to move toward a desired outcome.

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"Deep learning is only going to be used when it really makes sense – where it can quickly find intricate, variable relationships hidden in large volumes of data that we haven’t been able to pull out in any other way yet,” explains Mary Beth Ainsworth, Global Product Marketing Manager of artificial intelligence and text analytics at SAS. “But deep learning means a machine can look at a problem through a completely different analytic lens than its human counterpart. It could be used to tackle all sorts of issues. The potential in all the data we collect every day is yet to be realized.”

Interacting with AI

Progress is also being seen in how a second key building block of AI, natural language processing (NLP), has evolved into natural language understanding (NLU). If NLP is the ability to translate spoken or written language into a form an algorithm can understand and then respond with results in a spoken or written language that people can understand, then NLU is altogether more familiar: the ability to infer meaning in language and then respond accordingly, as people do instinctively. Siri and Alexa are first steps on a path to giving AI a much simpler, more human ease of use.

And, contrary to the dystopian results some may imagine, humans remain very much in the picture. Setting up and maintaining useful machine learning requires human interaction and insight, as does validating AI conclusions by testing them against new data – an essential component of any AI deployment. Moreover, selecting the right algorithm for the job, configuring it for best performance, refining the data it will work on, getting the ideal balance between the sophistication of the machine and its ability to consume data, and interpreting the results with the understanding that prediction is not the same as causation are part science, part art and all people power.

How will we manage AI?

Small wonder then, as a recent cross-national survey of SAS clients suggests, that one of the greatest concerns that businesses have about the adoption of artificial intelligence is having the human expertise to manage it.

“Organizations may want to jump on the AI bandwagon because it’s such a hot topic, but they have to identify what they want to do with it,” advises Ainsworth. “By the same token, other people perhaps still have a negative
perception of AI, from how it’s often portrayed, such that it can seem overwhelming. But in many cases they’re already leveraging forms of machine learning every day when they run a search on the internet, upload photos to social media or shop online with major retailers. Ultimately, it’s about using the right tool for the right job. AI requires a strategy with clearly defined tactical steps to successfully implement that larger plan. AI can provide valuable insights, but what you do with that information still requires human direction.”

It’s already clear that AI is set to be revolutionary; more so, most likely, than the move to automating repetitive manual tasks through robotic hardware. AI will require some dramatic culture shifts. But it will not only boost productivity—identifying maintenance problems before they happen, for example, or allowing for real-time online pricing—but it will save time, too. AI will work away in the background while we’re freed up to innovate or to attend to other tasks that require human attention. Much as Amazon’s distribution centers use robotics to select merchandise but people to pack it, commerce, and many other areas of life, will become a question of teamwork. Human and machine will work together.

This article was originally published by The Economist and sponsored by SAS.
Unraveling complex fraud schemes through a hybrid approach

Dutch health insurer CZ analyzes claims in real time, detecting fraud and preventing improper payouts.
When it comes to costly incidents like fraud and abuse, early detection is the best remedy. Once claims are paid, it can be difficult to get the money back. That’s why CZ, the third-largest health insurer in the Netherlands, turned to SAS Detection and Investigation. With a solution built on analytics, CZ can monitor its claims in real time and ensure each claim is legitimate – before money goes out the door.

“Prevention is always better than cure,” says Marnix Suijkerbuijk, Director of Health Care and Declaration Service at CZ. “Through intelligent analysis, we can stay ahead of faulty statements and fraud.”

From manual monitoring to automated discovery

For insurance companies, identifying claim errors in that mountain of data is like looking for a needle in a haystack. Every claim is based on numerous data elements, and the relationships between different elements can help identify fraudulent or wasteful spending.

With a total revenue of more than 8 billion euros, only 65 million euros were recovered from mishandled claims before using SAS. As little as 6 million euros could be classified as fraud.

“The traditional way of monitoring claims was manual and labor-intensive,” Suijkerbuijk says. “And that made it difficult to recognize patterns and relationships in the enormous amount of data.”

The process was more difficult due to a system of complex medical codes. Plus, CZ often checked statements only after a payment was made. This was done to avoid any long delays in processing claims. As a result, recouping funds proved costly and inefficient.

Because CZ knew it could uncover more fraud with analytics over a rules-based system alone, the company implemented SAS Detection and Investigation. This solution allows insurers to automate fraud discovery and check claims for fraud in real time.

Sophisticated data mining and extensive analysis

With SAS Detection and Investigation, the Dutch health insurer now analyzes health provider profiles more effectively. The company uses a comprehensive hybrid detection method that employs a combination of rules, anomaly detection, predictive models and social network analysis.

“Prevention is always better than cure. Through intelligent analysis, we can stay ahead of faulty statements and fraud.”

Marnix Suijkerbuijk
Director of Health Care and Declaration Service, CZ
By integrating disparate information on claims and costs, CZ also gets a full picture of a health care provider and a much broader view of provider data. And CZ is now able to detect previously unknown fraud schemes and spot linked entities to stem larger losses.

“SAS enables us to perform analysis on the largest possible data set from a central location,” Suijkerbuijk says. “We can also apply data mining to all the claims in our systems to identify patterns and anomalies in statements sooner. This allows us to look beyond the most obvious cases.

CZ is now able to move beyond a pay-and-chase model to prepayment control. The company can detect incorrect statements and consult with care providers immediately if there are any concerns about a claim.

‘Paving the way to health care payment integrity’

Using SAS, CZ established a second-generation health care cost-management program designed to quickly detect, investigate and report on suspicious claims.

“Through this program and enhanced communication among CZ staff, our employees can easily spot – and act on – irregular statements,” Suijkerbuijk says. “We also actively involve our 3.4 million insured parties with checking health care invoices. To increase this client participation in finding fraud, waste and abuse, insured parties can indicate possible mistakes and errors in the personal online portal ‘My CZ’ so we can follow up on it.”

One of the first areas CZ applied SAS Detection and Investigation was to check mental health and physiotherapy claims. Now, its use of SAS has expanded to process statements for medical accessories and pharmaceuticals. Eventually, the insurer plans to investigate general practitioner care, hospital care and dental health.

“Stagnation is not an option when it concerns combating waste and unlawful health care expenses,” Suijkerbuijk says. “We’re paving the way to health care payment integrity – stopping losses before they occur while processing genuine claims on time.”
Brother, can you spare a Healthcoin?

Blockchain technology and payment integrity in health care

Ben Wright, Sr. Solutions Architect, SAS
Blockchain technology has arrived in the health care space, bringing anticipation of revolutionary change in operational efficiency, data management, security, fraud prevention, disease prevention, and perhaps even in payments.

While these are not new goals, I am ever the optimist. As almost every article on blockchain technology points out, the technology itself promotes breaking down “data/process silos” and adoption of a processwide, end-to-end view of transactions. This is truly great news for enterprise analytics platforms, for payment integrity, member cost management, and for health care fraud detection! I’ll return to the payment integrity focus in a moment, but first a (very) brief explanation of blockchain technology.

What is blockchain? And how can it be used in health care?

Blockchain is the technology architecture on which Bitcoin and other cryptocurrencies are built. When blockchain is used in a health care setting, each event in a transaction’s life cycle generates a new “block” of information that is complete, permanent, cryptographically signed and cannot be modified, reversed or adjusted. One such event might be a medical record update, preceded by a primary care physician visit. These blocks are “chained” together chronologically.

In the case of Bitcoin, the blockchain is public, in that anyone can view the history but not the actors. In health, the blockchain would likely be private, meaning that an invitation is required to examine the chain. For example, the scope of the invitation might be defined by a payer, its members and its contracted provider network. Fortune Magazine ran a good introduction to blockchain, and for a more health IT-focused view, check out How Does Blockchain Actually Work in Healthcare? via Healthcare IT News.

How can blockchain reduce fraud in health care?

The opportunity to leverage blockchain to detect improper payments and health care fraud could be huge. Having the entire transaction, medical record and more at hand allows the application of advanced analytics methods for member cost and chronic condition management, as well as for prediction, overpayment detection and fraud detection from the same, verified set of data. It also opens up the potential to employ machine learning to detect dubious activity prior to payment.

When blockchain is used in a health care setting, each event in a transaction’s life cycle generates a new “block” of information that is complete, permanent, cryptographically signed and cannot be modified, reversed or adjusted.
Because all of the components (blocks) of the transaction are validated and signed, they serve as reliable input data to analysis. For example, it is possible to determine if the medical record and visit notes support the specific procedure coding on the transaction. This may take the form of rules-based, specific justification. Alternatively, the record may be used in predictive analysis to either support the likelihood a specific condition is present, or to question the billing if it departs too much from treatment usually associated with the particular condition.

**Is blockchain foolproof?**

There are so far no reports of blockchain technology being compromised, although it is still possible for the originator to submit a fraudulent health claim. It is also possible that the originator’s account can be hacked. Reportedly between 1 and 3 percent of Etherium and Bitcoin users report their accounts have been violated via typical identity theft methods, for example.

Other health care uses illustrate the potential for leveraging the data from “on chain” transactions, such as:

- Provider credentialing, enrollment and network management.
- Payment process management.
- Plan/benefit design and the pre-sales quotation process.
- Member eligibility and enrollment in Medicaid MCO (and Exchange plans).
- Chronic illness prediction and condition management.

From patient outcomes to payment integrity, blockchain health data lends itself well to the application of analytics that can deliver insights in near-real time to transform health care. Time will tell if we can seize the opportunity, but the optimist in me believes it will happen.
Analytics frees surgeons to spend more time with patients

Lillebælt Hospital streamlines clinical audits using SAS®
The Department of Orthopedic Surgery at Denmark’s Lillebælt Hospital gave up resource-intensive, manual journal audits and initiated an IT solution that provides quality control of registrations in all patient records.

Previously, 1 percent of the patient records in the Department of Orthopedic Surgery at Vejle Hospital, a division of Lillebælt Hospital, were checked by random sampling during record audits four times a year by a surgeon and a secretary. But even the 160 records that were checked brought limited knowledge to those who made the mistakes, and most importantly, the quality control was time-consuming.

The hospital detected errors in 33 percent of the records it checked by random sampling. This meant that the hospital registered faulty or too few diagnoses or treatments. For example, when a patient with a thigh-bone fracture caught pneumonia during the hospitalization, the pneumonia and the treatment of it were too often not registered.

Automated clinical audit

The department implemented the Clinically Correct Time-True Registration system, which automatically analyzes the records of all hospitalized patients. This is done by a text analytics-based solution from SAS. The software analyzes the surgeon’s dictation in the patient record and automatically registers the code that is connected to the diagnosis and the treatment. Some adaptation has been required to ensure that both Danish and Latin terms, as well as abbreviations, are interpreted correctly.

Lillebælt Hospital has adjusted and tested the system on an ongoing basis, and is ready to watch it stay the course on a larger amount of records. The hospital staff is evaluating the project to determine how well errors have been caught and fixed, and whether this is freeing surgeons to spend more time with patients.

“If the project meets our expectations, it can immediately be transferred to other orthopedic surgery departments in the Lillebælt Hospital group,” said a member of the management team. “And with a few adjustments of codes and terminology, it can also be transferred to other surgical departments, where electronic patient records are already in use.”

Information basis for other improvements

Due to this project, management at Lillebælt Hospital has prioritized the establishment of a database that can also be used for improvements in other areas. For example, the quality of clinical work can be improved because the procedures and diagnoses described in the electronic patient records are accessible in other systems, thereby forming a better basis for research and further diagnosis.

“Mistakes can be major or minor, significant or insignificant. But it is important to remember that all health care policy decisions are based on the statistics that each clinic contributes by registering data,” said another member of the management team. “If data is faulty, the basis for decision making is also faulty. Therefore, the Clinically Correct Time-True Registration system makes sense beyond our department and hospital.”
Navigate a transformative era in health care delivery with advanced analytics

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