ReFlections

RGA's Global Medical Newsletter

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FROM THE EDITORS

Happy New Year! We are pleased to bring you the first 2019 edition of *ReFlections*, RGA's global medical newsletter. Within are several thought-provoking articles we hope will start your year out on a good note.

We lead off with an article on iodine and thyroid disease, written by Dr. Jenny Wu, Medical Director, Asia Pacific, and Dr. Heather M. Lund, MBBCh, Chief Medical Officer - Asia. Although iodine deficiency has long been known to cause thyroid disease and a range of secondary sequelae, iodine excess in recent years in certain areas may have caused a substantial increase in incidence of thyroid cancer. An update on thyroid cancer risk classification is also provided. We think you will enjoy their exploration.

RGA's Electronic Health Records specialist Susan L. Wehrman, Vice President, EHR Initiatives, continues her periodic series of articles about EHR with a piece describing its current state and where trends might be taking its development. As the field continues to evolve, insurers, especially in the U.S., are finding themselves taking a stronger and more central role in the development of advanced and applicable systems.

For the first time, we are featuring an opinion column, written by a new *ReFlections* author: Dr. Rahul Kumar Garg, Development Underwriter, RGA International. Dr. Garg writes about the evolving role of machine learning and artificial intelligence in both clinical and insurance medicine and the role of the health practitioner.

Finally, our report on The Longer Life Foundation (LLF), the not-for-profit foundation supported by RGA and Washington University in St. Louis School of Medicine, features an interview with Dr. Samuel Klein, the new head of LLF's Longevity Research Program. Dr. Klein provides fascinating insights into current scientific thinking about nutrition and obesity, and demonstrates how LLF is advancing knowledge in this area for the insurance industry.

For 2019, we wish every one of you health and success. Please don't hesitate to let us know your thoughts about these articles, and how we can shape *ReFlections* to be the best medical newsletter for you!

Thank you,

Peter and Dan

THE RELATIONSHIP BETWEEN IODINE AND THYROID FUNCTION/DYSFUNCTION

Abstract

The relationship between iodine deficiency and thyroid dysfunction and disease has been well-established for nearly a century, resulting in strong efforts to ensure sufficient iodine for populations around the world. Interestingly, over the past few decades, incidence rates for thyroid cancers have reportedly been increasing dramatically, sparking research into the association of iodine excess and thyroid disease. In this article, we focus on the relationship between iodine and thyroid disorders, the updated clinical risk classification of thyroid cancer stages, and the possible impact of these changes on the insurance industry.

About Iodine

Iodine is a micronutrient necessary for human development and health. It is required for the synthesis of thyroxine (T4) and triiodothyronine (T3), two thyroid hormones that play key roles in human metabolic functions and processes. It is derived mainly from diet, and is dependent on concentrations in soil and water as well as supplementation. Excess iodine is primarily eliminated in urine.

Until about 100 years ago, lack of dietary iodine played a major role in the prevalence of goiter (enlarged and malfunctioning thyroid gland) and certain types of neurocognitive impairment. These conditions are today rarely seen in the developed world, but are still evident in certain areas of China, India, Central Asia, and Central Africa.

Iodine's role in curing and preventing thyroid disease has long been recognized, but it was not until the early 20th century that public health steps began to be taken to ensure improved population access. Iodized salt and iodine tablets were first introduced into Canada, Switzerland, and the U.S. shortly after the First World War (early 1920s).

In 1990, the United Nations World Summit for Children set forth the goal of eliminating iodine deficiency worldwide, resulting in the issuance in 1993 of recommended standards for universal salt iodization by the World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF). The standard recommended that "All food-grade salt, used in household and food processing, should be fortified with iodine as a safe and effective strategy for the prevention and control of iodine deficiency disorders in populations living in stable and emergency settings."

Today, universal salt iodization (USI) has been implemented in more than 120 countries,[2] and approximately 86% of the world's population currently has at least some access to iodized salt.

The benefits of correcting iodine deficiency are remarkable: Goiter, if caused by an iodine deficiency, is directly treatable using iodine. In addition, some systematic reviews have shown that providing iodized salt to populations has brought both a significant reduction in the risk of low intelligence (defined as IQ <70), and an almost 10-point overall increase in population IQ among iodine-deficient children.[3, 4]

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Dr. Jenny Wu is a Medical Director, Asia Pacific for RGA Reinsurance Company. Based in Beijing, she provides medical support and assistance for underwriting and claims, regional client training needs, and underwriting manual development. Dr. Wu received her Bachelor's and Master's degrees in Medicine from Capital Medical University in Beijing, and her clinical experience includes eight years at Xuanwu Hospital – First Hospital of Capital Medical University in an internal medicine and cardiovascular practice.

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Heather M. Lund, MBBCh, is Chief Medical Officer – Asia at RGA Reinsurance Company. She provides medical consultation expertise and technical assistance for reinsurance underwriting and claims assessment, supporting actuarial business development, marketing and pricing teams across the Asia region. A native of South Africa, Heather's Bachelor of Medicine, Bachelor of Surgery (MBBCh) degree is from the University of the Witwatersrand in Johannesburg. Her background is in family medicine, with a special interest in maternal health. She is a frequent contributor to medical publications and has also served on program committees of the International Committee for Insurance Medicine (ICLAM) and the Academy of Insurance Medicine in Asia (AIMA).

Unfortunately, however, iodine deficiency disorder is still a major global public health problem today. As of 2012, an estimated 2.2 billion people worldwide were known to be living in iodine-deficient areas.

Is excess intake a risk for thyroid cancer?

Interestingly, the relationship between iodine intake and thyroid disorders tends to be u-shaped, in that both deficiency and excess can cause thyroid dysfunction.

According to recommended dietary iodine standards from WHO, UNICEF, and the International Council for Control of IDD (ICCIDD), a normal range of urinary iodine concentration (UIC) is 100 to 199µg/L. A UIC level of <100µg/L indicates an iodine deficiency, a level of between 200 and 299µg/L is above normal, and ≥300µg/L indicates excess iodine.

At the 1927 International Conference on Goiter, eminent German pathologist Carl Wegelin predicted the incidence of thyroid cancer and endemic goiter would disappear due to iodized salt over the next 30 to 40 years. His prediction, insofar as goiter is concerned, has for the most part come true. As for cancer, however, the story is quite different.

> **Papillary thyroid cancer is now the fastest-growing cancer, especially among women, in high-income countries.**

The prevalence of anaplastic thyroid cancer (ATC), also known as undifferentiated thyroid cancer (UTC), decreased in many countries with the introduction of iodized salt. However, incidence of differentiated thyroid cancers such as papillary thyroid cancer (PTC) increased, particularly since the 1980s. PTC is now the fastest-growing cancer, especially among women, in high-income countries such as the U.S., South Korea, and several European countries including the United Kingdom and Switzerland.

The reason for this increase is unclear, although many researchers point to the growth in rates of imaging studies of the neck due to mandated screening programs in some countries. Small thyroid nodules are frequently discovered during imaging exams before they become apparent on physical exams. This has led to some belief among investigators that thyroid cancer is being over-diagnosed.

In March 2014, in an effort to slow the explosive growth in thyroid cancer cases diagnosed in South Korea, a group of South Korean physicians formed "The Coalition of Doctors to Prevent Over-diagnosis of Thyroid Cancer." Ultrasonography screenings of healthy people was called into question. Since then, insurance claims data suggest a 30% reduction in the incidence of thyroid cancer in South Korea.[5]

Still, whether the huge increase in thyroid cancer incidence was solely the result of over-detection or attributable to known or new risk factors causing a real change in the incidence is still up for debate.

Some researchers have suggested that higher iodine intakes are contributing to the increase in PTC, while others disagree.

Recent research from countries with high incidence of thyroid cancer has pointed out the association between excessive iodine exposure and increasing thyroid cancer risk.

In South Korea, for example, a meta-review of 16 studies determined that the odds ratio (OR) for the overall effect size between high iodine intake and PTC risk was 1.418 (95% confidence interval 1.054 – 1.909). Seven other studies conducted in high-iodinated

regions showed a positive association between iodine intake and PTC (95% CI 1.389 – 3.483).[6] Similarly, median UIC levels were significantly higher in the PTC group (786.0µg/l) than in the control group (112.0µg/l; p < 0.001).[7]

Studies from China have pointed out a temporal association between the country's introduction of mandatory universal salt iodization in 1996 and a subsequent increase in PTC incidence.[8] Most cases are papillary thyroid microcarcinoma (PTMC) with a maximum tumor diameter (MTD) < 1 cm. Medullary thyroid carcinoma (MTC) and follicular thyroid carcinoma (FTC), however, decreased.[9]

Several studies also found that thyroid cancer incidence in East China was highest while that in Middle China was the lowest. In addition, incidence was higher in urban than in rural areas. The highest urban incidence was in Dalian, and rural incidence in the Fujian

> **The relationship of iodine intake to thyroid disease is u-shaped due to the fact that both deficient and excessive intake can impair thyroid function.**

province's Changle district.[10] In addition, in 2010, Zhejiang, a coastal province south of Shanghai, had thyroid cancer incidence of 10.74/100,000, much higher China's nationwide incidence (3.23/100,000).[9] Although the above-mentioned coastal areas do not belong to regions noted for iodine deficiency, they are still supplied with iodized salt.

As mentioned earlier, the relationship of iodine intake to thyroid disease is u-shaped due to the fact that both deficient and excessive intake can impair thyroid function. Iodized salt program should be monitored carefully to provide adequate iodine but also avoid excess intakes.

Risk classification update[11]

In October 2016, against the backdrop of fast-increasing PTC (especially PTMC) incidence, the American Joint Committee on Cancer (AJCC) published its 8th edition of the AJCC/TNM cancer staging system.

In the new staging system, thyroid cancers range from stage I to stage IV, with higher stages indicating greater spread. The system, which stages thyroid cancers in accordance with the size of the tumor (T), the spread to nearby lymph nodes (N), and the spread, or metastasis (M) to distant sites, is one of the most important tools for underwriting and claims assessment.

The two main differences in the new staging system are:

- The age cutoff for stage I thyroid cancers has been raised from 45 to 55

- The definition of T3 disease has removed regional lymph node metastases and microscopic extrathyroidal extension

In other words, the new staging guidelines move a significant number of higher-stage thyroid cancer patients to lower stages. A significant number of patients between ages 45 and 54 with low lymph node spread and no metastasis (N1, M0) will automatically be downstaged to stage I, and older patients will be downstaged to either stage I (≥ 55 years old, minor extrathyroidal extension, N0, M0) or stage II (≥ 55 years old, N1, M0). In addition, all patients with differentiated thyroid cancer (≤ 4 cm) confined to the thyroid will be classified as stage I. The prior edition had classified smaller tumors (≤ 2 cm) as stage I and larger tumors (2 cm - 4 cm) as stage II.

Based on this new edition, many substandard or postponed cases will be issued at standard, and many thyroid cancer cases that were earlier defined as stage T2 and T3 are now to be classified as stage T1 and excluded from cancer claims but transferred into early-stage cancer group. This may impact underwriting manuals, CI definitions, and pricing bases.

The new [thyroid cancer] staging guidelines move a significant number of higher-stage thyroid cancer patients to lower stages.

Conclusion

Increased use of ultrasound screening over the past few decades has greatly increased detection of thyroid cancer, especially papillary and early-stage tumors, resulting in a large increase in incidence of thyroid cancer. Not all of the increase in incidence, however, can be explained by overdiagnosis. Other risk factors, including radiation exposure, iodine intake, obesity, diabetes, estrogen supplementation, reproductive factors, and Hashimoto's thyroiditis, can be considered possible causes.

The u-shaped curve describing the relationship between iodine intake and thyroid disorders reflects the fact that both deficient and excessive iodine intake can impair thyroid gland function. Thus, iodized salt programs should be carefully monitored to provide adequate but not excess iodine intake.

As for the most updated AJCC-8 thyroid cancer staging guidelines, underwriting, claims, pricing and product development departments of insurance companies need to pay close attention and make timely adjustments in their risk management. RJF

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# ELECTRONIC HEALTH RECORDS – ARE WE NOW IN PRIME TIME?

Abstract

Electronic Health Records (EHRs), long in development, are nearing a tipping point of acceptance in the U.S. However, challenges are still cropping up in terms of several issues, ranging from interoperability, structured and unstructured data, and most important, determining how best to develop a system that will allow all of the essential data to go to the right places. This article discusses the current state of EHR, its advances and challenges, and the insurance industry's role in making it work.

Overview

Electronic Health Records (EHRs) are currently experiencing widespread adoption in the U.S. Fueled by government involvement and funding, consumer engagement, physician comfort with the maturing technology, and overall evolution of the Health Information Technology (HIT) landscape, U.S. EHR adoption by healthcare providers more than doubled, from 42% to 87%, from 2008 to 2015. Currently, at least 84% of U.S. hospitals have adopted EHRs – a nine-fold increase since 2008.[1]

Figure 1: U.S. EHR adoption
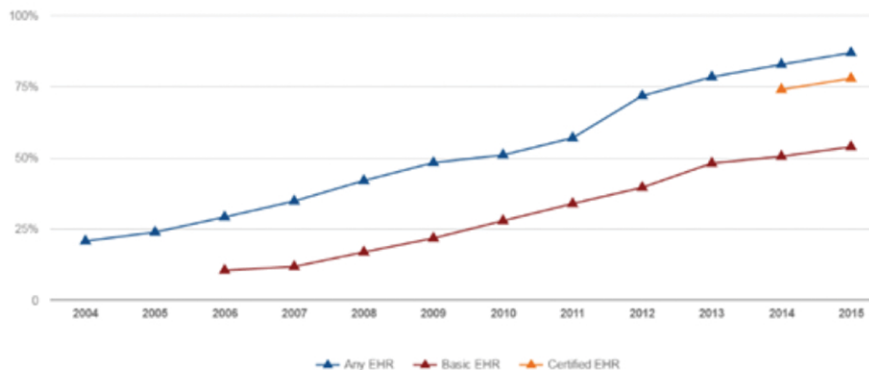
Source: ONC Health IT Dashboard

These numbers certainly indicate good news for EHR, but challenges remain. First, although adoption is high, interoperability – that is, the ability of various systems to communicate easily with one another – is still low. Second, although consumers like to be in control of their medical information and still contribute patient-generated information from wearables, home testing kits, diagnostic apps, and the like, many healthcare providers simply do not yet know how best to utilize the information.

Then there are the issues of EHR utility and usability, two fundamental and opposing needs. EHR usability has to do with the quality and completeness of data life insurers see during underwriting and claims adjudication, while utility has to do with ease of access and use.

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Susan L. Wehrman, Vice President, Electronic Health Record Initiatives (EHRI), founded and leads RGA's now seven-year-old electronic health record initiatives unit as part of RGA's U.S. Mortality Markets New Business Initiatives function, one of the first such units in the insurance industry. EHRI conducts in-depth research and analyses of this fast-evolving segment, monitors all pertinent activity in the U.S. and around the world, and assists clients with EHR-related issues. Sue has a Master of Science (M.S.) degree in Health Information Management, and publishes frequently on EHR-related topics.

Enterprises need structured, coded data-capture capability, whereas physicians need utility – that is, they need the data in a form that can facilitate fast and easy creation of clinical notes.

Structured and Unstructured Data

EHRs are collections of standardized files specified by the HL7 Electronic Health Record-System. HL7 is the international standard for transfer of clinical and administrative data between software applications used by various healthcare providers.

EHR files utilize reusable templates and set formats. Data is arranged chronologically, according to episode of care, and documents the patient profile, visit and encounter information, health status (symptoms, signs, test results, etc.), diagnoses made, treatment plans, and communications between care providers.

Structured EHR data is represented by several medical coding vocabularies (see Figure 2), each of which consists of thousands of codes that are used to represent diagnoses and symptoms in Problem Lists and Procedures. For example, there are nearly 95,000 ICD-10-CM codes alone, and ICD-10 is just one of many standardized code systems used in health care.

Unstructured data, on the other hand, represents roughly 80% of the data currently in EHRs. Unstructured data includes: notes and care plans (narratives); images of historical data; radiology and EKG reports; and more.

> **Enterprises need structured, coded data-capture capability, whereas physicians need utility.**

The Health Story Project, an initiative of the Healthcare Information and Management Systems Society (HIMSS), estimates that some 1.2 billion clinical documents are produced in the U.S. each year, and about 60% contain valuable patient care information. However, that information is trapped in an unstructured format.[2]

EHR Data Acquisition

There are four dimensions of data acquisition: data origination; data source(s) (EHR/medical claims); data aggregators and transmitters; and those who can alter the data.
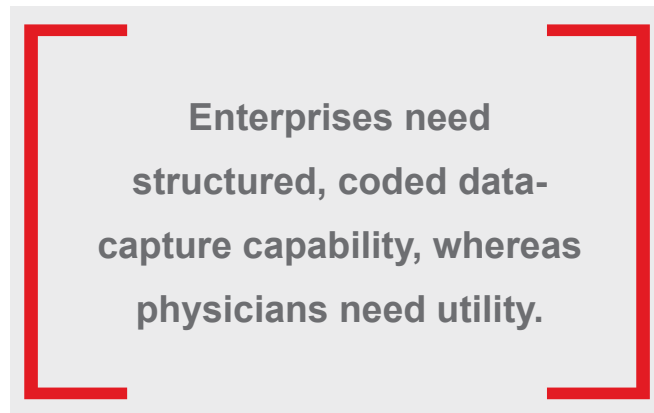
Figure 2: Standardized codes used for medical report sections

SECTION	STANDARDIZED CODES
Demographics	HITSP harmonized code sets for gender, marital status
Problem list	ICD-9/10-CM or SNOMED-CT
Procedures	CPT-4 or ICD-9/10-CM
Medications	RxNORM
Allergies	UNII for foods and substances, NDF-RT for medication class, RxNorm for medications
Immunizations	HL7 CVX
Vital signs (height, weight, blood pressure, BMI)	SNOMED-CT or LOINC
Progress notes and other narrative documents (history & physical, operative notes, discharge summary)	CDA templates
Departmental reports (pathology/cytology, GI, pulmonary, cardiology, etc.	SNOMED-CT
Lab orders and results	LOINC for lab name, UCUM for units of measure, SNOMED-CT for test ordering reason
Microbiology	LOINC for lab name/observation
Administrative transactions (benefits, referrals, claims)	X12, CAQH CORE

Source: RGA

Insurers acquire consumer data as follows:

- **Direct from consumers:** Consumers aggregate their health records from providers via their patient portal(s), and store the data in a central location (Personal Health Records, apps, etc.). They control and maintain their data, and make it available to their insurers. *This is structured EHR data.*

- **Patient Portals:** Consumers share credentials for their patient portals with their life insurers or other intermediaries, enabling them to retrieve the data. The health care provider controls and maintains the patient data at the source. *This is structured EHR data.*

- **Providers or Health Information Exchanges (HIEs):** Consumers permit their life insurer or other health care intermediary to directly exchange their health care data electronically with health care providers and/or HIEs. The provider or HIE controls and maintains the data at the source. *This is structured and unstructured EHR data.*

- **Healthcare Clearinghouses:** These companies are intermediaries that take in health care claims data and aggregate and "normalize" it (i.e., structure it) so that it can be viewed uniformly. They then forward the normalized claims information to insurance companies. The health care provider controls and maintains the actual data at the source. *This is structured claims data.*

- **Pharmacy Benefit Managers (PBMs):** These are third-party administrators of prescription drug (Rx) programs for insurers that aggregate and normalize pharmacy data. The pharmacies control and maintain the data at the source. *This is structured Rx claims data.*

> **Much health information is trapped in unstructured formats.**

New ways of aggregating and distributing EHR data are emerging. Apple, for example, recently released an app that allows patients to view their EHRs on their iPhones. The app will transfer patients' actual medical records to their handheld devices (structured EHR data). This is but one example in a string of attempts by nontraditional players to improve health data exchange.

Many of the newer acquisition models will challenge fundamental ways of thinking. Life insurers may have to redefine chain-of-custody and their comfort level with applicant control of protected health information.

Claims vs. Clinical Data

Generally, medical claims data are broad in scope and shallow in terms of detail, whereas EHR (clinical) data are narrow in scope but deep in detail.

Claims data comes from health insurers, and contains highly personal information, such as patient demographics (name, address, gender, etc.), employment and insurance status, dates of medical service(s), diagnoses and procedures, service provider information, and charges for services. Frequently it is the only holistic view of an individual's interactions with the health care system.

This data has several advantages for insurers: it provides a good reflection of the tests, procedures and services provided to a claimant; fills and refills of prescriptions are included, enabling underwriters to assess medication compliance; and it can reflect services from providers that do not use EHRs, or are not connected to an HIE or other

health information source, as medical services received by policyholders generally need to be reimbursed.

Clinical data from EHRs, on the other hand, is much richer. Claims data holds only those pieces of information required to facilitate reimbursement to the provider, but clinical data captures the medical history of uninsured patients, including purchases and use of non-prescription drugs, vital signs, personal habits (e.g., smoking), and past as well as current problems and diagnosis lists. Additionally, a patient may not always meet the criteria for a given diagnostic code (for purposes of reimbursement).

Also, with clinical data, all diagnoses and conditions reported during a visit are coded (especially symptoms), but may not necessarily all be reported for reimbursement and reflected in claims data. In addition, claims data lists charges for lab tests and procedures performed, but not the actual results. Finally, claims data also reflects only diagnoses and services that occurred on the date the claim was submitted, and don't convey information about the past.

> **The life insurance industry is breaking new ground in its efforts to correlate clinical data, health claims data, and patient-generated data.**

Challenges for Life Insurers

Accessibility. Now that EHRs, at least in the U.S., are digital, the Health Insurance Portability and Accountability Act of 1996, which governs privacy laws in the U.S., is also governing electronic transmission, specifying proper methods for de-identifying health information before sharing with outside parties ("Safe Harbor").
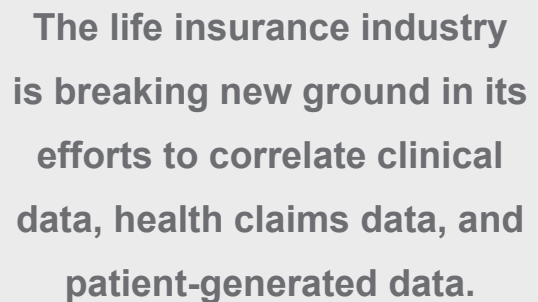
While cost structures should be changing due to advances in technology, progress is still slow. Covered entities (providers) are permitted to charge reasonable, cost-based fees that cover the cost of supplies and labor costs to provide paper and digital copies of EHRs. They cannot, however, charge a fee for retrieving the records. The cost of digital feeds to external parties remains largely unknown and is unregulated.

Aggregation. This is fueled by two primary factors: record-matching and interoperability. In terms of record-matching, as there is no national patient identifier or universal health record ID in the U.S., it is nearly impossible to stitch a record together electronically for a single individual from multiple healthcare facilities and providers.

As for interoperability, in the U.S. it was originally envisioned that it would be achieved by providers signing on with government-funded HIEs that would link to a National Health Information Network. The reality is the development of these exchanges is currently struggling with sustainability as federal funds dwindle. Also, each EHR vendor has developed proprietary software and platforms. Consequently, privately-funded exchanges and vendor coalitions have emerged, which are competing successfully with the government-funded exchanges.

Normalization. Despite mandated standards and templates for EHR, this may be a ways off. More than 1,000 IT systems are currently operating in the field of health care, and each has its own platform. Many systems are customized by providers to suit their specific implementation. Users populate the records according to their own comfort and habits, making frequent use of unstructured text.

Interpretation. Once health care data access was gained, and all of the data was aggregated and normalized, one would think insurers might be home free. But it is not that easy. Putting aside the sheer volume, duplication, and extraneous data (in terms of underwriting), insurer efforts to interpret the data are becoming even more complex.

Let us take a look at the timeline in Figure 3.

Figure 3: A year in the life of an insured
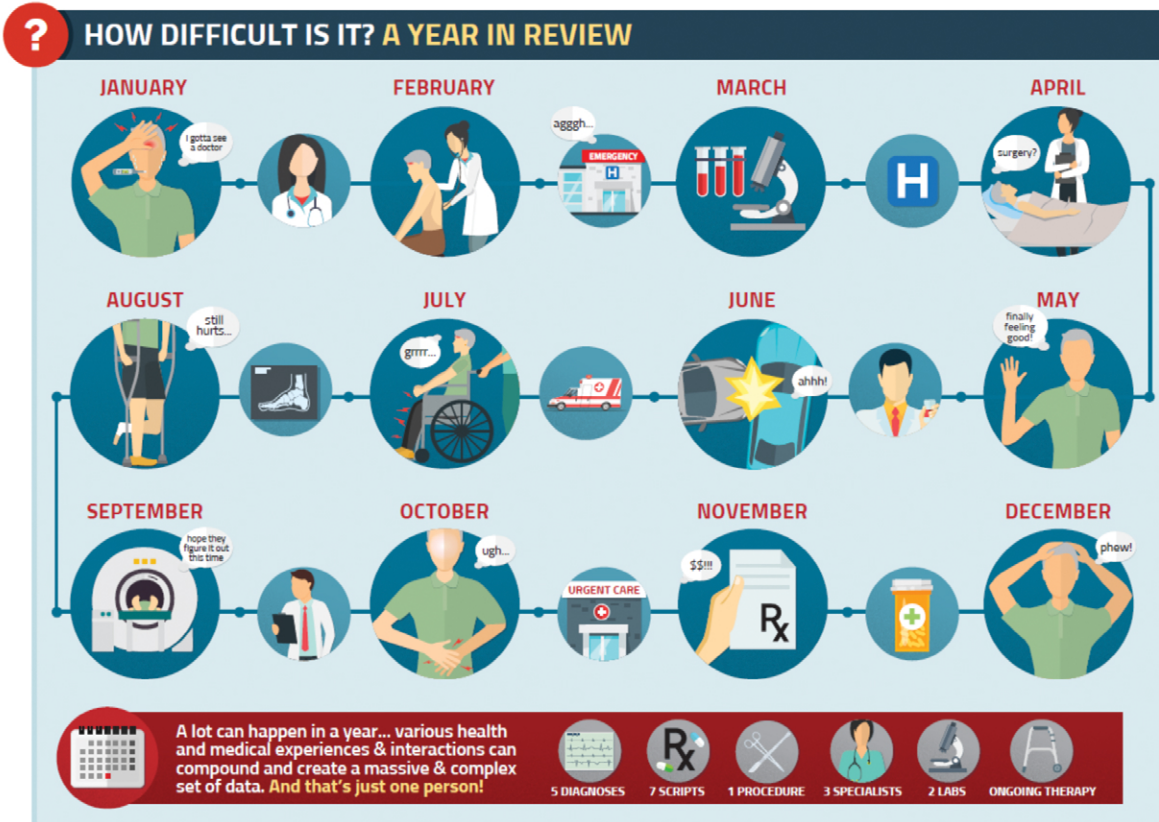
Source: RGA

Every month tells another piece of an individual's health care story, from conditions and tests to therapies, prescriptions, and medical equipment. All of this is important information for insureds, and will benefit from organization that facilitates interpretation.

Figure 4: Code sets used for EHR (clinical) and medical claims data

	Claims Data	EHR (clinical) Data
Diagnoses	ICD-9/10-CM	SNOMED CT
Laboratory	LOINC (no results)	LOINC
Procedures	ICD-9/10-PCD (no results)	CPT, HCPCS
Prescription Drugs	NDC	RxNORM
Vital Signs	None	LOINC

Source: RGA

Conclusion

For some time now, the big question has been "When?" … as in "When will EHRs become a reality for life insurers?" The answer is today. Right now.

The bigger question, now, however, is "How?" … as in "How will life insurers use EHRs?" That question is much harder than the first.

The life insurance industry is breaking new ground in its efforts to correlate clinical data, health claims data, and patient-generated data in order to derive the complete story of an insured's health or risk status.

The transformation of underwriting has already begun. Are you ready?

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RECENT WEBCASTS

RGA's webcasts, which are available for viewing at your convenience, focus on topics of interest to underwriters, claims managers, and insurance medical directors.

In this issue, we feature a four-webcast series covering the research undertaken from RGA's recent partnership with King's College London. The research is one of the first to use UK Biobank, a population-based cohort study of 500,000 participants, to investigate major mortality and morbidity outcomes via genetic and traditional risk factors. This extraordinary database, established to identify the determinants of common life-threatening and disabling conditions, contains extensive clinical, genetic, environmental, sociodemographic, and biomarker data, including thousands of collected variables.

Use of Genetics in Insurance and Growing Opportunities for Anti-Selection
Presenter: Peter Banthorpe, Senior Vice President Global Head of Research & Development, RGA
http://bit.ly/RGA_web1

Genetics 101: Genetic Risk to Disease and Polygenic Risk Scores
Presenter: Dr. Richard Russell, Lead Health Data Scientists, Global Research and Data Analytics, RGA
http://bit.ly/RGA_web2

RGA Research Collaboration with King's College London
Presenter: Cathryn Lewis, Professor of Genetic Epidemiology and Statistics, Statistical Genetics Unit, King's College London
http://bit.ly/RGA_web3

Genetics and Risks of Anti-Selection
Presenter: Peter Banthorpe, Senior Vice President and Head, Global Research and Data Analytics, RGA
http://bit.ly/RGA_web4

INTELLIGENT ROBOTS AND EMOTIONAL CLINICIANS – WHAT STILL MATTERS IN THE DOCTOR-PATIENT RELATIONSHIP

Knowledge has long been of the essence in clinical medicine. However, with advances in machine learning (ML) and artificial intelligence (AI) coming with increasing speed, could the basic human component of clinical medicine – the relationship of the patient with the doctor and other clinicians providing services – be in danger of obsolescence?

That is becoming an increasingly tough question to answer. Machine learning capabilities are growing exponentially with every machine training cycle,[1] and data scientists today are working feverishly to improve and enhance these emerging capabilities. For example, it is onerous to teach a machine to calculate square roots for the first time, but once the machine learns, it can scale its capability via training to calculate square roots of large numbers as well.

Already, big data and advanced analytic capabilities are leveraging the genome in ways that are vastly improving diagnostic and treatment capabilities, and AI algorithms have integrated into medical information-gathering as well as other routine clinical work.

This could all be fostering an ecosystem too dynamic to even have a comfort zone.

At this point, however, many human aspects of health care appear to be safe, at least for now. Although studies are claiming that most[2] skilled jobs may be completely automated by the year 2060[3] and the majority of healthcare jobs might at least be partially automated in the next 10 years,[4] I don't believe or expect ML or AI to replace flesh-and-blood clinicians completely.

Why? Do clinicians possess a capability that machines do not? Yes: emotional intelligence.

This to me is a positive, as the idea of machines substituting for clinicians is definitely not in my comfort zone. And I doubt I am alone in my unease. In healthcare, the human component is still vital. Think about Albert Mehrabian's 7-38-55 Rule of Personal Communication: 55% of human communication occurs via body language, 38% through tone of voice, and only 7% through spoken words.[5] Patients present not just with biometric data points, but also with verbal and non-verbal cues found in their tone of voice, the speed and rhythm of their speech, and their body language – all important elements for a good diagnosis. Relying only on words and numbers, as machines must do, would miss a whopping 93% (38% + 55%) of input – input that could make a difference in that patient's future health.

In addition, although the pace of growth in computers' capacity to take in and access data began to slow in 2015, it is still growing rapidly. In 30 years, the president of Japanese tech-focused hedge fund Softbank believes computers could have the computational and data-storage

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power equivalent to an intelligence quotient of 10,000 – about 100 times greater than that of the average human.[6]

All of this intelligence is bound to change workplaces – including our own – and the ability to manage intelligent workplaces is clearly going to be a future skill need. That being said, it is unlikely that an algorithm would replace humans in the management of medical practices or underwriting. Medical professionals, however, are going to have to be far more than just clinicians. To manage practices that integrate human abilities with ML and AI, they will need leadership skills, strong emotional quotients (EQs), high levels of medical and technical knowledge, and a commitment to continuous improvement of their knowledge and skills, both in medicine and technology.

The medical professionals who can make the leap not just to managing machines and humans, but also to working hand-in-hand with increasingly intelligent machines, will be the most effective clinicians and underwriters, going forward. No matter how much machines and the data they analyze and generate can help, the care of health and underwriting of lives are still, fundamentally, human-driven endeavors, and are likely to remain so. 🞔

Note: For additional reading on this topic, please visit https://jamanetwork.com/journals/ jama/fullarticle/2718456 and https://jamanetwork.com/journals/jama/fullarticle/2718457.

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Longer Life Foundation

An RGA/Washington University Partnership

Dr. Samuel Klein is a long-renowned researcher in the field of obesity science. He holds several chairs at Washington University in St. Louis School of Medicine, and was recently named Director of the Longevity Research Program, an initiative sponsored by The Longer Life Foundation (LLF) that seeks to take a multidisciplinary focus on how nutrition, along with a range of lifestyle factors, can impact biomarkers for cell health and human longevity.

In a recent discussion with Dr. Daniel Zimmerman, managing director of LLF and co-editor of ReFlections, Dr. Klein shared insights into current advances in scientific thought about nutrition and obesity, how the field is evolving and how it might continue to evolve in the years ahead.

How did you personally become interested in studying human nutrition and metabolism? Did you have any role models or mentors?

My interest in nutrition and metabolism has grown from college until now, through a steady progression of targeted training experiences. I first became interested in the relationship between nutrition and health when I was in college, which led to my interest in going to medical school. In medical school this interest increased, so I sought a medical residency program at Boston University, in part because of its reputation for excellence in nutrition support of hospitalized patients.

To get a better understanding of the science of nutrition, I completed a Master's Degree in Nutritional Biochemistry and Metabolism at Massachusetts Institute of Technology. While there, I began to work closely with the late George Blackburn, M.D., Ph.D., who is one of the founding fathers of obesity medicine and nutrition support, and Robert Wolfe, Ph.D., who helped establish the field of using stable isotope tracers to evaluate metabolic function in people and is currently the Director of the Center for Translational Research in Aging and Longevity at the Reynolds Institute on Aging. Dr. Blackburn and Dr. Wolfe, both of whom I consider my mentors and role models, made me appreciate the importance of conducting clinically important, hypothesis-driven metabolic research in human subjects – a research approach that has declined with the explosion in basic science technology and genetically modified rodent models.

LLF INTERVIEW

SAMUEL KLEIN
M.D.

William H. Danforth Professor of Medicine and Nutritional Science

Chief, Division of Geriatrics and Nutritional Science, Department of Medicine

Director, Longevity Research Program

Washington University in St. Louis School of Medicine

What is the Longevity Research Program at Washington University in St. Louis School of Medicine, and what is your vision for it?

The purpose of the Longevity Research Program (LRP) is to stimulate interdisciplinary research among Washington University faculty members, with the goal of evaluating the physiological and cellular mechanisms that promote healthy aging. The focus of LRP is on investigating the impact of lifestyle factors, namely diet (e.g. energy content, composition and timing of food intake), physical activity (e.g. duration, frequency and intensity of endurance and resistance exercise), and sleep (e.g. duration and timing). We plan to continue the research into calorie restriction pioneered by Dr. Luigi Fontana and Dr. John Hollozsy, who led LRP for many years. LRP also maintains a unique repository of blood, adipose tissue, muscle, and liver samples from human subjects who have had comprehensive assessment of their body composition and metabolic function, that can be used for future analyses to test novel hypotheses that develop as the field grows.

How would you compare our current understanding of obesity and obesity-related disorders to that of just a few short years ago?

Advances in basic science technology have led to a marked increase in knowledge about the causes (regulation of food intake) and consequences (adverse medical outcomes) of obesity. This has led to an explosion of knowledge as well as a new understanding of the importance of the liver and adipose tissue in mediating the adverse metabolic consequences of excess body fat, and has laid down the foundation of future research directions.

Could you tell us a little bit more about the phenomenon of "metabolically normal obesity" and how that can be recognized? Does it carry less mortality and morbidity concern?

Obesity typically causes a constellation of metabolic abnormalities (increased liver fat content, resistance to insulin, inadequate insulin secretion by the pancreas,

and atherogenic dyslipidemia [high triglycerides and low HDL-cholesterol]) that are important risk factors for type 2 diabetes and cardiovascular disease. However, not all people with obesity develop metabolic abnormalities. We believe that ~10% of people with obesity are protected from the adverse metabolic effects of excess fat accumulation and can be considered "metabolically healthy" after careful metabolic testing. These individuals are at a much lower risk of developing diabetes or dying from cardiovascular disease and cardiovascular disease mortality than are people with obesity who are metabolically unhealthy.

The mechanisms responsible for the development of metabolic complications in some but not all obese persons are unknown, but potentially involve differences in genes, adipose tissue biology and inflammation, gut bacteria (the microbiome), and lifestyle factors (e.g., diet, physical activity, and sleep). A better understanding of why some people with obesity are predisposed to, while others are protected from, the metabolic complications associated with excess body fat will help identify the mechanisms responsible for the link between excess body fat and disease.

Do you think that nutritional, behavioral, or pharmacological therapies will be able to address many, if not all, of the health risks associated with obesity in the future?

Obesity is the most important public health problem in the U.S. because of its high prevalence rate, causal relationship with serious medical complications, adverse effects on quality of life, and considerable economic consequences, estimated at more than $150 billion per year in obesity-related health care costs. In my opinion, the key to reducing the health risks associated with obesity is to prevent it in the first place. However, the ability to implement changes in lifestyle that affect energy balance is not simple. Obesity prevention will require a collaboration among federal and state agencies, corporate leaders, academic institutions and health care systems to develop and implement evidence-based solutions. In the meantime, the hope is that better pharmacologic therapies will be developed to help people maintain a healthy body weight and to break the link between obesity and adverse health outcomes in those who remain obese.

Any additional comments?

A better understanding of how and why obesity causes multi-organ system dysfunction and cardiometabolic diseases in most people and why some are protected from these adverse effects will facilitate the development of novel therapies that prevent and treat obesity-related disease. It is our hope that LRP will bring together talented investigators from different disciplines who will make new discoveries in this area, which could have considerable implications on health, quality of life, and longevity. R̶F̶

Note: Please click on the link below to read a peer-reviewed article about Dr. Klein's research funded in part by The Longer Life Foundation that appeared in the journal Cell Metabolism. https://www.cell.com/cellmetabolism/fulltext/S1550-4131(16)30053-5

MEDICAL TEAM UPDATE

RGA welcomes Dr. Shiori Ochiai, Associate Medical Director, to our global network of medical officers. Dr. Ochiai is a Board Certified Member of the Japanese Society of Internal Medicine.

Please join us in congratulating Dr. Sheetal Salgaonkar, Medical Director, Global Medical Support, who recently completed all requirements to earn the designation of Diplomate of the Board of Insurance Medicine (DBIM). This is a significant milestone for Dr. Salgaonkar, who works in our Mumbai office.

Long-Term Prognosis of Patients with Takotsubo Syndrome
Ghadri J et al. J Am Coll Cardiol 2018;72:874-82
https://www.ncbi.nlm.nih.gov/pubmed/30115226

This study compared the prognosis between Takotsubo syndrome (TTS) (also known as Takotsubo cardiomyopathy) and acute coronary syndrome (ACS) patients enrolled in the International Takotsubo registry as well as researching the short- and long-term outcomes of TTS depending on trigger. Mortality between the two syndromes was found to be similar. TTS triggered by physical stress demonstrated higher mortality than ACS while cases with emotional triggers had better outcomes compared with ACS patients.

Editor's Note: *Takotsubo syndrome has often, in the past, been considered a relatively benign disorder. However, this and other recent research would indicate it has the potential for significant long-term mortality and morbidity risk. Insurers would do well by reviewing the newer literature and updating their manuals and impairment definitions accordingly.*

Smoking Cessation, Weight Change, Type 2 Diabetes, and Mortality
Hu Y, et al. N Engl J Med 2018 Aug 16;379:623-32
https://www.nejm.org/doi/abstract/10.1056/NEJMoa1803626

The authors of this study examined outcomes in men and women in the U.S. who had quit smoking and then prospectively assessed change in body weight on the impact of developing type 2 diabetes as well as death from cardiovascular (CV) disease and all-cause mortality. The risk of type 2 diabetes peaked 5-7 years after quitting (then declined) and was directly proportional to the amount of weight gained. Favorably, weight gain was not associated with increased CV or all-cause mortality.

Editor's Note: *Insurers frequently offer reconsideration for insured lives issued at tobacco rates who can demonstrate they have quit. Additionally, more insurers may consider wellness initiatives to assist insured lives to stop smoking. It is reassuring to know that the weight gained after cessation of smoking is unlikely to negatively impact the benefits of quitting and the insurers' bottom line.*

Acceleration of BMI in Early Childhood and Risk of Sustained Obesity
Geserick M, et al. N Engl J Med. 2018 Oct 4;379;1303-12.
https://www.nejm.org/doi/full/10.1056/NEJMoa1803527

Much past research has focused on predictors of adolescent, young adult, and adult obesity based on early childhood and school-age weight. This study looked at both retrospective and prospective data along with changes in BMI over time by age. It found that 53% of obese adolescents had been overweight or obese from age 5 onward. In addition, it found that prospectively, more than 90% of children who were obese at age 3 were overweight or obese in adolescence, and the greatest acceleration of BMI increments had occurred between ages 2 and 6.

Editor's Note: *As more juveniles are being underwritten globally for both life and living benefits products, often with very long policy terms, it is vital insurers understand the probability of childhood overweight and obesity persisting into adulthood and the risk that imparts.*

Companies Tout Psychiatric Pharmacogenomic Testing, But Is It Ready for a Store Near You?
Abbasi J. JAMA. 2018 Oct 3;320(16): 1627-9.
https://jamanetwork.com/journals/jama/fullarticle/2706179

The author delves into the pros and cons of pharmacogenomic testing for psychiatric patients and their various conditions. These tests are being promoted aggressively by testing companies, yet the benefits remain controversial. It is noted that "each and every new test needs to be independently evaluated" and in some cases "the marketing is way out ahead of the data." Another quote notes pharmacogenomics "is one weapon in the clinical treatment arsenal. It's not meant to be a silver bullet to replace current medical standard of care."

Editor's Note: *Pharmacogenomic testing is growing in many branches of medicine. Certainly, the hope is that this testing will lead to faster and better treatment outcomes resulting in reduced morbidity, mortality, and health care costs. While this is an admirable goal, insurers should exercise reasonable caution before supporting these initiatives. A good rule of thumb is to ensure the documented presence of analytical and clinical validity as well as clinical utility with regard to any pharmacogenomic testing.*

The Projected Timeframe until Cervical Cancer Elimination in Australia: A Modelling Study
Hall MT, et al. Lancet Public Health. 2018 Oct 2.
https://www.thelancet.com/pdfs/journals/lanpub/PIIS2468-2667(18)30183-X.pdf

Australia was one of the first countries to establish a national human papilloma virus vaccination program. The authors of this paper estimated the age-standardized incidence of cervical cancer from 2015-2100. They concluded incidence will decrease to fewer than six cases per 100,000 by 2020 and fewer than four cases per 100,000 by 2028. By 2066, incidence could fall to less than one case per 100,000. In addition, by 2034, less than one death per 100,000 will be attributable to cervical cancer. These conclusions indicate that the vaccination program is having a strongly positive effect on reducing cervical cancer rates.

Editor's Note: *These impactful projections demonstrate the power of a national vaccination campaign. Benefits to society and insurers will be real and measurable.*

BOOK REVIEW

Between Hope and Fear – A History of Vaccines and Human Immunity
By Dr. Michael S. Kinch
Pegasus Books Ltd. 2018
ISBN: 978-1-68177-751-1 (hardcover)
ISBN: 978-1-68177-820-4 (e-book)

In this detailed and well-researched book, Dr. Michael Kinch, Director, Center for Research Innovation in Business at Washington University in St. Louis, presents a detailed history of the development of vaccines over the centuries and establishes the basis, albeit flawed, for the current anti-vaccine movement. It makes for fascinating reading on this timely subject.

Editor's Note: *The anti-vaccine movement has grown substantially over recent years. Insurers will need to understand the basis for this movement as well as potential implications for morbidity and mortality, especially if offering life and living benefits cover for juvenile lives.*

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