SCORviews

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INSIDE THIS ISSUE

MESSAGE FROM THE LIFE AMERICAS CEO

Focusing Top Talent on Underwriting Solutions

Underwriting expertise and innovation are core tenets of SCOR's client solutions strategy. Our goal is to be a flexible asset for your company for support in assessing and covering large and impaired risks, evaluating the usefulness of electronic data and partnering with you on automated and accelerated programs.

To address your changing needs and help fill gaps, we direct a wide range of expert talent toward the development of underwriting solutions. SCOR teams at work on these endeavors include…

- Life Research & Development, which has its finger on the pulse of industry innovation and accelerated underwriting,
- Facultative Underwriting, providing medical expertise and traditional underwriting support, and
- Velogica® and its team of specialists that support SCOR's tool for executing automated underwriting in both traditional and accelerated programs.

These teams bring specialized skills and insight to all aspects of life underwriting, ensuring that you have the best talent – including actuarial, medical, data and technology – focused on your underwriting priorities.

We look forward to joining clients and other industry colleagues in Chicago for the annual conference of the Association of Home Office Underwriters. I'm sure this year's agenda will drive home the reality that our industry – and underwriting in particular – is undergoing a major transformation.

There is widespread consensus that life insurers can and must modernize underwriting processes to deal with aging distribution channels and changing consumer expectations. This places new demands on individual underwriters but also creates opportunities for professional growth.

In this issue of *SCORviews* we interview three SCOR underwriters who are deeply involved in underwriting innovation and R&D: Cindy Mitchell, Vice President, Underwriting Research, Dawn Boitnott, Vice President, Underwriting – Velogica, and Maria Beaulieu, Assistant Vice President, New Data Development. Each began her career as a production underwriter. Their transition from traditional underwriting to roles at the frontiers of their profession reflect the challenges and opportunities that come with change.

SCOR
The Art & Science of Risk

TECHNOLOGY

The Frontiers of Life Underwriting

Technology and digital information are changing the way companies underwrite mortality risk. We interviewed three SCOR underwriters deeply involved in risk selection innovation and R&D. Each has transitioned from traditional case underwriting to roles at the frontiers of alternative underwriting.

Cindy Mitchell
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Your career followed a "textbook" path. You started as a trainee at a large life company, gradually took on larger and more complex cases, transferred to an "impaired" risk unit and then moved to a reinsurer where you underwrote facultative submissions. When did your career diverge from this traditional underwriting path?

About eight years ago I took a lateral transfer to work in underwriting research. I'd been working as a line underwriter for 15 years, and this new opportunity intrigued me. I went from underwriting individual risk to analyzing blocks of business and then to protective value studies on new data sources such as clinical lab data. It's a totally different experience.

There's a misconception that production underwriters can readily transfer from line underwriting to R&D. There was a steep learning curve for me in the beginning. I needed to have a strong foundational knowledge of mortality tables, data analytics and predictive models. My role changed from working independently to having significant collaboration with others including actuaries and data scientists. Having said that, knowledge of traditional underwriting tools and requirements is an essential asset to bring to an R&D team that's exploring the value of traditional underwriting evidence. We must understand where we've been to understand where we need to go.

The best analogy for what we are going through in underwriting is *Moneyball*, the book and movie about the paradigm shift in major league baseball from traditional scouting to statistics-driven selection of who makes it on the player roster.

What were your first underwriting R&D projects?

When I first joined the R&D area, we were working on a model to predict preferred risk class distribution given a set of preferred guidelines. The team was analyzing and manipulating blocks of business to better understand what was driving the mortality. Mortality experience can vary a great deal across companies that have similar products and underwriting guidelines. This was an important realization, and in some ways, it helped to open our minds to new ways of selecting and classifying risk. The old ways were not necessarily always right.

Serious investment in alternative underwriting initiatives took hold a few years ago. What were the main causes for such an industry-wide trend?

"Faster, simpler, better" became the mantra for all functional areas from products and distribution to underwriting and administration. But the mantra really took off in underwriting, because many in the industry had come to see traditional underwriting as the biggest obstacle to new sales. And with advances in technology and the phenomenal growth of digital information on individuals from third party data sources, underwriting was ripe for a change.

What is the difference between automated and accelerated underwriting or are they one and the same?

There is considerable confusion in the industry regarding these terms. Although they often are used interchangeably, they fundamentally mean different things.

In the simplest terms, automated means no human underwriter involvement is needed. For example, SCOR's Velogica is an automated underwriting engine.

Accelerated underwriting may or may not include automation. It involves a "subset" of fully underwritten business where fluids are waived, based on rules or a predictive model. This "subset" of low risk applicants is "accelerated" through the underwriting process without fluids (blood, urine, vitals), because they are determined to have no significant medical conditions that would prompt the need for requirements such as fluids. And, it's important to note, the premium is the same as those that are fully underwritten.

Continued

The Frontiers of Life Underwriting

Cont.

Dawn Boitnott
VP, Underwriting - Velogica
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Like Cindy, you also spent most of your career in traditional underwriting roles. How much does that knowledge and experience help in your current role on the Velogica team?
I couldn't do what I do without it. Yes, I've moved from a traditional production environment to a technology-driven environment, and we're using different tools to underwrite, but the goal is the same: evaluate individual mortality risk and protect the insurance company from taking on too great a risk.

It takes skills and knowledge from multiple fields of learning to automate the underwriting process, and knowledge of traditional underwriting and underwriting rules is essential to getting it right. We have professionals on the Velogica team that come from various disciplines. They bring skills that are fundamental to building and maintaining an underwriting algorithm – in actuarial, data, and behavioral sciences, artificial intelligence and machine learning. But everyone on the team needs to learn underwriting concepts – and they do – just in a different way than I did.

What data sources are used in the Velogica engine today?
Velogica uses information in the application, prescription data, MVR, MIB, criminal history, clinical lab data, and we are in process of implementing credit-based mortality scores. A combination of sources may be used, based on client preferences.

How do some of the newer and emerging data sources compare to the more tried and tested e-data sources?
Rx was a big leap forward because it brought medical information into the automated process. The newer electronic data that we are integrating into the Velogica algorithm – like clinical lab data (CLD) – has enormous potential. CLD can be a highly effective replacement for fluids from both risk assessment and cost perspectives, giving the underwriter the ability to stratify otherwise declinable cases on a simple product.

Clinical lab data is just the most recent example of how SCOR is constantly working to keep the flexibility and power of Velogica up to date and with the latest data available to underwriting automation.

VELOGICA®
WHERE SPEED MEETS KNOWLEDGE.

Through Velogica, SCOR is dedicated to continuously expanding automated underwriting to higher face amounts while bringing the supported price points closer to those supported by a fully underwritten process.

What products can be underwritten using Velogica?

Velogica is being used across the product spectrum from final expense, simple and fully underwritten products. It has the potential to also underwrite group, disability, long term care and critical illness. The algorithm obtains underwriting evidence, correlates both disclosed and discovered evidence and renders a decision, most of the time in less than a minute.

It's highly versatile and can be used in many ways including straight through decisioning, triage and input to a carrier's workflow either to take a case down a certain underwriting path or as input to a predictive model. A carrier can have a multi-line distribution and/or traditional life-focused agent-driven business with various products and underwriting rules represented in Velogica.

How many applications have been underwritten by Velogica?

Since inception, about 3.8 million

How can automated underwriting be expanded to higher face amounts with rates closer to fully underwritten?

We're focusing on two approaches. One is to add new data sources that can provide protective value with no degradation in the speed of the decision. The other is to get smarter about when "slow evidence" is really needed. We need to identify where time and money are being spent on traditional requirements that add no – or minimal – protective value when compared to instant data sources.

The Frontiers of Life Underwriting

Cont.

Maria Beaulieu
AVP, New Data Development
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During your underwriting career you have worked in both a "slow evidence" and an e-data environment. How would you describe the transition?

For many years we really didn't see any change. Underwriting shops used the application, paramedical exams, fluids, physical measurements, EKG, MIB, MVR, medical records, inspection reports, etc. to complete the risk assessment. Then we saw the introduction of prescription drug data, but for most underwriters, this evidence simply became another item to underwrite. In some instances, it replaced the need for medical records.

Today we see a range of e-data sources being used in both traditional underwriting and automated underwriting engines or in some stage of R&D. I would categorize them as ...

- Well established e-data – Rx, MIB & MVR
- New e-data – clinical lab data (CLD), health claim information, criminal records, credit based mortality risk scoring, other medical based mortality risk scoring, etc.
- Emerging e-data – propensity models, electronic health records (EHR), wearables data, facial analytics, etc.

While evidence traditionally was used to assess the risk, today the data is applied in multiple ways from input into risk assessment and algorithms to alert misrepresentation and determination of non-e-data requirements.

What underwriting R&D initiatives are you currently working on?

We're working on studies to validate new data such as CLD and health claims information and its protective value as underwriting evidence. We're also looking at EHR data providers and other health data. We think CLD is a real game changer in terms of providing digital medical information on individuals. It's a step towards electronic health records, which is the holy grail for instant underwriting decisions.

Each additional e-data source provides protective value with no degradation in the speed of the decision. In addition, it allows carriers to get smarter about when "slow evidence" is really required. The new e-data sources and removal of fluids/exams can, however, cause movement between risk classes of the existing insured/applicant pool.

Most of the new, emerging e-data sources can be used to predict/stratify mortality. The challenge is to determine what the remaining or incremental value is when combined with other data sources.

Do you see a common approach to how e-data sources are used?

There is not one e-data strategy that will fit all carriers. The strategy will be driven by a carriers' risk appetite, client base, distribution channel, desire to be an early adopter, etc.

The SCOR Life R&D team and Velogica team have been instrumental in evaluating these new data sources for our carriers. We have completed both protective value and mortality improvement studies and provided valuable input to carriers in the design of accelerated underwriting programs and use of e-data.

There is not one e-data strategy that will fit all carriers. The strategy will be driven by a carriers' risk appetite, client base, distribution channel, desire to be an early adopter, etc.

What can underwriters do to develop skills to better understand and be engaged in the new frontiers of underwriting?

Most life companies today are involved to some degree in accelerated underwriting. Some are careful adopters; some are all in. My suggestion is to volunteer for related project work, attend industry events and network with underwriters and vendors active in this space. In my experience, I've learned the most when several disciplines were involved in the project.

For those looking to branch out, I would also recommend developing skills in programs like Excel and Tableau and gaining knowledge of predictive modeling and artificial intelligence.

Any final thoughts?

The changes we see in underwriting create exciting new opportunities in our profession, but there's no typical way to prepare for these hybrid roles. Make sure you communicate your desire to try something new, then be proactive and take the initiative wherever you can.

Adult Congenital Heart Disease

Dr. Regina Rosace,
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The definition of congenital heart disease (CHD) is the persistence of any structural abnormality of the heart or great vessels that is present at birth. Those patients with CHD that achieve adulthood are considered to have adult congenital heart disease (ACHD). This is a very heterogenous group, consisting of multiple types of lesions and various stages of repair.

Currently in the United States, there are more people over the age of 20 years with CHD than under that age. The population of adult CHD patients is growing at a rate of 5% per year, with 1 to 1.3 million people in the U.S. and 2.3 million in Europe having ACHD. Estimates suggest that there are approximately 50 million ACHD patients worldwide, with a suspected steady increase in prevalence in 2050 projections.

While infant mortality due to congenital heart disease in the last four decades has decreased by almost three-fold, adult congenital heart disease prevalence has increased by more than two-fold in the United States. Over 85% of infants with CHD are now expected to reach adulthood. This is a result of the enhancement in diagnosis, including prenatal, refined surgical techniques and modern medical interventions such as the use of prostaglandin and infant cardiopulmonary bypass.

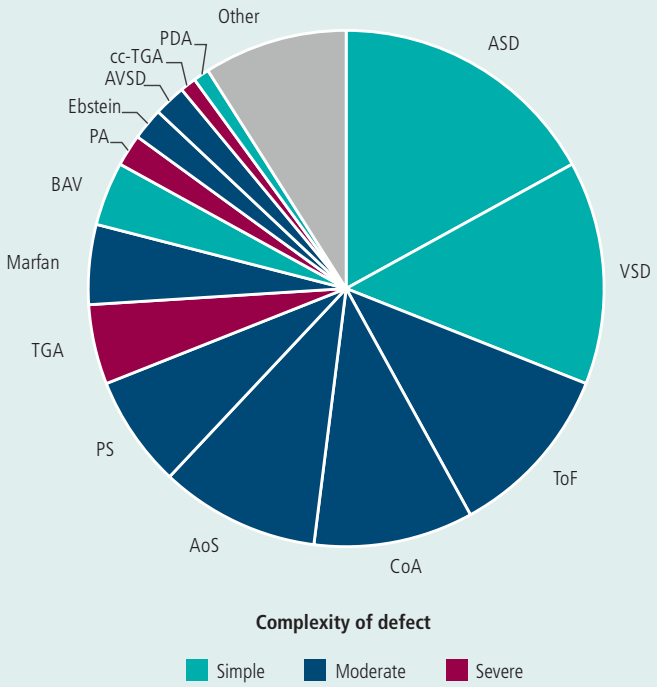
As would be expected, those patients with simple lesions, such as shunt defects atrial septal defects (ASD), ventricular septal defects (VSD) or patent ductus arteriosus (PDA), have a much lower mortality rate and therefore a higher prevalence in ACHD than those with severe lesions such as transposition of the great arteries or a single ventricle. Some of the mild noncyanotic lesions may not be diagnosed until adulthood.

According to the Dutch CONgenital CORvitia (CONCOR) national registry for ACHD, the most common defects seen in adult patients are atrial septal defects, ventricular septal defects, tetralogy of Fallot, aortic stenosis, aortic coarctation, pulmonary stenosis, transposition of the great arteries, Marfan syndrome and bicuspid aortic valve.

Chronic heart failure (26%) and sudden death (19%) were the causes of death recorded most often. The median age at death from heart failure was 51.0 years (range: 20.3–91.2 years) and median age at sudden death was 39.1 years (range: 21.0–78.2 years). Two-thirds of patients died from a cardiac cause; 77% of deaths had cardiovascular origins, which would include all cardiac causes plus vascular causes such as pulmonary embolism and stroke.

Sudden cardiac death (SCD) is of particular concern in ACHD patients. In the CONCOR study the seven defects with the greatest known risk of late SCD are univentricular heart, transposition of the great arteries, Ebstein's anomaly, aortic coarctation, aortic stenosis, double outlet of right ventricle and pulmonary atresia.

Proportional distribution of main diagnoses among 6,933 study subjects



ASD – atrial septal defect (17%)
VSD – ventricular septal defect (14%)
ToF – tetralogy of Fallot (11%)
CoA – aortic coarctation (10%)
AoS – aortic stenosis (10%)
PS – pulmonary stenosis (7%)
TGA – transposition of the great arteries (5%)
Marfan – Marfan syndrome (5%)
BAV – bicuspid aortic valve (4%)
PA – pulmonary atresia (2%)
Ebstein – Ebstein's anomaly (2%)
AVSD – atrioventricular septal defect (2%)
cc-TGA – congenitally corrected transposition of the great arteries (1%)
PDA – patent arterial duct (1%)
Other – other congenital heart defects with n , 65 (9%)

(Verheugt, Carianne L., et al. "Mortality in adult congenital heart disease." *European Heart Journal* 31.10 (2010): 1220-1229)

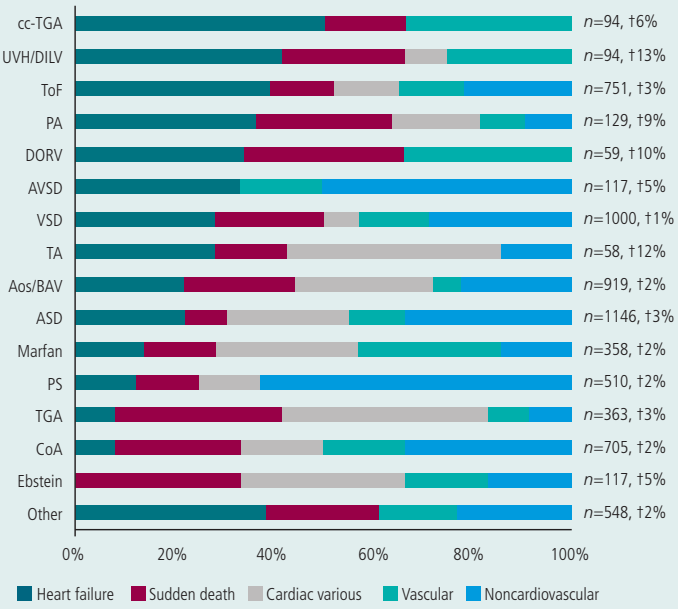
Continued

A 2018 GLIMPSE AT...

Adult Congenital Heart Disease

Cont.

Proportional distribution of causes of death by defect in 197 deceased patients



(Verheugt, Carianne L., et al. "Mortality in adult congenital heart disease." *European Heart Journal* 31.10 (2010): 1220-1229)

cc-TGA – congenitally corrected transposition of the great arteries
PA – pulmonary atresia associated with ventricular septal defect
UVH/DILV – univentricular heart/double inlet left ventricle
AVSD – atrioventricular septal defect;
ToF – tetralogy of Fallot
ASD – atrial septal defect
DORV – double outlet right ventricle
AoS/BAV – aortic stenosis/bicuspid aortic valve
PS – pulmonary stenosis
TA – tricuspid atresia
TGA – transposition of the great arteries
CoA – aortic coarctation
VSD – ventricular septal defect
Ebstein – Ebstein's anomaly
Marfan – Marfan syndrome
Other – defects comprise defects without or less than three deaths [patent arterial duct, common arterial trunk, left ventricular outflow tract obstruction, mitral valvar prolapse, anomalous pulmonary venous connections, aortic regurgitation, aortopulmonary window, and atrial situs inversus.

To examine factors related to excess mortality in a cohort of patients with ACHD, JM Oliver et. al. conducted a survival analysis in Spain using prospective data of 3,311 adults with CHD, with a median follow-up time of 10.5 years. Independent risk factors for excess mortality were identified by the left-truncated Cox regression model and include among others:

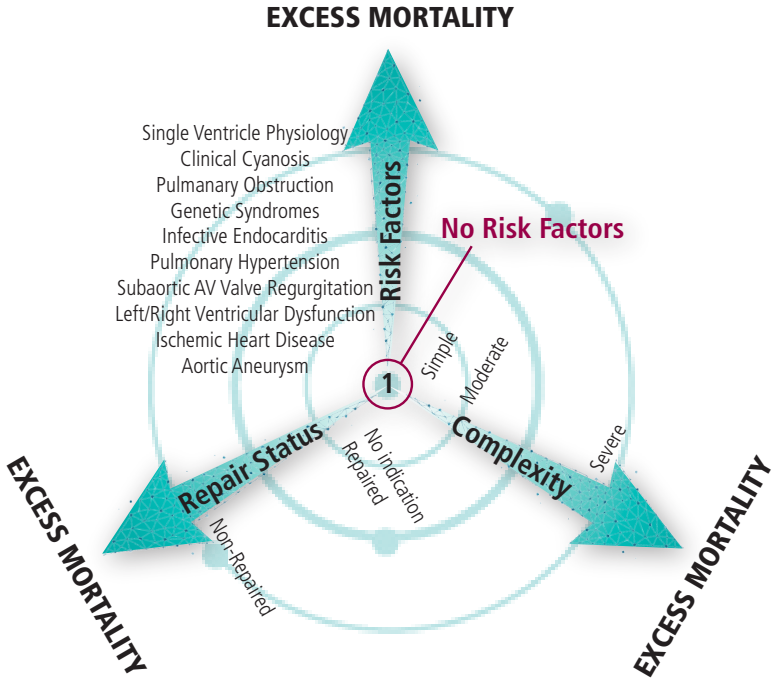
- cyanosis
- univentricular physiology
- genetic syndromes
- systemic ventricular dysfunction
- pulmonary hypertension
- pulmonary outflow tract obstruction
- infective endocarditis

Survival of individuals with no risk factors did not differ from the reference population. In contrast, the standardized mortality ratio (SMR) was 5.22 (95% CI 4.5–6.0; P< 0.001), and the median age at death for patients with at least one risk factor was 55.6 years.

Compared with age at diagnosis, sex and time of follow-up-adjusted expected survival for the Spanish general population, the SMR of 2.64 for the entire cohort was significantly higher (95% CI 2.3–3.0; P < 0.001) and increased progressively with the level of complexity of the defect. There was also an excess mortality for each underlying heart defect that ranged from 1.49 in patients with aortic valve disease to near 30-fold in patients with single ventricle physiology or pulmonary vascular disease.

Overall, adult survivors with CHD have globally reduced survival compared with the general population, with substantial variations relating to CHD complexity, repair status and specific CHD. Clinical parameters, such as anatomical features, hemodynamic sequelae or acquired complications, account for the early mortality of the contemporary ACHD population. Those who have required a repeat surgical procedure are also at greater risk for mortality. Importantly, survival of individuals with no risk factors did not differ from the reference population.

In terms of insurance medicine, the graph below summarizes the difficulty in estimating an excess of mortality in ACHD. Only by taking into account the complexity of the defect, the repair status and the risk factors can one come to an accurate and meaningful risk assessment.



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CONFERENCE

SCOR Presence at AHOU

SCOR's presence at the annual meeting of the Association of Home Office Underwriters (AHOU) in Chicago includes four session presenters and the SCOR booth in the exhibit hall during the meeting. We look forward to seeing you. Please stop by our booth and say hello!

Our presenters:

Dr. James Kadouch, Vice President & Medical Director, is presenting "Atrial Fibrillation: When Atria Tremble," a disease which is associated with a 200% increase in risk of death and 500% increased risk of stroke.

Philippe Aussel, Director, Technical Underwriting, is presenting "The Metamorphosis of Underwriting," which traces the advances and significant changes in the underwriting profession during the past 40 years.

Cindy Mitchell, Vice President, Life Underwriting – R&D, is a panelist during the session entitled "The Underwriting ShapeShifter." She and fellow panelists will answer a series of questions about their careers in underwriting and how they have changed.

Terry Feeney, Director, Underwriting, is a panelist in the session entitled "How to Stay Relevant," during which she and fellow panelists are discussing industry trends, tips, organizational strategies and success stories to promote professional development and the knowledge, skills and abilities needed to build strong underwriters today and in the future.

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