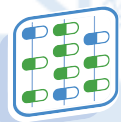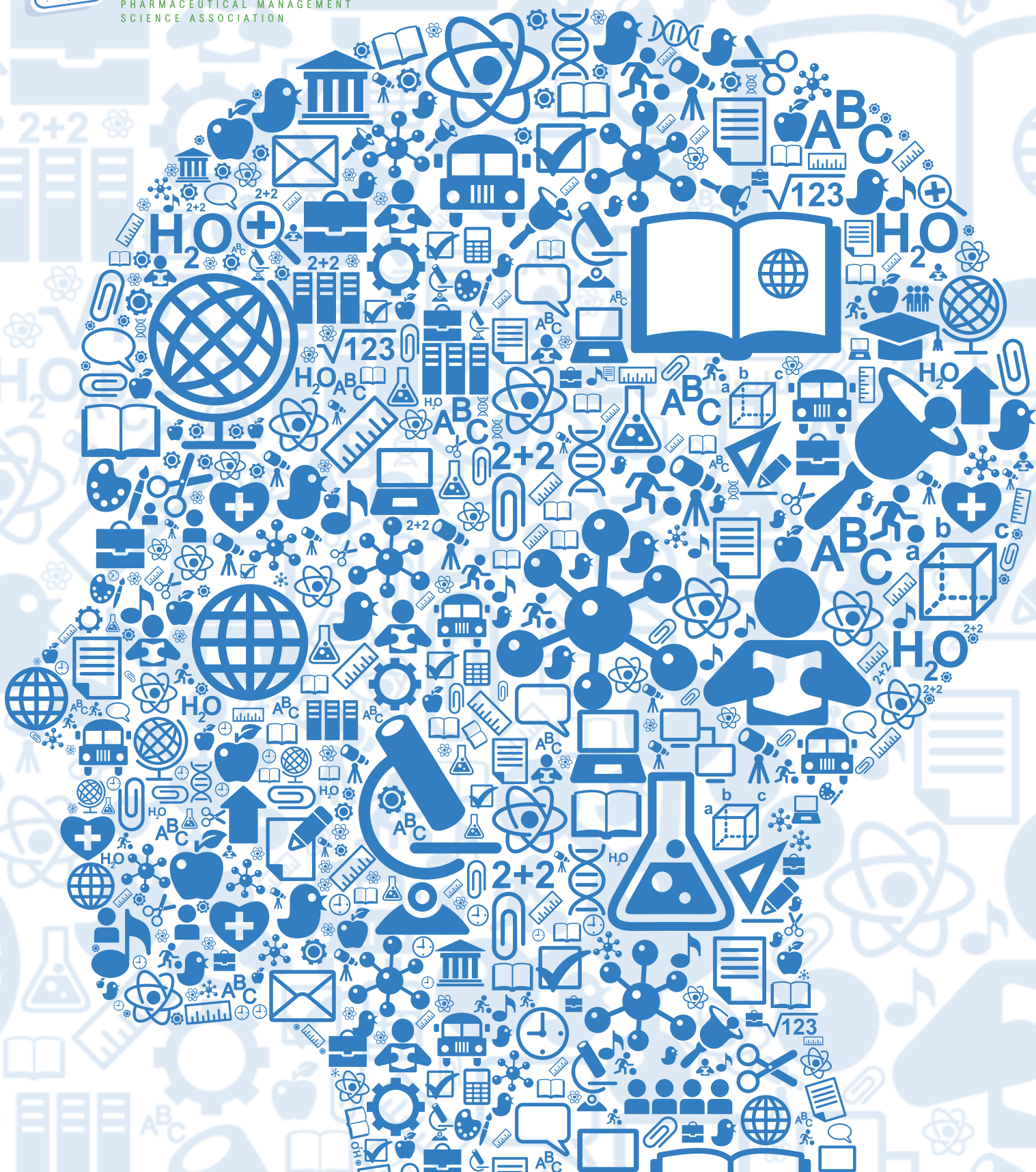# JPMSA

JOURNAL OF THE PHARMACEUTICAL MANAGEMENT SCIENCE ASSOCIATION

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SPRING 2014

PMSA Journal: Spotlighting Analytics Research

Welcome to the second edition of the Pharmaceutical Management Science Association (PMSA) Journal! The Journal is the official research publication of PMSA. Its purpose is to promote and embody the mission of the association. In particular, the Journal aims to help meet the following goals:

- Raise awareness and promote use of Management Science in the pharmaceutical industry

- Foster sharing of ideas, challenges, and learning to increase overall level of knowledge and skill in this area

The Journal publishes manuscripts that advance knowledge across a wide range of practical issues in the application of analytic techniques to solve Pharmaceutical Management Science problems, and that support the professional growth of PMSA members. Articles cover a wide range of peer-reviewed practice papers, research articles and professional briefings written by industry experts and academics. Articles focus on issues of key importance to pharmaceutical management science practitioners.

If you are interested in submitting content for future issues of the Journal, please send your submissions to David Purdie at dpurdie@pmsa.net.

Guidelines for Authors

Summary of manuscript structure: An abstract should be included, comprising approximately 150 words. Six key words are also required.

All articles and papers should be accompanied by a short (about 100 words) description of the author(s) and, if appropriate, the organization of which he or she is a member.

Industry submissions: For practitioners working in the pharmaceutical industry, and the consultants and other supporting professionals working with them, the Journal offers the opportunity to publish leading-edge thinking to a targeted and relevant audience.

Industry submissions should represent the work of the practical application of management science methods or techniques to solving a specific pharmaceutical marketing analytic problem. Preference will be given to papers presenting original data (qualitative or quantitative), case studies and examples. Submissions that are overtly promotional are discouraged and will not be accepted.

Industry submissions should aim for a length of 3000-5000 words and should be written in a 3rd person, objective style. They should be referenced to reflect the prior work on which the paper is based. References should be presented in Vancouver format.

Academic submissions: For academics studying the domains of management science in the pharmaceutical industry, the Journal offers an opportunity for early publication of research that is unlikely to conflict with later publication in higher-rated academic journals.

Academic submissions should represent original empirical research or critical reviews of prior work that are relevant to the pharmaceutical management science industry. Academic papers are expected to balance theoretical foundations and rigor with relevance to a non-academic readership. Submissions that are not original or that are not relevant to the industry are discouraged and will not be accepted.

Academic submissions should aim for a length of 3000-5000 words and should be written in a 3rd person, objective style. They should be referenced to reflect the prior work on which the paper is based. References should be presented in Vancouver format.

Expert Opinion Submissions: For experts working in the Pharmaceutical Management Science area, the Journal offers the opportunity to publish expert opinions to a relevant audience.

Expert opinion submissions should represent original thinking in the areas of marketing and strategic management as it relates to the pharmaceutical industry. Expert opinions could constitute a review of different methods or data sources, or a discussion of relevant advances in the industry.

Expert opinion submissions should aim for a length of 2000-3000 words and should be written in a 3rd person, objective style. Whilst references are not essential for expert opinion submissions, they are encouraged and should be presented in Vancouver format.

Industry, academic and expert opinion authors are invited to contact the editor directly if they wish to clarify the relevance of their submission to the Journal or seek guidance regarding content before submission. In addition, academic or industry authors who wish to cooperate with other authors are welcome to contact the editor who may be able to facilitate useful introductions.

Editorial Committee: We would like to thank the Journal's Editorial Committee for their support in finding and reviewing manuscripts: David Purdie, John Fazio, Sharon Patent, Tom Mullen and Anthony Hillman.

PMSA 2014 Annual Conference Coming in May

May 18-21, 2014
Hyatt Grand Cypress Resort
Orlando, Florida

Registration is now open for the 2014 PMSA Annual Conference. The PMSA Annual Conference is the industry's most important gathering of management science professionals and executive management in pharmaceutical commercial operations. The conference is targeted to both long-time veterans and newcomers to the industry. Find out how the latest cutting edge analytics can be used to address challenging business problems facing commercial operations. Discover the latest trends on health care reform, and knowledge on how analytics can keep you ahead of the game.

Highlights from the conference agenda are below:
- Keynote address from Greg Barrett, Daiichi Sankyo

- Keynote address from E. Loren Buhle, Jr. PhD, IBM

- General Sessions on:
  - Proactive Analytics: How to Build Analysis Readiness and Enhance Focus on Comprehensive Insights
  - Big Data: How Can It Create Value and Competitive Advantage for Pharma?
  - EMR Exploration & P.O.V
  - Seeing the World in Living Color: The Power of Physician Notes

- Review of Publicly & Commercially Available Anonymous Patient-Level Data Sources to Enhance Forecasting
- Measuring and Optimizing Complex Dynamics in a Multi-Channel Marketing
- Uncovering Influential Customers Using Social Network Analysis
- Measuring the Value of Providing Call Plans to the Field Sales Teams
- Physician Life Time Value - A Forward Looking Approach

- Plus concurrent sessions on Incentive Compensation and Marketing Analytics

Two four-hour tutorials will also be offered during the conference.

The annual PMSA conference will also feature a stimulating poster session wherein attendees have a chance to interact face-to-face with presenters of analytic concepts. We'll also host an exhibitor fair, where you can experience first-hand the cutting edge data and services that are available from our supplier and consultant partners.

Visit www.pmsa.net for more information.

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Embracing EHR Data for Competitive Advantages in the Pharmaceutical Market

Steve Davis, Vice President and General Manager, Life Sciences, Humedica and Amie Moreno, Account Management, Humedica

The increased utilization of Electronic Health Records (EHR) has revolutionized the field of pharmaceutical marketing. EHR data, a digital capture of a physician's chart, provides pharmaceutical manufacturers insight into the clinical factors that drive physician-prescribing behaviors over the course of patients' treatment. Equipped with this type of comprehensive information, brand teams are able to leverage extensive datasets to refine marketing and sales strategies and optimize brand adoption in the market place.

Healthcare data collection and analysis have advanced exponentially over recent decades. Considerable improvements in technology and an ever-changing healthcare market space have created the opportunity and an increased demand to implement state-of-the-art information technologies to deliver timely, evidence-based solutions.

Evolution of Healthcare Data

Beginning with the introduction of pharmacy-based transaction data that provided valuable insights into market share, pharmaceutical companies have been harnessing healthcare data to create more targeted marketing campaigns for years. More recently, claims data have been the premier source for monitoring healthcare activity (e.g., medication adherence, switching, and discontinuation), as they capture patients' longitudinal interactions within the healthcare system, tracking both diagnostic and procedural information leading to treatment decisions, and treatment outcomes. The comprehensive data profiles created by claims data have been valuable sources of outcomes analyses used by pharmaceutical companies to position brand strategies.

While claims data are extremely useful, they lack the clinical specificity that can be provided by electronic health records. EHR data provide pharmaceutical manufacturers a window into the physician's decision-making process by utilizing clinical information and unstructured information like clinician notes, which frequently identify specific rationale for alterations in treatment. According to the Department of Health and Human Services, more than 50% of eligible physicians and up to 80% of hospitals have demonstrated meaningful use of EHRs, and adoption continues to grow. The uptick in technology use has allowed for enhanced care coordination and ultimately better, more efficient care for patients, which is crucial to the adoption of the Affordable Care Act.[1]

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[1] U.S. Department of Health and Human Services [Internet]. Washington, D.C.: c2013. News; 2013 May 22 [cited 2013 November 13]; [1 screen]. Available from: http://www.hhs.gov/news/press/2013pres/05/20130522a.html.

Accessing the multitude of data now available across a patient's care continuum typically required complex and costly analyses. Because of the enhancement in EHR technology, there now exist sophisticated analytical tools that allow brand teams quick and accessible answers to their business questions. Tools have been recently developed which harness this robust clinical data and provide the most efficient access to information that can be used to inform targeted marketing strategies. It is this breakthrough in healthcare technology that can empower brand teams with easily accessible, timely answers to the questions driving brand strategy.

Assessing the Competitive Landscape

Diabetes is a prime example of the advantages to leveraging EHR data. It is a complex, crowded market, with several relevant labs and clinical observations related to treatment of the disease. Upon entering the market, it is imperative for a brand to evaluate its competitors' strengths and weaknesses, and understand where opportunities exist to provide additional value within the therapeutic space. EHR data can arm brand teams with market share information specific to each clinical segment as defined by relevant procedures, physician assessments and observations, and lab results, as well as demographic and comorbidity information. While the data are crucial to guide long-term positioning necessary to remain successful, a thorough review of the current landscape also enables successful pre-launch strategy to determine the brand's value proposition.

In the complex market of well-established diabetes medications, it is challenging for a newly launched brand to find its niche. Analysis of patients' glycated hemoglobin (HbA1C) scores reveals that there is limited room for a new brand to differentiate itself among competitors. EHR data allow brands to cross-reference multiple clinical factors in order to identify a more targeted market that may either be untapped or in need of additional support.

A number of GLP-1s, like albiglutide, are currently in late stages and preparing to launch into an already densely populated market. An analysis of the anti-diabetic market share by A1C (lab results) and Body Mass Index (BMI) shows that the current anti-diabetic classes span the range of A1C scores, with metformin patients having the lowest median A1C and long-acting basal insulin patients the highest. When cross-referencing Body Mass Index (BMI) with A1C scores, however, a gap in the market is revealed. Several players have already dominated the low median BMI range, and only GLP-1s have well established their presence in the extreme range of median BMI (37+ or Obese II). There is clearly a population of patients with medium to high BMI and mid range A1C that were not currently being supported, suggesting that this may be a point of entry for the brand in order to distinguish itself in the market.

Figure 1 illustrates that GLP-1s have greater adoption among patients with higher BMIs, as they remain the dominant class in the high BMI space. Brand teams can utilize this information to position their product competitively.

Invokana, the first-in-class SGLT2, can use similarly rich clinical information to track adoption in the anti-diabetic marketplace. With insight derived from the EHR data, marketers can uncover adoption patterns by median eGFR and LDL results relative to other classes. eGFR, a measure of kidney function, is an

Figure 1: Diabetes Competitive Landscape
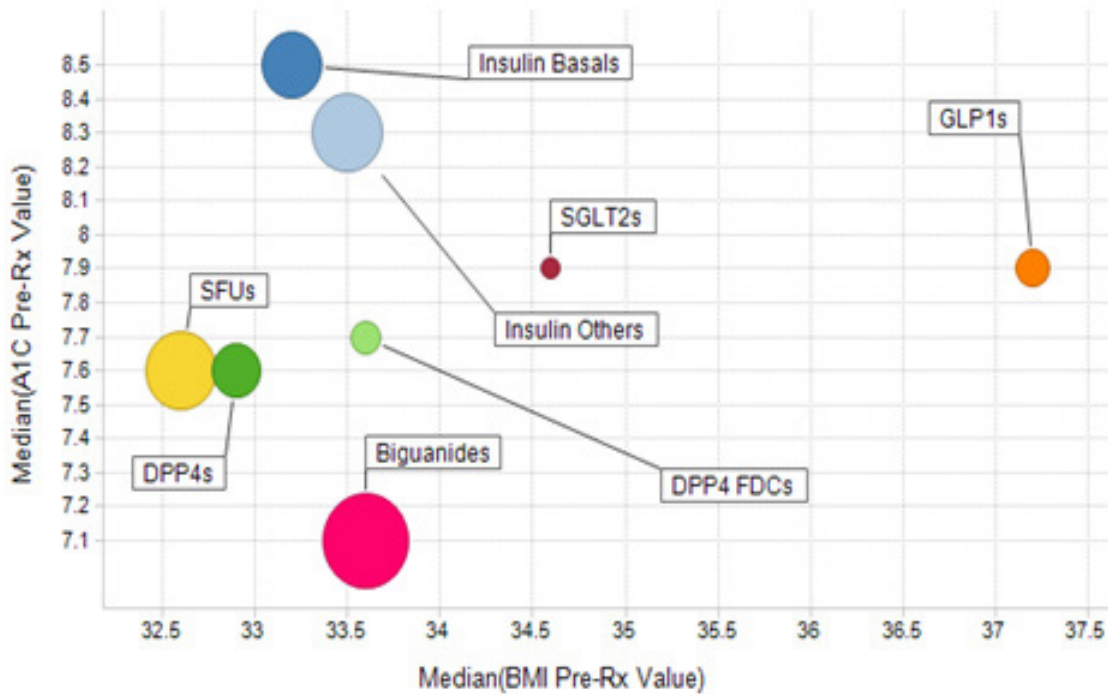
Source: Humedica NorthStar™ Diabetes. Timeframe: January 1, 2007 – May 31, 2013. Data include most recent median A1C and BMI results within 180 days prior to written prescription.

important consideration in this market as many diabetes medications are processed in the kidneys, and diabetics are at risk of experiencing decreasing renal function over time. Several classes, including insulins, Sulfonylureas (SFUs), and Dipeptidyl peptidase-4 (DPP4s), hover in the eGFR market space below 100 (a normal eGFR result is considered ≥90). Invokana, however, has found a niche in the marketplace among patients with well controlled LDLs and stable kidney function (as seen in the eGFR results). This level of information is beneficial in allowing brand teams to understand the characteristics of current adopters, and provide insight to help inform future strategies over the life of the product.

By cross-referencing LDL levels with eGFR results (see Figure 2), it is apparent that Invokana's (SGLT2) adoption is strongest among patients with well-controlled LDL space, differentiating the brand in this market space.

Tailoring Message to Targeted Market

One of the key challenges in creating a marketing message is to understand the real world rationale for physician treatment adjustments in an ever-changing marketplace. Do patients switch from one brand to another due to economic/formulary considerations? When do side effects drive discontinuation? Short of primary research, it is difficult to determine the causes of such behaviors through pharmacy and claims data alone.

Natural Language Processing (NLP) can be used to analyze Physician Notes and identify topics associated with physician

Figure 2: Diabetes Marketplace Post Invokana Launch
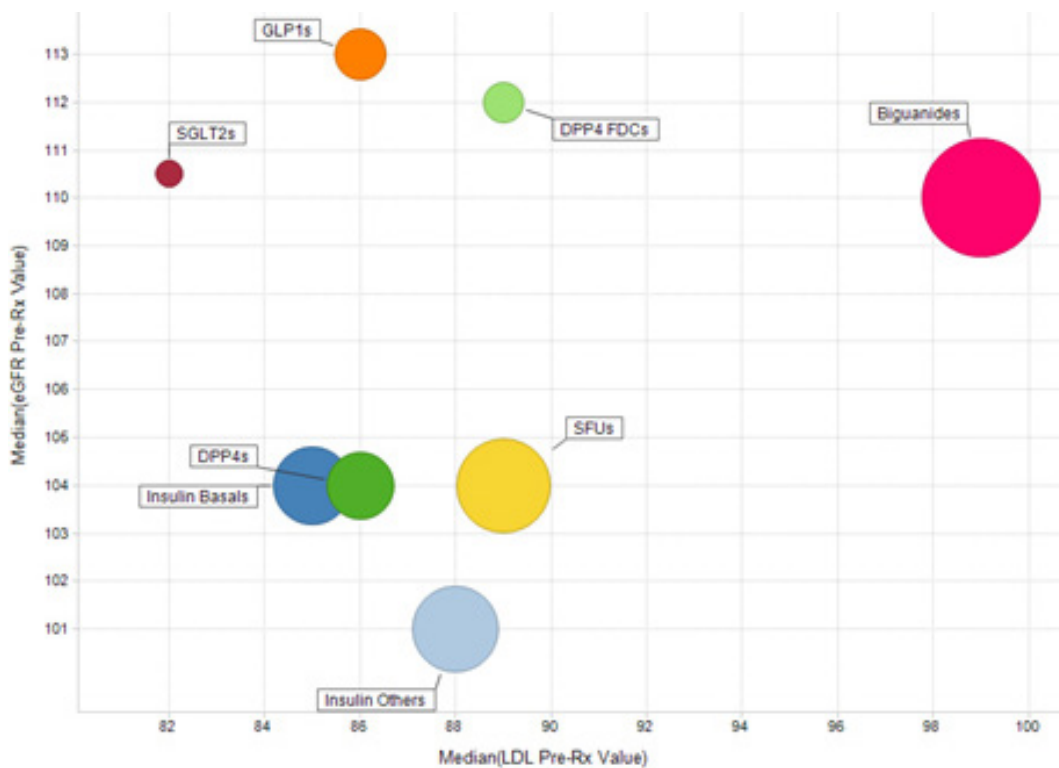
Source: Humedica NorthStar™ Diabetes. Timeframe: April 1, 2013 – May 31, 2013. Data include the most recent median eGFR and LDL results within 180 days prior to written prescription.

rationale for changing a course of treatment. This process is done via complex computer programming methodologies that search text fields in the EHR and extract specific facts and items of data into a structured format. For example, a physician may cite "lack of goal attainment" as a reason for discontinuing a dyslipidemia brand. Using NLP technology, these insights can be aggregated across an entire patient population. In addition, marketers can cross-reference what the physician has noted with clinical values to gauge efficacy sensitivity. For example, lab results can define the change in LDL, HDL, or triglycerides that prompted the physician to cite efficacy as a reason for behavior.

Within the dyslipidemia market, it is clear that Fibrates, Omega 3's, and Niacin are very competitive among patients with high triglyceride levels. In order to further distinguish itself in this space, Lovaza, an Omega 3, can leverage insights from physician notes to determine, for example, reasons for patient discontinuation. Data from the physician notes indicates that, while cost is a significant factor for discontinuation compared to Fibrates and Niacin, Lovaza is less likely to be discontinued because of clinical reasons (clinical reference) compared to Niacin. Lovaza also has fewer mentions of issues with efficacy associated with discontinuation in comparison to Fibrates.

Physician Notes allow insight into rationale for drug discontinuation. Omega 3's are associated more with discontinuation due to cost compared to competitors in their market, however, there appears to be fewer concerns about clinical concerns (Figure 3).

Figure 3: Physician Considerations for Dyslipidemia Medication Discontinuation
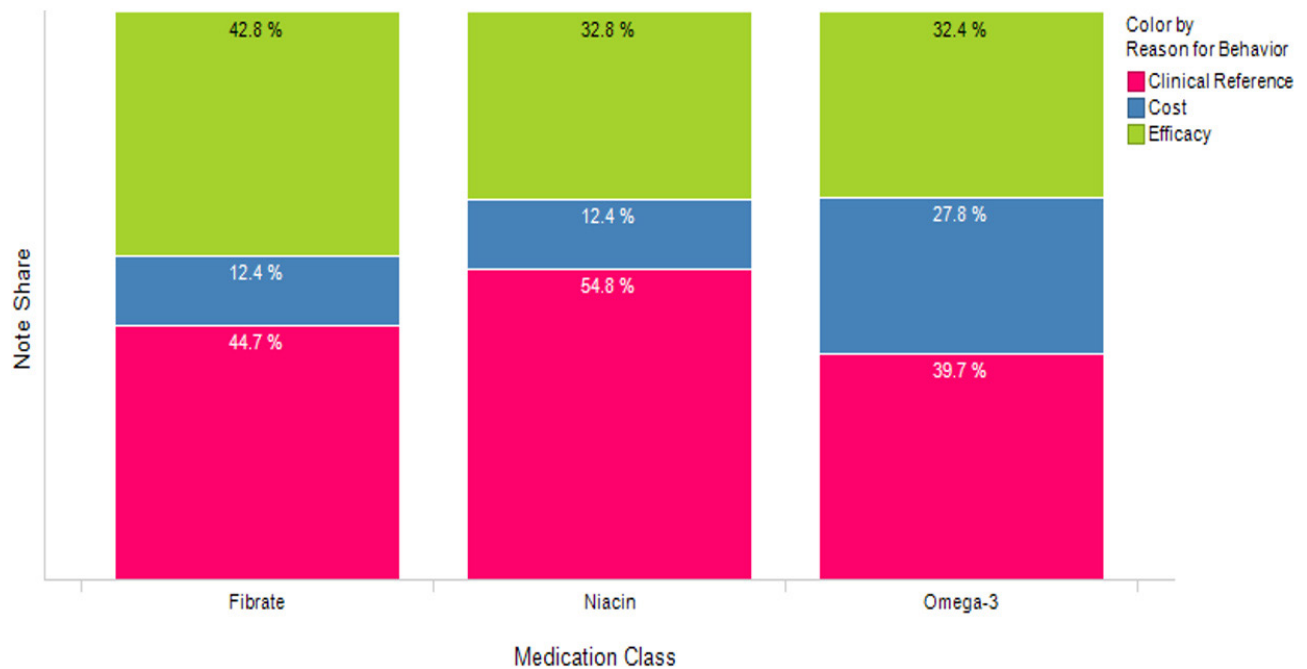
Source: Humedica NorthStar™ Dyslipidemia. Timeframe: January 1, 2007 – April 30, 2013. Data includes mentions of discontinuation associated with cost, efficacy, and clinical reference.

To further understand rationale behind a physician's behavior, notes can be used to uncover specific clinical considerations associated with the decision to discontinue using established Medical Dictionary for Regulatory Activities (MedDRA) categories. Within the Rheumatoid Arthritis (RA) therapeutic area, methotrexate and tumor necrosis factor (TNF) inhibitors make up a large portion of the market. However, there are distinct differences between the two classes, which can be seen in the details for physician discontinuation behaviors. More than 20% of notes for injected TNF inhibitors indicate that physicians are stopping a prescription for this class of medications due a patient concern about infections/infestations (including a viral or bacterial infection). This could account for the increase in older patients who are being prescribed a methotrexate, as the notes show that only 8% of discontinuation for the methotrexate class is related to infections. This level of granularity can be applied to stress the distinction between the two classes and provide a value story within the RA space.

Clinical considerations provide unique insight into real world rationale for a physician prescribing behavior. This level of clinical information enables brands to understand patients' concerns that are significant enough to initiate a change in therapy (Figure 4).

Uncovering Disease Prevalence

Obesity is a relatively new diagnosis, but this condition is gaining awareness as an epidemic both in the healthcare industry and in broader communities. That being said, this therapeutic area carries with it a considerable stigma, which may contribute

Figure 4: Physician Consideration Summary
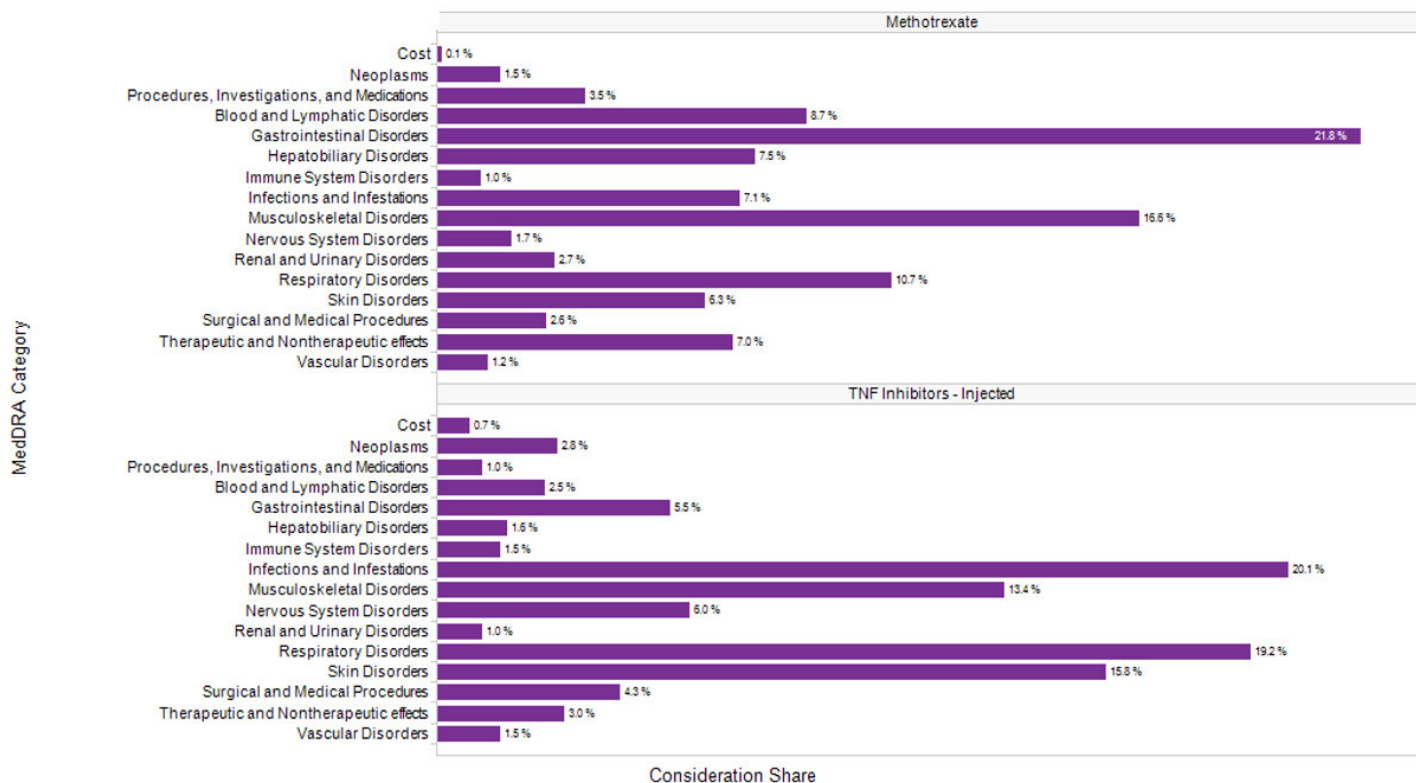
to the relatively low population of patients that are clinically diagnosed with obesity. Additionally, many patients who are clinically obese (based on Body Mass Index results of 30+) also have comorbid conditions that may be considered to be more severe, and therefore, they may be treated for these other comorbidities in lieu of obesity.

Using claims data alone, only two pieces of information can be tracked, the diagnosis for obesity and any associated medications. The most relevant piece of clinical information, BMI, is not captured in this data. Electronic health records can provide this additional layer of data; they not only identify patients being treated for obesity, but they can identify all patients who are clinically obese, regardless of treatment plan. The results of a BMI analysis can be compared against a variety of other clinical factors such as comorbidities, labs, and demographic data in order to understand how physicians are making the decisions about treating – or not treating – a patient's obesity.

Details about BMI results can be observed to understand what characterizes obese patients. In terms of market share, the majority of patients are classified as Obese 1, equating to a BMI of 30-34.9, with fewer patients falling into the categories related to BMIs of 35 and above (Obese 2, Morbidly Obese, and Super Obese). Sizing the market by these segments alone is very useful to begin to make decisions about the appropriate populations to target. Brands must keep in mind, however, the importance of actual opportunity within each segment and associated value related
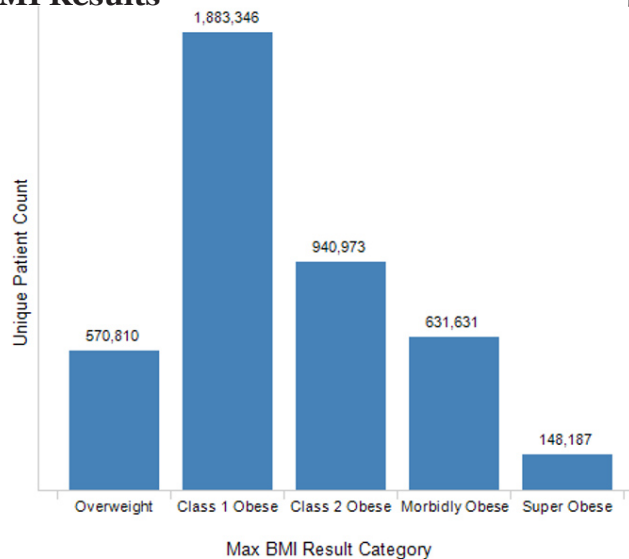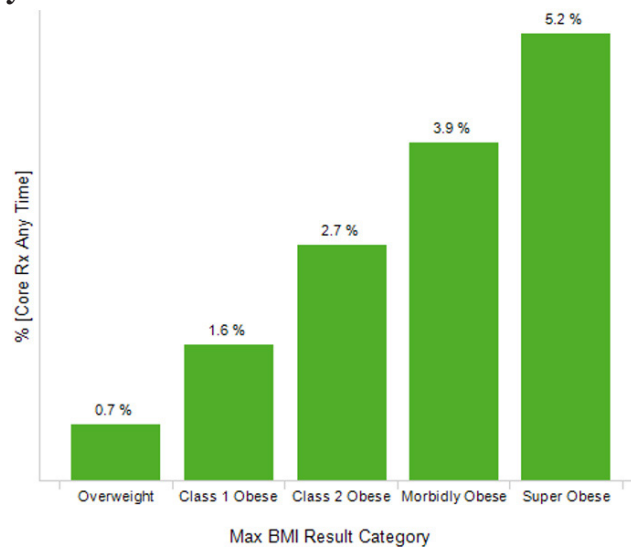
Figure 5: Patient Population by BMI Results

Figure 6: Percentage of Core Obesity Meds by BMI Results

Source: Humedica NorthStar™ Obesity. Timeframe: January 1, 2007 – June 30, 2013. Data includes most recent BMI results within 90 days prior to the written prescription. Core Obesity medications include: Orlistat, Phentermine, Phentermine/Topiramate ER, Diethylpropion, Phendimetrazine, Desoxyn, and Lorcaserin.

to the size of each population. An argument could be made to focus on patients with higher BMIs, as, by virtue of severity, they seem like the most appropriate targets. Brand teams must ask themselves: is a potentially larger treatment effect within a small segment more valuable than a smaller treatment effect within a sizable population?

Physician notes along with additional clinical data can be utilized to help answer this question. In a cross-tabulation of segmented BMI populations with core obesity medication treatments (medications that have a primary indication for obesity), it is revealed that only a fraction of patients who are obese are being treated with these core obesity medications. Even within the segment with the highest range of BMIs, the Super Obese (BMI 50+), only ~5% are being treated with medications indicated specifically for obesity. In light of this information, it

may be in a brand's best interest to target Obese 1 patients in the 30-34.9 BMI range. Due to the lack of traction for core obesity medications in the therapeutic area overall, it is likely more valuable to target patients based on population size. (Figures 5 & 6)

Conclusion

The healthcare industry has officially entered the era of Big Data, both by virtue of the volume of data now available and the robustness, sophistication, and timeliness with which it is delivered. With the advent of EHR data, pharmaceutical manufacturers are empowered with an unprecedented level of clinical specificity to improve business solutions. Information available in EHR data, coupled with the complete and outcomes-based claims data provides the most holistic view of the patient experience and allows brand teams to market intelligently to providers throughout the

continuum of care. The integration of these two data sources is transforming healthcare analytics. Companies leveraging this novel class of data analytics will not only improve their competitive advantage, but ultimately be the pioneers in a healthcare revolution.

About the Authors

Steve Davis brings deep experience in health care informatics to his role as Vice President and General Manager, Life Sciences. Previously, he was the Vice President of Product Management and Business Development at Marketing Technology Solutions (MTS), a data informatics company managing multiple information-driven consumer health care solutions for the pharmaceutical industry. Prior to MTS, Steve was with Versipan, L.L.C. for seven years, most recently as the Vice President of Longitudinal Patient Data Solutions. Steve began his career at Matthew Thornton Health Plan, a division of Dartmouth Hitchcock Medical Center. He received his bachelor's degree from the University of Tennessee.

Prior to joining Humedica, Amie Moreno led the Business Analytics team at Adheris, Inc., an inVentiv Health Company that utilizes pharmacy data to improve patient health outcomes. At Adheris, Amie drove the approach, design, and analysis of medication adherence
programs to gain insights into patient and prescriber behavior, providing strategic recommendations to meet client goals. Her previous experience includes account management and consultative sales in both the neuroscience and managed healthcare fields. Amie received her BS in Psychology, with minors in Statistics and Spanish from Boston University.

About Humedica

Humedica is a Business Associate of Health Care Provider Organizations, and processes their electronic Protected Health Information under approved Business Associate and Data Use Agreements. Humedica aggregates Electronic Health Records (EHR) data directly from these providers, integrating multiple EHRs from across the continuum of care, both inpatient and ambulatory. These data capture a comprehensive clinical picture that includes medications, lab results, vital signs, physician notes, diagnoses, procedures, demographics, hospitalizations, and outpatient visits. Once aggregated, Humedica normalizes, validates, and statistically de-identifies these data for use by contracted third parties.

Unlocking the Value of Closed Loop Marketing Analytics to Drive Customer Centricity

Pratap Khedkar, Managing Principal, ZS Associates, and Saby Mitra, Associate Principal, ZS Associates

Summary

The pharmaceutical industry has started to move from a brand-centric philosophy toward a customer-centric, commercial model using a new, digital approach to closed-loop marketing (CLM) programs. The success of this new approach has been fueled by the fact that many health care professionals have rapidly adapted to digital technologies. Click-stream data from tablet-based CLM is today able to capture a wealth of customer insights, attitudes and preferences. Pratap Khedkar, managing principal at ZS Associates, and Saby Mitra, associate principal, outline guiding principles on how CLM analytics help pharma companies achieve a customer-centric vision by 1) predicting customer preferences to design personalized engagements, 2) delivering personalized engagements to drive customer impact and 3) understanding the drivers of customer impact to infer preferences.

A significant portion of closed loop marketing (CLM) programs in the pharmaceutical industry have traditionally focused on converting paper assets to digital content and pushing this digital content to the sales representative's tablet as detailing aids.

In this first wave of CLM, the industry had two primary objectives: 1) achieve significant cost efficiency in content production, distribution and approval; and 2) understand content utilization and adoption in the field to make informed decisions on rep training or content simplification.

But was that "closing the loop" or simply electronic detailing? It was definitely not closing the loop at the customer level, because these organizations learned very little – if anything – about the customer through those digital interactions. As such, the value generated from CLM programs remained significantly low, and these programs struggled for a place at the top of the commercial agenda.

A new thinking on CLM programs has emerged in recent months, however, as the industry moves away from a brand-centric philosophy and tries to move toward a customer-centric commercial model. This movement is largely driven by the rapid adoption of iPads and other digital technologies by today's health care professionals (HCP), particularly in the United States.

Additionally, as companies continue to focus on specialty product portfolios, sophisticated brands are investing heavily in designing highly interactive and animated digital content to not only illustrate the products' clinical value proposition, but also engage customers during sales calls. This creates tremendous opportunities for pharmaceutical companies to capture valuable customer

insights, infer customers' unmet needs and preferences and develop personalized and customer centric engagements across multiple channels of interaction. Given the rapidly transforming industry dynamics – combined with new digital possibilities – CLM programs can no longer afford to remain constrained as an "electronic detailer," but instead must evolve as a key enabler of customer centricity, a mission that the broader organization aims to achieve.

Empowering Customer Centricity

Since the term "customer centricity" is very subjective, we must establish a common understanding of what it is and what it means for the pharmaceutical industry. Successful customer-centric organizations go much beyond being just customer focused and providing a superior level of service to the customers. They expand on the traditional CRM charter to adopt an outside-in perspective and evaluate their own business efforts from the perspective of their customers.

To these companies, customer centricity may also mean focusing less on driving customer transactions for short-term gain and more on fostering trust-based relationships over the long term. The Walt Disney Company (Disney) employee training handbook emphasizes building a culture of fully engaged employees who are dedicated to anticipating customer needs and delighting them with an amazing experience. Amazon.com (Amazon), another pioneer in driving customer-centric engagements, systematically searches for customer disappointments and issues rewards – sometimes even before the

customer is aware of the disappointment. Amazon also spends millions in predicting customers' preferences to increase its appeal to these customers and the likelihood they will make a purchase.

But can Disney and Amazon serve as the "customer centric" yardstick for the pharmaceutical industry? Unlike its peers in the retail or financial services industries, the pharmaceutical industry needs to consider the extreme cost of research and development in its customer strategy. The average branded drug costs nearly a billion dollars to bring to market, and pharmaceutical companies must wrestle with the temptation to maximize the drug's sales before it hits the patent cliff. While a truly Disney- or Amazon-like customer centric model may not be feasible in the pharmaceutical industry today, a practical starting point will be to mine for customer insights and deliver a personalized customer experience.
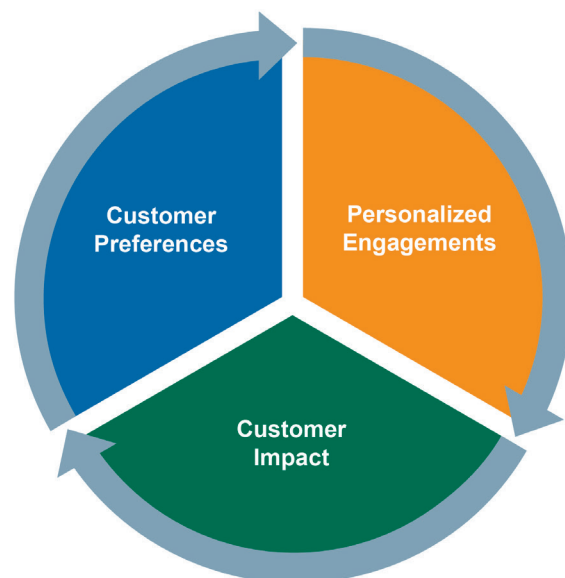
Figure 1

Figure 2

Rank	Top 5 Message Combinations	Message Combination Count	% Count	Average Time On Message (Minutes)							Total Detail
				Efficacy	Summary	MOA	Safety	Dosing	Patient Services	Reimbursement	
1	Efficacy	8	22.1%	7							7
2	Efficacy + Safety + Dosing	6	17.2%	5			3	3			11
3	Efficacy + Summary	5	16.1%	5	3						9
4	Efficacy + Safety	3	11.7%	4			4				8
5	Efficacy + Dosing	2	7.3%	5				3			8

Dr. X's Offer Affinity and Top Messages (Brand A)

Top 5 message combinations used

Dr. X's offer affinity towards efficacy

CLM analytics can help do just that. Click-stream data available from tablet-based CLM systems offer a wealth of customer insights, attitudes and preferences that may significantly enable customized customer engagements – a core tenet of customer-centric strategies. While a broad range of analytics from CLM click-stream data may help inform a variety of commercial tactics, Figure 1 displays three business themes that will truly empower an organization to achieve its customer-centric vision: *1) Predict customer preference to design personalized engagements, 2) Deliver personalized engagements to drive customer impact, and 3) Understand drivers of customer impact to infer preferences.*

Customer Preferences
Can we predict the customer's offer affinity by analyzing click-stream data captured from CLM systems?

The CLM system enables reps to capture the customer's attitude toward a message or service discussed during a detail. However, where data cannot be explicitly collected or reliably mined, predictive analytical methods on click-stream data may be applied.

Take the example of a recent project where the iPad data indicated that a statistically significant amount of rep time with Dr. X was spent on the efficacy content for Brand A, which happens to be in its early lifecycle stage. Since Dr. X allowed the rep to spend significantly more time on efficacy compared to other messages and we observed similar behavior on the brand website, the brand team was able to infer that Dr. X has a high affinity toward efficacy. (Figure 2)

Similarly, by analyzing the data, we were able to predict Dr. X's message format preference, such as an affinity toward videos or charts compared to text. Where enough customer data may not be available, predicting preferences based on "like" customer behavior, as shown by the

Figure 3: Average Number of Times HCP Saw Message (over the duration of a quarter)

A higher recall was associated with the efficacy message

Efficacy: 1.6* / 1.0
Safety: 1.0 / 1.3
Dosing: 0.5 / 0.7
MOA: 1.3 / 1.5
Reimbursement: 0.4 / 0.6

- HPC recalled message
- HPC did not recall message

* Denotes statistical significance
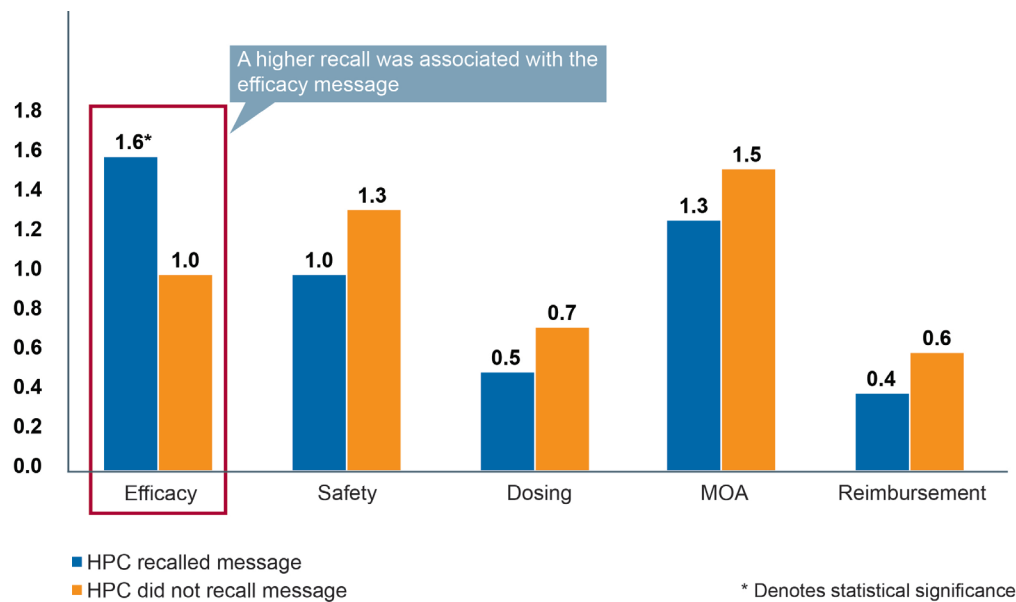
recommender algorithms used by Netflix, Inc. and Amazon, can be a useful technique. For example, "Primary care physicians (PCPs) in your neighborhood and affiliated with St. Mary's Hospital have requested Savings Cards in the past 30 days." Interestingly, the content affinity inferred from the direct rep channel may scale to other non-personal channels of interaction, bringing the organization one step closer to a multi-channel, customer-centric vision.

Personalized Engagements
Can we design a personalized engagement and customized journey for the customer?

Combining a customer's offer affinity with historical interaction data will shape the most appropriate message combinations for the customer. For example, the customer's offer affinity may be safety. In the last interaction, side effect No. 1 was discussed in context of safety. Hence, side effect No. 2 is suggested as one of the key messages to be delivered in the next interaction.

Sophisticated brand teams may also choose to combine offer affinity derived from click-stream data with the customer's brand agnostic channel preference in order to design multi-channel, and personalized customer journeys. This allows the brand to shape a contextual journey using channel-offer pairings based on the customer's affinity.

Customer Impact
Do customers value our interactions? Do these interactions improve the overall perception and satisfaction of our brands?

While analyzing tablet click-stream data can help understand content utilization and predict content affinity, integrating click-stream data with other primary research sources may help understand whether customer-centric strategies work.

For example, correlating click-stream data with Awareness Trial Usage (ATU) studies can help understand if CLM is raising incremental awareness, improving

Figure 4

Business Themes		Analytics Types	Data Sources			
			iPAD Data	Other Channels	Primary Research	Sales
Organization Centric	**Utilization and Adoption**	**Understand digital content adoption** (e.g. adoption by regions, sales teams, segments)	✓			
		Track alignment with brand goals (e.g. attainment vs. goals by customer segments)	✓			
	Commercial Outcome	**Develop Rx impact modeling** (e.g. Rx/market share lift attributed to CLM)	✓			✓
Customer Centric	**Customer Preferences**	**Predict content affinity** (e.g. affinity to offers or formats – videos etc.)	✓	✓		
	Personalized Engagements	**Design message combinations** (e.g. next best message combinations)	✓	✓		
		Optimize message sequence (e.g. usage pattern and optimal delivery sequence)	✓			
	Customer Impact	**Measure customer satisfaction** (e.g. perception and satisfaction scores from ATU)	✓		✓	
		Understand message receptivity (e.g. CLM message vs. ATU message recall)	✓		✓	

the perception of the brand and driving higher satisfaction levels. Alternatively, integrating with message recall studies helps to understand if CLM-based detailing improves the overall message recall of the details. (Figure 3)

CLM analytics can help you become customer-centric, but a few barriers need to be overcome first

Brand managers and marketing analytics teams often ask, "Primary research indicates that HCPs in segment X prefer a patient profile alongside the efficacy message. I can see that the patient profile slide is used for 68 percent of interactions with segment X, but is that value good or bad?" It is not easy to answer these questions, unless the CLM program establishes appropriate Key Performance Indicators (KPI)s to measure message delivery against any stated brand goals, e.g., Patient profile should be used with the efficacy message for at least 90 percent of interactions, which suggests a big gap between goals and actual attainment (68 percent). Similarly, organizations must also analyze if customer-centric approaches result in a positive business performance. Figure 4 shows a wide range of analytics that CLM programs should support, some directly related to customer centricity, some indirectly.

What Is Needed to Realize the Benefits of CLM Analytics?

While CLM analytics can be a dominant driver toward achieving customer centricity, four key implementation considerations must be addressed to ensure rich, reliable and trustworthy analytics can be performed:

1. **Secure championship.** The commercial strategy and sponsorship for CLM remains unclear for many companies. The reluctance to invest in strategies with unproven

return on investment (ROI) and the daunting task of formulating a truly cross functional core team comprised of brands, sales force effectiveness, marketing science, compliance, market research and information technology serve as key barriers to implementing a thoughtful CLM program today. CLM programs will require senior executive level championship to have a high probability of adoption. The sponsor should typically be as senior as a general manager or a business unit owner of a franchise, and more importantly, have both sales and marketing functions reporting to the position.

2. **Design content to facilitate data collection.** Content with great interactivity and appropriate scripting can be tremendously helpful in collecting valuable customer inputs and creating richer customer profiles. During a sales call, the reps may simply hand over the tablet for HCPs to interact with its content. This not only enriches the HCP experience, and but also has been statistically proven to influence their clinical decisions. For example, reps may ask, "Dr. X, can you use the slider to capture how many patients in your practice suffer from COPD?"

3. **Enable consistent metadata tagging.** Accurate and reliable CLM analytics depends on the robustness of the underlying content metadata tagging process. Organizations often underestimate the importance of this process and end up with insufficient and inconsistent tags across customer-facing digital sales aids. Insufficient tagging hinders the ability to analyze data at a granular level, and inconsistent tagging makes it difficult to conduct cross brand analysis. A metadata tagging taxonomy and process will enable the organization to embrace consistent content tagging nomenclature across brands and improve the quality and predictability of CLM analytics.
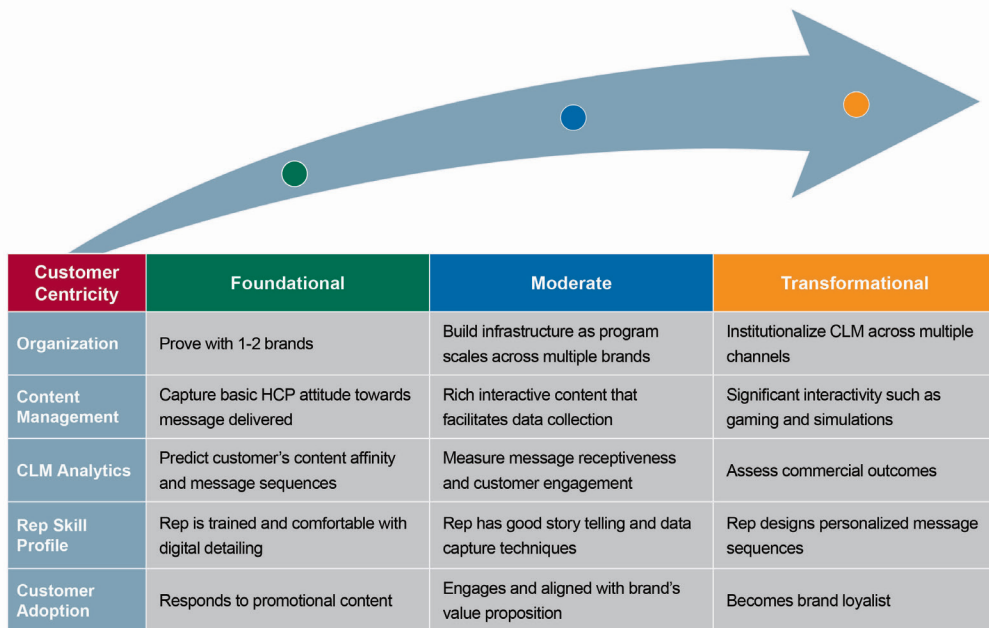
4. **Establish an analytics support organization.** Lastly, while process and technology elements must be in place, an analytical support organization or a center of excellence must be established to model sophisticated analytics and consistently deliver insights to inform customer strategies. The organization's charter may include establishing a common KPI framework across brands, defining business rules, managing metadata repository, collaborating with IT and agencies to script digital content, and of course, filling the role of a brand's preferred partner to provide analytical insights.

So, how should the pharmaceutical industry approach CLM analytics to enable the broader customer centricity agenda?

The pharmaceutical industry must take incremental steps toward customer centricity to make the implementation pragmatic and realistic. CLM analytics capabilities should be built incrementally to support the organization's gradual evolution toward customer centricity. Predicting customer's offer affinity is a good place to start.

As the organization becomes more comfortable with its customer centric

Figure 5: Customer Centricity Continuum

Customer Centricity	Foundational	Moderate	Transformational
Organization	Prove with 1-2 brands	Build infrastructure as program scales across multiple brands	Institutionalize CLM across multiple channels
Content Management	Capture basic HCP attitude towards message delivered	Rich interactive content that facilitates data collection	Significant interactivity such as gaming and simulations
CLM Analytics	Predict customer's content affinity and message sequences	Measure message receptiveness and customer engagement	Assess commercial outcomes
Rep Skill Profile	Rep is trained and comfortable with digital detailing	Rep has good story telling and data capture techniques	Rep designs personalized message sequences
Customer Adoption	Responds to promotional content	Engages and aligned with brand's value proposition	Becomes brand loyalist

philosophy, CLM analytics capabilities may be further developed to measure how customers value the brand engagements. Figure 5 shows how organizations embrace customer centricity and the role CLM analytics and content management can play at each lifecycle stage.

It's time for the pharmaceutical industry to embrace the change that comes with rapidly evolving customers. Commercial models that place customers in the center are neither experiments nor novelties. They are the future. Pharmaceutical manufacturers that combine the power of digital technologies with the potential of CLM today will become indispensable to their customers tomorrow.

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Understanding Physician Influence: Advances in Secondary Data Analysis and Network Science

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The widely accepted methodology for choosing targets for pharmaceutical promotion is a combination of segmentation by individual-physician characteristics and prescribing volume. While these methods have proven reliable, they capture only one part of the physician's activity and importance; an individual physician's characteristics are modeled, but not the physician's social environment or the impact of his or her local professional network of other physicians within which treatment and prescribing decisions are made.

Along with broad market targeting based on volume and segmentation, pharmaceutical companies routinely identify a smaller set of physicians considered important primarily due to their ability to influence the behavior of other physicians. The phrase "opinion leader" became routinely used after the pioneering work, Personal Influence, by Paul Lazarsfeld and Elihu Katz[1]. Using data from surveys, they showed that persuading people is often not accomplished through mass-media approaches alone, but is instead mediated by local, trusted sources. Over time, this insight from the academic world became more broadly accepted in sales and marketing organizations. Today pharmaceutical companies routinely use "Key Opinion Leaders (KOLs)" as targets in their promotional campaigns.

Despite being based explicitly on the concept of influence, methods used for identifying KOLs seldom make a systematic attempt to measure their accuracy. Approaches that consider institutional position or publishing record do not explore whose behavior these putative leaders might affect. Take, for instance, the real example of two clinical directors at a major academic hospital with extensive and similar publishing histories and academic positions. However, one has close clinical ties to eight high prescribing physicians while the other has ties to only one. KOL methods that cannot distinguish between these two physicians are not following the evidence which underlies this approach[2-3].

Recognizing the shortcomings of many of the KOL approaches, the company Comsort (later acquired by Merck) introduced Influence Network Marketing in 1997. Comsort and subsequent adherents of network marketing would survey a portion

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[1] Katz, E., & Lazarsfeld, P. (1955), *Personal Influence,* New York: The Free Press.

[2] Christakis NA, Fowler JH. Commentary--Contagion in Prescribing Behavior Among Networks of Doctors. *Marketing Science.* 2011;30(2):213-216.

[3] Iyengar R, Van den Bulte C, Valente TW. Opinion Leadership and Social Contagion in New Product Diffusion. *Marketing Science.* 2011;30(2):195-212.

of the physician population of interest, asking questions about trust and working relationships. This allowed, at a minimum, the identification of the KOL's who working physicians actually considered influential. To some degree, this methodology is able to also identify the audience for a particular KOL, thus giving a better measure of their value as an influencer. An influencer with no audience really has no influence at all.

Advances in analytic methodology, network science, and web-based technologies in conjunction with the availability of "big data" are enabling new and innovative methods that improve performance in core pharmaceutical promotional and educational activities. In particular, the blending of network science with multiple secondary data sources is providing direct, actionable insights beyond what can be accomplished with traditional approaches. While primary research techniques will continue to be essential tools, the use of secondary data in lieu of survey-based data provides a broader, more cost- effective and unbiased perspective. Further, validation studies can confirm the accuracy and reliability of secondary data sources as compared to traditional survey methods[4].

Secondary data sources typically include anonymous patient-level data (APLD, or medical claims data) and prescription claims data (Rx claims). Network science techniques can be applied to mine these sources to develop a deeper understanding of the connections between health care providers (HCPs), and the role of their

connections in information dissemination (e.g., your brand's message) and behavior change (i.e., brand adoption). Typical anonymous patient level data can be used to track the passage of a patient through the medical system, although it cannot be used to identify that patient. Thus, one can tell that a particular physician, faced with a particular diagnosis, will almost always refer for treatment. Even where there is no referral relationship, one can measure strong ties by looking at other aspects of the data, such as practice coverage, patient switching, and similar connections with a broader group of physicians. Although the underlying algorithms are complex, taking into account patient histories, physician specialties and practice patterns, it is possible to construct a model of physician relationships similar to that derived from a survey. In addition, such data can also provide information about physician influence that would be difficult to obtain reliably from physician surveys. By adding information about relationships that can be learned from research and clinical collaborations, institutional affiliations and education histories, a physician can be situated in a network of their most influential relationships.

This broad picture, in contrast to the more limited views obtainable with surveys, allows application of a wide set of social theory and methods generally categorized as social network analysis. Although social network analysis in the social sciences began with the work of classical sociologists Georg Simmel and Emile Durkheim in the early 20th century[5], it was not until the

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[4] Barnett, Michael L. & Bruce E. Landon, A. James O'Malley, Nancy L. Keating, Nicholas A. Christakis "Mapping Physician Networks with Self-Reported and Administrative Data." Health Services Research 2011.

[5] Durkheim, Emile. 1982. The Rules of Sociological Method and Selected Texts on Sociology and its Method. New York: The Free Press.

general availability of powerful computing that it became possible for social scientists to borrow insights from mathematical graph theory to analyze and display social networks. This has led to an explosion of academic research exploring influence and patterns of correlated behaviors in social networks[6-9]. Along with work on the diffusion of behaviors in populations, scientists have made significant steps towards understanding how to measure and affect the process of behavioral change[10]. Although this research is still in the early stage of development, it has already led to a dramatic improvement in both the theory and mathematical modeling of behavior change in social groups.

For pharmaceutical marketing, the relative ease of finding data to build networks and new analytic capabilities is likely to make simple volumetric and segmentation approaches obsolete. There is little doubt that physician – to –physician influence has a major effect on prescribing decisions - it has been observed and measured for more than 40 years[11-13]. The primary challenge has been acquiring appropriate data and developing methods for exploiting it. Although there is much development to come, initial solutions to these problems are now broadly available.

Along with the developments in network science, the continuing advances in natural language processing have made it possible to characterize both clinical and non-clinical aspects of physicians much more quickly and thoroughly than was previously possible. Natural language processing and extensive medical ontologies can be combined with domain expertise to identify HCPs who are not just active in certain areas, but also pinpoint their specific focus or context areas within therapeutic categories. For instance, a company with a product that has a new or less widely accepted mechanism of action may wish to find the particular physicians and researchers who are champions of the approach. Surveys are unlikely to obtain these data reliably because the audience is unlikely to know it, and more rudimentary bibliographic counts will not look at content. A company may wish to have a clinical specialist on an advisory board, but a treatment policy specialist for a speaking engagement. The wide variety of online databases and effective tools for interpretation make these more precise

[6] Christakis NA, Fowler JH. The Spread of Obesity in a Large Social Network over 32 Years. *N Engl J Med*. July 26, 2007 2007;357(4):370-379.

[7] Christakis NA, Fowler JH. The Collective Dynamics of Smoking in a Large Social Network. *N Engl J Med*. May 22, 2008 2008;358(21):2249-2258.

[8] Christakis NA, Fowler JH. *Connected: The Surprising Power of Our Social Networks and How They Shape Our Lives*. New York: Little Brown; 2009.

[9] Fowler JH, Christakis NA. Dynamic spread of happiness in a large social network: longitudinal analysis over 20 years in the Framingham Heart Study. *BMJ*. December 4, 2008 2008;337(dec04_2):a2338-.

[10] Watkins C, Harvey I, Carthy P, Moore L, Robinson E, Brawn R. Attitudes and behaviour of general practitioners and their prescribing costs: a national cross sectional survey. *Quality and Safety in Health Care*. 2003;12(1):29-34.

[11] Thistlethwaite JE, Ajjawi R, Aslani P. The decision to prescribe: influences and choice. *InnovAiT*. 2010;3(4):237-243.

[12] Prosser H, Almond S, Walley T. Influences on GPs' decision to prescribe new drugs-the importance of who says what. *Family Practice*. 2003;20(1):61-68.

[13] Coleman, J. S., E. Katz, H. Menzel. 1966. Medical Innovation: A Diffusion Study. Bobbs Merrill, Indianapolis.

approaches to thought leader identification both fast and relatively inexpensive.

There is valuable network information in datasets about research, clinical trials or affiliations. Physicians may have worked in the same departments or collaborated on a research project or trial. Sophisticated algorithms can take such complex data and infer the existence of meaningful relationships. In combination with networks derived from patient level claims data, conclusions can be drawn about physician behavior and influence that are extremely useful for pharmaceutical promotions. Non-network methods are unlikely to be able to distinguish between two thought leaders – one of whom is in regular clinical practice with several high prescribers and the other who maintains a primarily academic career. The question of which one would be better for a speaking engagement is rather obvious, but the data and analytic methods to support this choice have not been previously available.

These new approaches enable the entire continuum of pharmaceutical professionals – Medical Affairs, Marketing and Sales teams - to think more broadly about physician participation in promotion targeting, clinical trials, advisory boards and KOL/Thought Leader programs. Is a list of 50 national thought leaders for an advisory board required? Who are the best regional leaders to use for speaking engagements? Who are the local influencers we should invite for dinner engagements? Once an integrated network of clinical practice, affiliations and expertise is created, lists for any purpose and of any size can be generated from the same dataset and by the same vendor.

An additional source of information not yet discussed is the availability of data about the online activities of physicians. Much like the rest of the population, there are physicians expounding upon their experience and knowledge, asking questions, and telling stories across thousands of different web venues. With Twitter or blogs, messages can often be measured for importance by looking at how many times they were passed along to other users, commented upon, or referred to. Although certain users will be effectively anonymous due to the use of usernames, many physicians are identifiable when commenting on medical matters. With the enormous volume of online activity, it is necessary to have a strong ontology for recognizing the meaning of unstructured commentary, and to truly understand what is being said. Companies that specialize in deciphering physician comments are substantially better than those that more broadly analyze internet sentiment.

As with the expert data, online commentary data can be incorporated into the generation of network information by integrating with other sources of network information. This allows the promotional team to not only identify which physicians are influential online and whether they are likely to support campaign goals, but also look at how these individuals tie in to local, regional and national networks of other physicians (Figure 1). Some of these online personalities may be talking to key groups of other physicians, while others may be primarily talking to lay people. The promotional team should be able to discern the difference.

With all of the new data and analytic techniques available, pharmaceutical marketers will soon be able to truly create for the Health Care Provider what has been called the 360-degree profile in other

Figure 1: Real Physician Network Based on Multiple Data Sources

- Claims/Clinical practice ID & network
- Expert/KOL/Research
- Both
- Online Influencer
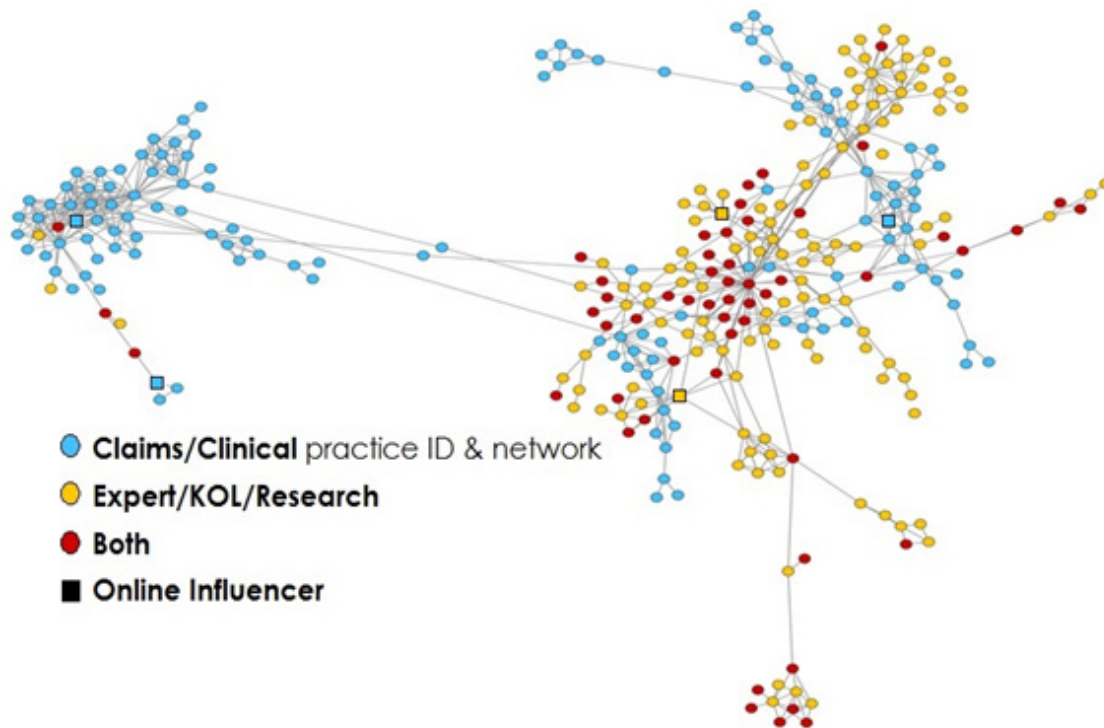
industries. How much does this physician practice? Do they comment online? Do they tend to refer difficult patients? Are they influencing the treatment decisions of a large number of other high-volume prescribers? Does their perspective tend to support the promotional goals or are they likely to be indifferent or hostile? These types of questions, familiar for many years in the industry, can now be answered in a way never before really possible in the healthcare industry. Companies who do not pay attention to these trends will fall substantially behind their competitors. Additional promotional resources, if poorly targeted, will not be able to make up the difference against a competitor that has a broad, deep and dynamic understanding of the actual influences on physician behavior.

About The Authors

Gregory Gallo leads the Life Sciences practice at Activate Networks. He has held executive sales, general management, and sales operations positions at Quest Diagnostics and ImpactRx. Prior to that, he had a successful career in pharmaceutical sales management with Ortho-McNeil Pharmaceuticals and Ortho Biotech. Greg has authored or co-authored articles and studies on salesforce effectiveness and network analytics for business, and has been a featured speaker at pharma industry conferences, such as PMRG and PMSA.

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experience.*
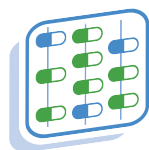
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