IN THIS ISSUE

NEWS
Call for Abstracts of Educational Research and/or Innovations due November 15

Big Data in the Era of Data-Driven Health Care

Rural Health Track Increases Physicians Serving in Colorado’s Rural Areas

PROFILE
Timing is Everything for our New Senior Associate Dean for Clinical Affairs

TEACHING TIPS
What is Best Evidence in Medical Education (BEME), and how does it integrate into my teaching and educational leadership?

FAQs
May I participate in election campaigns?

EVENTS
LINKS TO ARTICLES ABOUT ACADEMIC MEDICINE

NEWS

Call for Abstracts of Educational Research and/or Innovations due November 15

The fifth annual Education Scholarship & Innovation Symposium, hosted by the Academy of Medical Educators, will take place on Tuesday, Jan. 31, from 1:00 p.m. to 5:00 p.m.

All Anschutz students, residents, graduate students, post-docs and faculty are invited to submit an abstract on educational research and/or innovations in the health sciences professions. Abstracts are due by 11:59 p.m. on Tuesday, Nov. 15. All abstracts will be considered for poster presentations, with a minority selected for oral presentations. Please see the site for further details.

Click here for details about the abstract submission process and the symposium.

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Big Data in the Era of Data-Driven Health Care

By Michael G. Kahn, Michael J. Ames and Janet Corral

“Big Data” are big words these days, often used to describe the next transformative force in health care. So, what does this term mean? How will it impact clinical care, teaching and research? And, what do I need to know to incorporate these new ideas into my career?

Defining Big Data

While formal definitions of Big Data exist (and often differ from each other), complexity, heterogeneity and size of data are typical features used to describe the concept. Weber provides an accessible view of Big Data, enumerating 15 different types of data—some very familiar such as demographics,
encounters, diagnoses. Others less often considered, such as lifestyle, social networks and environment, illustrate a “tapestry of potentially high-value information sources” on individuals.¹

No less than 30 different data sources, from genomic sequences and expression arrays to news feeds and weather reports, are used as examples that contribute meaningful individual-level data. They span the spectrum of well-described, fully coded data, such as ICD10-CM codes, and unstructured, highly idiosyncratic data such as personal tweets and Facebook postings. Data contained in “traditional” clinical systems such as electronic health records, laboratory, pharmacy and imaging systems or administrative/billing systems will soon represent the minority of relevant individual-level data that is available electronically. Add continuously monitoring, wearable devices, such as Fitbit and Apple Watch; the burgeoning number of Internet-enabled everyday devices as part of the Internet of Things (IoT) movement; and the explosive use of genomics, and one begins to appreciate the “big” in Big Data.

Beyond bigness, equally challenging is the messiness of these data, with differences in structure, format, accuracy, completeness and even truthfulness (as observed by Peter Steiner’s July 1993 New Yorker cartoon: “On the Internet, nobody knows you are a dog”). “Data wrangling” is a relatively new term used to describe the effort needed to assemble multiple bits of data derived from different systems that store information in different ways into a linked, standardized, coherent whole. Current analytic methods often perform poorly with data that violate nearly every assumption or requirement for standard statistical models. Like data wrangling, new analytic terms such as deep learning, Bayesian causal models and natural language processing are being developed and applied to extract knowledge from data that are inherently biased.

How should one approach Big Data in a realistic way to advance a scientific agenda?

In a rapidly changing field, new terms and concepts can inhibit understanding the strengths and weaknesses of a new technology. Perhaps more difficult is differentiating achievable results from aspirational claims. The Gartner Hype Cycle cautions that new technologies often undergo painful journeys that begin with over-heated expectations followed by deep disillusionment before finding their rightful place.¹ Big Data tools and methods are early-stage technologies that are showing remarkable early successes but may still be in the unrealistic expectations phase of maturity.

What does Big Data mean for clinical, research and education faculty members on campus?

The explosion of commercial Big Data products and new analytics engines, such as IBM Watson, under the marketing banner of predictive analytics, have begun to produce remarkable results in realizing the potential of “P4 Medicine” (predictive, personalized, preventive, participatory). P4 medicine shifts from a focus on treating disease, to medicine that engages health-relevant data points (both of the individual patient as well as emerging understanding from large data genomic analysis, mobile health sensors and
other sources) in order to optimize wellness, inform diagnostic decision-making and even lead to targeted therapies.

The Big Data agenda brings a host of opportunities for broad, multi-disciplinary faculty engagement. For clinical practitioners, two early areas require extensive engagement from front-line clinicians. The first is understanding the validity of P4 medicine to current practice—do the models and predictions generated by Big Data analytics make sense, can they be implemented, do they have the intended impact on improving clinical outcomes, reducing adverse events and enhancing the quality of life? The second is how Big Data is used administratively or for quality improvement projects—have we created measures that impact the cost and efficiency of care while maintaining the “personal” in personalized medicine? Do the current systems of care ensure patient and provider safety? Can we increase patient autonomy and decision-making to support engaged patient decision-making?

For researchers

Big Data also brings innovative opportunities for discovering new relationships across biological, clinical, personal and population-based data domains that were previously in separate silos. As new data domains are integrated to realize the expanded view of Weber’s “Tapestry,” questions that seemed unable to be asked will come into focus for investigators willing to consider academically valid and valued methods that fall outside randomized clinical trials. Researchers and trainees are likely interested in learning about what data are currently available for research on campus; what frameworks and methods are relevant to their field of study; what infrastructure, data storage, validity and ethical considerations are impacted by Big Data; and how Big Data practices are changing the overall landscape of data-driven research careers in academic health centers.

For educators in health professions programs

“Big Data” isn’t often “big”—though approaches such as creating a data warehouse for the multiple data sources related to student learning and life, as well as visualizing certain data sets, can be translated to educational contexts to inform decision-making. Somewhat different from Big Data for research and clinical practices, education “big” data utilizes the specific practices of learning analytics (focused on describing learning within context) and educational data mining (which is more focused on finding patterns within educational data). The heterogeneity and complexity of educational data sources (including student, faculty, learning, financial and student life data) echo the needs in Big Data for data validation; appropriate infrastructure, privacy, security and ethics practices; and clear data governance.

How is Big Data being engaged at CU Anschutz?

Many significant local investments have created the foundational computing infrastructure, the data feeds and the analytics methods to support new opportunities in research and clinical activity.

- **Health Data Compass** is a recently funded collaborative effort between the University of Colorado, University Physicians Inc., University of Colorado Health and Children’s Hospital
Colorado. The aim is to build a Big Data platform for investigators, clinicians and administrators to leverage the vast range of biomolecular and clinical data resources on the Anschutz Medical Campus along with local, regional, state and federal data sets to support next-generation data-driven discoveries.

- A newly funded Dean’s Transformational grant at the School of Medicine, called D4 (Data Driven Discovery and Decision Science), seeks to marry new Big Data opportunities with new Big Data analytic methods.
- A new computing platform called TICR (Translational Informatics Computing Resource) within the Colorado Center for Personalized Medicine brings large-scale parallel computing and massive storage capabilities to integrate clinical and genomic data.

All of these new resources create opportunities to engage in Big Data projects at a scale not previously possible. New resources bring new opportunities for collaborations between computational biologists, computer scientists, bioinformaticians, biomedical informaticians, bioengineering faculty, basic scientists, clinicians, health system leadership and—most importantly—the patients we all serve.

**Where can I learn more?**

There are two opportunities on campus this fall.

1. A four-part workshop series open to all of campus will introduce the basic concepts of analytics in decision-making, and invite you to dialogue around how Big Data impacts the clinical, research and education missions. This workshop series is jointly sponsored by the Academy of Medical Educators, the Office of Information Technology, the Office of Academic Resources and Services, the Center for Bioethics and Humanities and the D4 project.

2. A second opportunity, targeted more to faculty and research personnel, will delve deeply into the challenges of using Big Data to solve biological, clinical and health systems challenges. The Adult and Child Consortium of Outcomes Research and Delivery Science (ACCORDS), the Colorado School of Public Health and the D4 Dean’s Transformational program will be hosting internal and external experts to share their experiences using Big Data.

In the coming months, there will be more opportunities to formally train in the skills and techniques needed for Big Data. New analytic methods courses are being developed that combine techniques from the disciplines of computer science, statistics and computational biology. Additionally, new informatics courses will focus on data integration, standards, visualization and decision support methods.

**Concluding thoughts**

Big Data is a team sport. Strong interdisciplinary team science approaches are critical for Big Data projects to successfully attack real-world problems and to make impactful new data-driven discoveries. In parallel, the analytics for the educational mission requires multiple personnel willing to collaborate across data sets and disciplines in order to unearth the potential available to inform decision-making—and to enhance student learning with predictive applications valid to the complex health professions learning context. These realities underscore the importance for each member of the Anschutz community: You have a meaningful and significant role in the success of Big Data initiatives. We invite you to engage, learn and explore. Our campus’ future is bright and welcoming of the many perspectives,
talents and skills of our community, toward leading a thoughtful adoption of Big Data in academic health care and education.


Rural Health Track Increases Physicians Serving in Colorado’s Rural Areas

By Mark Deutchman, MD, Director, Rural Track, Associate Dean for Rural Health

Colorado’s rural areas are short of physicians, particularly those who specialize in primary care. To address that shortage, the University of Colorado School of Medicine created the Rural Track eleven years ago. CU is one of only 30 medical schools in the U.S. with a program aimed at attracting, admitting and nurturing students who aspire to become rural physicians. Our Rural Track has a successful record of producing rural physicians for our state.

Here are some of our results:

Residency choice

- Seven classes of Rural Track graduates have now entered residency. Family medicine residencies were chosen by 42% of our 132 Rural Track graduates in contrast to the overall School of Medicine’s Family Medicine Residency match rate of only about 10%.

- Although only 10% of the students in each medical school class are in the Rural Track, they constitute approximately 50% of CU’s Family Medicine Residency match.

The Need for Rural Physicians

- Although approximately 20% of Colorado’s 5 million people live in rural areas, only 9% of physicians practice there.¹

- Of our 64 counties, 24 are rural and 23 are frontier.²

- All but 12 of Colorado’s counties qualify as full or partial primary care Health Professional Shortage Areas.³

- The Colorado Rural Health Center currently has 55 job openings listed for rural primary care physicians, 34 of which specifically request family physicians.⁴

- Without family medicine physicians, 92% of our counties would be full or partial health professional shortage areas.⁵
Rural Track graduates also enter a variety of other specialties that are needed in rural areas including general surgery, psychiatry and internal medicine.

**Clinical practice**

- Four classes of Rural Track graduates (66) have completed residency and entered practice.
  - Half are practicing family medicine.
  - 46% have entered rural practice.
- Rural towns where our graduates now work include: Del Norte, Walsenburg, Springfield, Sterling, Eagle, Buena Vista, Canon City, Craig, Montrose, Glenwood Springs, Rifle and Gunnison.

We are proud of our results but have work ahead to make the Rural Track a permanent program of the School of Medicine. Currently, we are working to secure financial and relational support to ensure the long-term continuation of the program. The School of Medicine supports approximately 25% of the cost but the program requires additional financial support from external stakeholders to continue past 2017.

You can learn more about the rural health track by watching our video: [The Rural Track Story](#), or by visiting our website.

4. [https://coruralhealth.org/colorado-provider-recruitment/jobs](https://coruralhealth.org/colorado-provider-recruitment/jobs)
5. [http://www.graham-center.org/maps/WDHPSA02/WDHPSA02_CO.pdf](http://www.graham-center.org/maps/WDHPSA02/WDHPSA02_CO.pdf)

### PROFILE

**Timing is Everything for our New Senior Associate Dean for Clinical Affairs**

It’s an exciting time to be at the University of Colorado School of Medicine. So much so, that Anne Fuhlbrigge, MD, packed up her desk at Harvard and headed west to assume the role of Senior Associate Dean for Clinical Affairs.

For Dr. Fuhlbrigge, the time was right to make a change. She’s excited about the tremendous growth that’s happening all along the Front Range.

“There’s nimbleness to the environment here, which to me means we can do more adventurous things,” she said. “Everyone here seems to be thinking a little bit..."
differently than I’ve seen elsewhere, and everyone seems to be focused on how to collaborate in ways that are best for the patient and the provider.”

The university’s location was certainly a big draw, just not for the typical reasons one might expect. Dr. Fuhlbrigge is 100% on board with how the university continues to innovate and evolve as it works to bring specialty care to our seven-state region.

“The people here on campus engaging in telehealth programs are truly focused on doing what’s right for the patient, and I expect to see this continue to evolve in ways that position CU as a leader in this area.”

It was also a good time for Dr. Fuhlbrigge on a personal level. Her husband, Robert Fuhlbrigge, MD, PhD, has also joined the School of Medicine faculty. He will be heading the pediatric rheumatology practice at Children’s Hospital Colorado. With both of their daughters in college, the move to Colorado has placed them geographically closer to each of them.

“It’s not always easy to find a place with great opportunities for both people in a two career family,” she said.

It was also a good time for her to focus on new interests. “I’ve always told my daughters: Medicine is a fascinating career. It can expand as you personally change your interests,” she said. “I enjoy clinical care and research, but I’m now looking forward to contributing administratively. It’s a great next step.”

Since starting in her new role in June, Dr. Fuhlbrigge has been enjoying getting to know her colleagues across the university. And she’s impressed with the university’s emphasis on interprofessional training.

“It helps that we have such strong programs on campus—nursing, pharmacy, dental medicine, PT, OT and public health —and it’s great to see how entire care teams are training in how to best integrate our disciplines so we can work well together.”

Dr. Fuhlbrigge is poised to help the school face the nationwide challenge of reducing the cost of care. “It’s so critical to be cost-conscious. If we want to continue to innovate, we need to be sure we’re not wasting resources or putting an undue burden on our patients. It’s part of my role to ensure we’re increasing the value of our care and achieving the best outcomes at the most reasonable cost.”

The institution has already made great strides in reducing silos of care, and Dr. Fuhlbrigge also wants to continue to improve interdepartmental programs. “I’ll be pleased if I can help push forward programs that have our patients at the center yet continue to meet the needs of our staff and faculty,” she said.

Although she’s only been in this role a short time, Dr. Fuhlbrigge believes she’s in the right place. “It’s been good to meet my colleagues and see just how passionate everyone is about the integration of care and figuring out how we work together best. I’ll miss Boston, but we made a good move and we’re looking forward to the next few years.”
Dr. Fuhlbrigge most recently served as Clinical Chief of Pulmonary and Critical Care Medicine and Vice Chair of Ambulatory Specialty Services at Brigham and Women’s Hospital in Boston, as well as Assistant Professor of Medicine at Harvard Medical School. She served as co-investigator on several large multi-institutional projects, and on national and international programs and committees evaluating treatment strategies and implications for health policy management.

TEACHING TIPS

What is Best Evidence in Medical Education (BEME), and how does it integrate into my teaching and educational leadership?

By Janet Corral, PhD, and Eva Aagaard, MD

Best Evidence Medical Education (BEME) consists of reviews of the health professions education literature on key topics, in order to inform educational practice and leadership. BEME reviews are conducted by voluntary teams of medical education scholars from around the world. When the nonprofit BEME board receives a topic proposal, the board ensures the ability of the voluntary team members to complete an effective review by assessing the team members and the proposed review process. Once the proposal is accepted, the protocol is returned to the team to implement the review.

How does BEME relate to my work as an educator and scholar?

BEME reviews provide evidence-based guidance related to teaching strategies and methods, curriculum design questions, assessment practices and curriculum/program evaluation. BEME reviews are an addition to the social science discipline knowledge that informs medical education practices.

Examples of BEME reviews that are directly helpful to educators and scholars:

<table>
<thead>
<tr>
<th>Is team-based learning effective in medical schools?</th>
<th>What are effective methods to teach evidence-based medicine to medical students?</th>
<th>Can assessments in clinical rotations and experiences identify learners in need of remediation?</th>
<th>How should we design our simulation program or curriculum?</th>
</tr>
</thead>
</table>

How does BEME relate to my work as an educational leader?

It relates to your work in two ways. First, as with educators and scholars, the BEME reviews provide direct reviews of the evidence with clear answers regarding many of the teaching and evaluation practices in medical education, as well as regarding student issues. In this regard, BEME reviews can be
very helpful for committees: rather than having to conduct a literature review from scratch, committees can consider the analyzed results of the peer-reviewed literature to answer key questions.

Second, many BEME reviews have focused on systems-level topics, or topics relevant to administrative leaders. The results can be used to inform decision-making and program planning (or renewal). For example:

<table>
<thead>
<tr>
<th>How are medical students’ career decisions formed?</th>
<th>Should we invest in an audience response system?</th>
<th>How are the relationships between medical education programs and communities perceived by stakeholders?</th>
<th>Should admissions use the multiple mini-interview format, or a traditional method for selecting students?</th>
<th>What contributes to effective faculty development?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer: <strong>BEME Guide 33</strong></td>
<td>Answer: <strong>BEME Guide 21</strong></td>
<td>Answer: <strong>BEME Guide 35</strong></td>
<td>Answer: <strong>BEME Guide 37</strong></td>
<td>Answer: <strong>BEME Guide 40</strong></td>
</tr>
</tbody>
</table>

**Can I do a BEME review?**

Absolutely! The University of Colorado School of Medicine’s Academy of Medical Educators is one of the 19 international BEME collaboration sites. We peer review the protocols as well as participate in the BEME governance committees. There are multiple accepted forms of BEME review, including systematic review, realist synthesis review, effectiveness review, scoping review and definitional review. Each form engages a logical and explicit appraisal of available information to determine the best evidence relating to an issue in medical education.

**BEME workshop coming soon**

A workshop on conducting a BEME review will be offered this winter. Please see the Faculty Affairs workshop registration page in November for details.

**FAQs**

**May I participate in election campaigns?**

As private citizens, University of Colorado School of Medicine faculty members are permitted and encouraged to participate in election campaigns and advocate for public policies. However, most faculty members are also public employees, and the state and Board of Regents limit the manner in which employees may use the name and resources of the university. Specifically:
Under the Colorado Fair Campaign Practices Act (CRS 1-45-117), public money and university resources cannot be used to advocate for or against any candidate, ballot initiative or referred measure in any local, state or national election. This means that faculty members are prohibited, 24 hours per day, from using university computers, email accounts, university websites, faxes, office supplies or other resources to influence an election or to advocate for or against any candidate for office or any issue (ballot initiative or referendum) that is before the people.

Faculty members may not use their university email accounts to send or forward any materials that urge electors to vote for or against a candidate, ballot initiative or other campaign issue that is before the people.

Faculty members may not participate in any election activities during working hours; if they wish to do so, they must take personal (vacation) leave. Even if using personal time, faculty members may not use university resources and must clarify that their activities are being conducted on personal time and not on behalf of, or at the request of, the university.

Under the Act, any person can complain to the secretary of state that a public entity or public employee has violated the campaign practices law. The secretary of state may investigate any complaint and may impose monetary fines.

Certain campaign-related activities are allowed. For example, faculty members may provide information in response to questions posed in the ordinary course of their duties, even if the information provided relates to a ballot issue—so long as the question was not solicited by a state employee.

Separate rules and restrictions apply to students and student groups and to regents and certain other officers of the university.

EVENTS

Unless otherwise indicated, register at http://som.ucdenver.edu/FacultyDevelopment/

**Active Learning - 3 Easy Ways**  
Oct. 27, 2016  
12:15 p.m. to 12:45 p.m.  
Janet Corral, PhD  
Webinar

**Analytics in Decision-Making: Personalized Medicine**  
Nov. 1, 2016  
Noon to 1:00 p.m.  
Fulginiti - Gossard Forum
What is a "Best Evidence Medical Education" (BEME) review?
Nov. 3, 2016
12:15 p.m. to 12:45 p.m.
Janet Corral, PhD
Ben Harnke, MLIS
Webinar

Herding Cats Part II: Creating a Culture of Accountability, Trust and Collaboration
Nov. 8, 2016
8:00 a.m. to noon
Kari Granger, PCC
Fulginiti - Gossard Forum

Outpatient Teaching
Dec. 9, 2016
1:00 p.m. to 3:00 p.m.
Multiple Presenters
AO1, Room 6101

LINKS TO ARTICLES ABOUT ACADEMIC MEDICINE

http://www.ucdenver.edu/academics-colleges/medicalschool/education/academy/Newsletter/academicmedicine/Pages/oct-16.aspx

- A Workshop on Leadership for Senior MD-PhD Students
- Closing the Health Care Gap in Communities: A Safety Net System Approach
- Critical Deficiency Ratings in Milestone Assessment: A Review and Case Study
- Improving the Medical Student Performance Evaluation to Facilitate Resident Selection
- Online Learning Tools as Supplements for Basic and Clinical Science Education
- Procedural Competence Among Faculty in Academic Health Centers: Challenges and Future Directions
- The Residency Application Process: Pursuing Improved Outcomes Through Better Understanding of the Issues
- Value-Added Clinical Systems Learning Roles for Medical Students That Transform Education and Health: A Guide for Building Partnerships Between Medical Schools and Health Systems
- What is the Prevalence and Success of Remediation of Emergency Medicine Residents?
- What Shape is Your Resident in? Using a Radar Plot to Guide a Milestone Clinical Competency Discussion
- Working Definitions of the Roles and an Organizational Structure in Health Professions Education Scholarship: Initiating an International Conversation