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CLINICAL INFORMATICS IN PSYCHIATRIC TRAINING: PREPARING TODAY'S TRAINEES FOR THE ALREADY PRESENT FUTURE

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In an increasingly digital world, the impact and scope of technology on the specialty of psychiatry will continue to grow [1]. The rise of electronic medical records (EMRs), readily-available prescription drug databases, and health information exchanges represents a transformative change in the history of psychiatry. These technologies are only the first in a series of new information technologies that will continue to shape the field. Mobile apps, augmented reality, virtual reality, artificial intelligence, and big data are all active, nascent areas of mental health technology research that will likely make stronger inroads into the field.

These technology changes have inherent advantages and disadvantages on clinical care. Psychiatry trainees must be educated about *clinical informatics*, the study of information technology in the context of clinical care [2,3]. Learning how clinical informatics can be applied and incorporated into psychiatric care can help trainees make informed choices about these advances, while understanding the risks and benefits. Psychiatrists will risk losing the opportunity to incorporate informatics as part of the practice of psychiatry if the training to critically evaluate and safely approach new mental health technologies is not offered to trainees who will work in an increasingly digital era.

This paper will introduce the importance of teaching clinical informatics to psychiatry trainees, explore current broader medical educational efforts outside of psychiatry, propose elements of a curriculum specific for psychiatry trainees, and propose a call for further action.

The need for teaching clinical informatics in psychiatry

Teaching clinical informatics to psychiatry residents is not a new concept, but it has not received necessary attention recently. In 1998, Huang et al. described the importance of

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informatics and need for a psychiatry resident curriculum on the topic [4]. The authors focused their proposed curriculum on four core areas of knowledge: patient care, communication, education, and practice management. Technology and its role in clinical care has changed in the 20 years since Huang et al. wrote their article. At the time, the iPhone did not exist, EMRs were uncommon, and all prescriptions were still written by hand. The authors wrote, “one could imagine a future where psychiatric practice involves frequent, short, intensive outpatient visits by videophone” [4]. That vision is now a clinical reality that more clinics and programs face every day. The aptly titled article ‘Teaching to See Behaviors—Using Machine Learning?’ published in August 2017 in Academic Psychiatry also notes that medical educators themselves must learn to teach new concepts that relate to the future of clinical psychiatry such as machine learning, reflects a growing awareness of the digital transformation occurring across all of healthcare [5].

Thus digital transformation is due to rapid advances in technology, which have expanded the role of clinical informatics in psychiatric service delivery, models of care, and clinical innovation. While residents do not need to create electronic medical record systems, build their own smartphone applications, or master data science, effective and successful psychiatrists should understand the fundamentals of these technologies in order to understand their optimal clinical use. New models of care—especially collaborative care, the medical home model, and accountable care organizations—have psychiatrists overseeing the health of large populations of patients. As psychiatrists begin to rely more heavily on population data, it will become increasingly important to understand the informatics and methods used to produce the statistics and reports informing clinical care. Understanding the assumptions, limitations, and strengths of how population data is generated will ensure that psychiatrists remain active and informed clinicians instead of passive stewards of data.

The recent surge of interest in mobile mental health and artificial intelligence technologies (in the burgeoning field of affective computing and emotion sensing) is exciting, but also suggests an increasing need for psychiatrists to understand these new technologies and ensure that they are properly evaluated and utilized for clinical use. Teaching clinical informatics to psychiatry residents is thus important for expanding their ability to work with new models of care delivery and their ability to guide the role of new technologies.

The role that clinical informatics play in psychiatry today will likely be small compared to the role that they play in the future. The environment that residents and fellows are training in may be very different in only a few years. A flood of clinical informatics research, symbolized in the launching of several new journals, including the *Journal of Medical and Internet Research: Mental Health* in 2014, *Computational Psychiatry* in 2015, and *The Journal of Technology in Behavioral Science* in 2016, represents the growing academic study of psychiatric informatics. As the growing research literature is translated into evidence based clinical tools, it will be impossible to ignore the digital landscape of psychiatry. Further, government research institutes, such as the USA’s National Institute of Mental Health, and whole health systems, such as the United Kingdom’s National Health Service, are actively promoting the use and development of such technologies. If trainees are equipped with the right education and skill set, they will be able to make informed decisions to lead the adoption and promote the judicious use of novel technologies as part of their

clinical duties. With this as our motivation, we present a proposed curriculum for teaching clinical informatics to residents.

Current clinical informatics educational efforts

The growth of EMRs and digital health information spurred the growth of clinical informatics in the last decade [6]. Both medical and surgical specialties have recognized the importance of training residents in clinical informatics. Novel training opportunities, like the University of California Los Angeles' resident informaticist program, are now emerging to begin to offer residents elective opportunities and experiences in clinical informatics [7]. Other specialties, like pathology [8], anesthesia [9], and pediatrics [10], have already renewed efforts to explore how to best teach clinical informatics to residents. A recent study of US medical students noted that 30% had some interest in clinical informatics, but few were aware of related opportunities or career pathways [11].

The importance of a curriculum for clinical informatics has already been recognized, though there have been no recent efforts specific to psychiatry. In 2014, Hersh et al. outlined undergraduate medical education learning objectives, competencies, and milestones for clinical informatics [12]. Their broad framework offers a useful starting point to consider a psychiatry-specific curriculum and covers universal fundamentals like privacy and security mandates, professionalism in the digital age, and engaging patients with information technology tools. It is also complementary to the vision for technology competenciy development in psychiatry called for in 2006 by Srinivasan and colleagues [13]. An adapted and updated version highlighting opportunities for educators to incorporate clinical informatics skills into psychiatry competencies is presented below in figure 1.

Psychiatry residents have limited exposure to clinical informatics, and even less exposure to their implementation. Although there is an opportunity to learn about clinical informatics via Quality Improvement projects, which are part of resident common program requirements, there is no data as to what proportion of Quality Improvement projects are conducted through technology. Currently, residents in most settings are taught to use EMR for documentation and billing and to use EMR messaging and health system paging. Residents are taught the principles of he Health Insurance Portability and Accountability Act (HIPAA) and secure data within the health system. Informatics training beyond this, however, is done on largely an informal, *ad hoc* basis. For instance, using Internet resources to find community resources and other providers and using Internet sources for collateral data is often learned through informal trial and error. Computer training is conducted by IT personnel, who may not understand the context of IT use within psychiatric practice. Much interaction with mental health apps is done through Apple's App Store and the Google Play Store, as opposed to an official formulary or evaluation process.

For those trainees especially interested in clinical informatics, a new fellowship pathway does exist. Clinical informatics is a new approved subspecialty recognized by the American Board of Medical Specialties. In 2011, the American Board of Preventive Medicine agreed to host the board certification process for clinical informatics. Fourth-year psychiatry residents and board-certified psychiatrists are eligible to apply to these two-year fellowships.

A practice pathway for board eligibility also exists [10] through 2022. The fellowship is offered at more than 20 universities throughout the United States. Currently, two psychiatrists (both authors on this paper) are enrolled though in the Department of Medicine at their health systems. A variety of programs exist, including through the Department of Pediatrics at Stanford; through the Department of Medicine at Beth Israel Deaconess Medical Center; and through the Department of Medicine at University of California, San Francisco, among many others. Those interested in the fellowships or seeking to learn more may use the following link in the references to access a updated list of Accreditation Council for Graduate Medical Education (ACGME) accredited fellowships, which psychiatry trainees (or faculty) can apply to [14]. The formal ACGME program requirements can be accessed at the following reference [15].

Proposed components of a clinical informatics curriculum for psychiatry residents

In psychiatry, an initial movement toward EMR and telepsychiatric skills and competencies [16] has now evolved into a need for specific skills across a broad spectrum of electronic mental health options, including apps, text/e-mail, social media/networking, and other therapeutic components [17]. There is also a need for facility to learn to see how technology surrounds all that they do (i.e., platform, mobile health). Our field faces the same challenges as others in measuring the human capability required for effective performance, which may include individual and aggregate components of skill, knowledge, attitudes, or personal qualities. These elements affect personal conduct, habits, ways of interacting, and manners [18], and even broader, culturally determined behaviors.

Creating a curriculum and framework for clinical informatics education in psychiatry will be an ongoing process. It will require the involvement of numerous stakeholder groups including trainees, educators, hospital leadership, faculty and others. Below, we present an outline of the components of a clinical informatics curriculum, updated from the 1998 work by Huang et al [4]. Similar to the prior iteration, we organize our proposal around four core areas: 1) patient care and communication (combined), 2) education, 3) practice management, and 4) (added) technology. However, we have updated the individual topics based on the consensus of the authors, reflecting the input from three current program directors and two current clinical informatics fellows, as well as review of the literature, and experiences attending and presenting on the topic at recent annual meetings including the American Association of Directors of Psychiatric Residency Training, Association of Directors of Medical Student Education in Psychiatry, and American Medical Informatics Association. The goal of this present paper is not go into depth on each of these proposed components, as much has already been written about the individual pieces such as for example teaching on ethics of digital health [19], but rather to raise awareness and spark discussion for the field. Creating a widely accepted curriculum will need to be a large scale, inclusive, and open process with multiple stakeholders involved.

In conclusion, the role of clinical informatics in psychiatry will increase because of its extreme efficiency at transmitting information, its entrenchment in every other medical

specialty, and the heavy levels of financial investment in information technologies like EMRs and decision support systems. Teaching psychiatry trainees and existing psychiatrists the fundamental principles of clinical informatics will ensure that psychiatrists remain educated, engaged, and integral in shaping how technology is used for clinical care. Realizing the advantages that digital tools can offer, while avoiding their risks and pitfalls, will require that tomorrow's psychiatrists have access to clinical informatics knowledge. Further work on competencies, training and evaluation is needed.

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References

1. Hilty DM. Technology in psychiatric education: the technology innovation column. Acad Psychiatry. 2016 Jun 1; 40(3):543–5. [PubMed: 26895929]
2. Rapoport M, Moussaoui G, Whiteman KL. Smart and Personalized Geriatric Psychiatry: How Sensors, Mobile Devices and Informatics May Change the Way We Practice. The Am J Ger Psychiatry. 2017; 25(3):S36.
3. Ben-Zeev D. Technology in Mental Health: Creating New Knowledge and Inventing the Future of Services. Psychiat Serv. 2017; 68(2):107–8.
4. Huang MP, Alessi NE. An Informatics Curriculum for Psychiatry. Acad Psychiatry. 1998; 22:77–91. [PubMed: 24442933]
5. Louie AK, Balon R, Beresin EV, Coverdale JH, Brenner AM, Guerrero AP, Roberts LW. Teaching to See Behaviors—Using Machine Learning? Acad Psychiatry. 2017
6. Ohno-Machado L. Using health information technology for clinical decision support and predictive analytics. J Am Med Inform Assoc. 2017; 24:1. [PubMed: 28039394]
7. Singer JS, Cheng EM, Baldwin K. , et al. [Accessed 1 August, 2017] The UCLA Health Resident Informaticist Program - A Novel Clinical Informatics Training Program. J Am Med Inform Assoc [Internet]. 2017.
8. Sinard JH, Powell SZ, Karcher DS. Pathology training in informatics: evolving to meet a growing need. Arch Pathol Lab Med. 2014; 138:505–11. [PubMed: 24678681]
9. Chu LF, Erlendson MJ, Sun JS, et al. Information technology and its role in anaesthesia training and continuing medical education. Best Pract Res Clin Anaesthesiol. 2012; 26:33–53. [PubMed: 22559955]
10. Lehmann CU, Shorte V, Gundlapalli AV. Clinical Informatics Sub-Specialty Board Certification. Pediatr Rev. 2013; 34:525–30. [PubMed: 24187144]
11. Banerjee R, George P, Priebe C, et al. Medical student awareness of and interest in clinical informatics. J Am Med Inform Assoc. 2015; 22:e42–7. [PubMed: 25726567]
12. Hersh WR, Gorman PN, Biagioli FE, et al. Beyond information retrieval and electronic health record use: competencies in clinical informatics for medical education. Adv Med Educ Pract. 2014; 5:205–12. [PubMed: 25057246]
13. Srinivasan M, Keenan CR, Yager J. Visualizing the future: technology competency development in clinical medicine, and implications for medical education. Academic Psychiatry. 2006 Nov 1; 30(6):480–90. [PubMed: 17139019]
14. https://www.amia.org/membership/academic-forum/clinical-informatics-fellowships
15. https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/381_clinical_informatics_2017-07-01.pdf

16. Tuxworth E. Deakin University Course Development Centre. A collection of readings related to competency-based training. Victoria, Australia: Victorian Education Foundation, Deakin University; 1994. Competence-based education and training: background and origins; 109–123. (Original work published in 1989)http://files.eric.ed.gov/fulltext/ED384695.pdf [Accessed 1 August, 2017]

17. Marelli AF, Tondora J, Hoge MA. Strategies for developing competency models. Admin Pol Ment Health. 2005; 32:533–61.

18. Hilty DM, Crawford A, Teshima J, et al. A framework for telepsychiatric training and e-health: competency-based education, evaluation and implications. Int Rev Psychiat. 2015; 27(6):569–92.

19. Roberts LW, Torous J. Preparing residents and fellows to address ethical issues in the use of mobile technologies in clinical psychiatry. Acad Psychiatry. 2017; 41:132–4. [PubMed: 27472934]

Table 1

Prototype of Medical Informatics Competencies for Residents, Based on the ACGME Framework [12]

Competencies	Opportunities to incorporate informatics
Patient Care and Procedural Skills	Looking up latest information in smartphone reference apps. Provide exposure therapy through virtual and augmented reality devices.
Medical Knowledge	Understand how information systems and processes can optimize or hinder workflows.
Practice-based learning & improvement	Use information technology to optimize learning and self care. Educate patients on technology opportunities. Apply informatics to quality improvement projects.
Interpersonal & communication skills	Explain the risks and benefits of technology to patients, medical students, and other mental health clinicians.
Professionalism	Demonstrate sensitivity to the impact information system changes have on psychotherapy, clinical practice, physician-patient relations and physician work-life balance.
Systems-based practice	Use clinical decision support systems to prevent adverse events.

Table 2

Outline of Components of E-curriculum in Clinical Informatics.

1.Patient Care (or Clinical Evaluation and Treatment):	
	Electronic Medical Records (EMR)
	Open Notes, providing patients unrestricted access to view progress notes
	Electronic Diagnostics and Treatments
	Evaluating digital literacy and readiness of patients
	Understanding limitations of mobile biosensor data (wearables)
	Evaluating and using mobile apps and devices
2. Communication:	
	Understanding patient use and barriers to technology
	Physical vs. virtual space
	Impact of communication via person, e-mail, text messaging, voice messaging, social media/networking and videoconferencing
	Creating an environment free of technology distractions
	Telepresence
	Cultural issues regarding the values, language support and cultural use of technologies
3. Education:	
	Role of secondary sources on the web (e.g., Pubmed, Google Scholar, World of Science, and EMBASE)
	Evaluating information from the web
	Technology equipment (e.g. hardware, software, microphone, camera)
	Big Data and data sciences
	Population health
4. Practice Management:	
	Digital Professionalism and Ethics
	Documentation using information technologies, clinical care coordination, administrative and logistics support with information technologies
	Media, publicity, and online presence; privacy, confidentiality and security/encryption; clinical malpractice and liability; licensing and privileging; informed consent; federal, provincial, state and local and inter-jurisdictional practice; Food and Drug Administration and prescribing (e.g. Ryan Haight)