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A Telehealth Framework for Mobile Health, Smartphones, and Apps: Competencies, Training, and Faculty Development

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Abstract
Technologies like smartphones and apps are reshaping life, health care, and business. Clinicians need skills, knowledge, and attitudes to ensure quality care and to supervise the current generation of trainees, consistent with the Institute of Medicine's Health Professions Educational Summit. Literature is integrated on patient-, learner-, competency-, and outcome-based themes from the fields of technology, health care, pedagogy, and business. Mobile health, smartphone/device, and app competencies are organized in the Accreditation Council for Graduate Medical Education (ACGME) Milestone domains of patient care, medical knowledge, practice-based learning and improvement, systems-based practice, professionalism, and interpersonal skills and communication. Teaching methods are suggested to align competency outcomes, learning context, and evaluation. Services by mobile health, smartphone/device, and apps have a broader scope than in-person and telehealth and telebehavioral health care. This includes clinical decision support in medicine, hybrid delivery, and integration across health systems' e-platforms. A curriculum with seminar, case- and problem-based teaching, supervision, evaluation, and quality improvement practices is needed to achieve competency outcomes. Clinicians have to adjust assessment, triage and treatment and attend to ethical, privacy, security, and other challenges. Health systems need to manage change, proactively plan faculty development, and create a positive e-culture for learning. Research is needed on implementing and evaluating mobile health competencies for this significant paradigm shift in health care.

Keywords Apps · Training · Mobile · Smartphone · Competencies · Health · Clinician · Behavioral · Faculty · Development

Introduction

Mobile health (mH), defined as the application of mobile or wireless communication technologies to health and health care (Steinhubl et al. 2013), and social media have been propelled by the X, Millennial/Y, and Z generations. Health care can be delivered nearly anytime/anywhere, as geographical, cost, temporal, and even organizational barriers are overcome

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(Bhugra et al. 2017; Hilty et al. 2019b). Over 225 million people in the USA and over 2 billion people around the globe are using smartphone/devices (SP/Ds) and apps (Poushter et al. 2018), including over 10,000 mental health and wellness apps (Torous and Roberts 2017). Apps are used for learning health information, reminders, supportive messaging, symptom monitoring, communication with providers, self-assessment, and decision support (Hilty et al. 2017a). These technologies lie on a spectrum from people or patients (or clients, the term for some professions) informally seeking help on one end, to formal health services like telebehavioral health on the other end (Hilty et al. 2015a).

mH, SP/Ds, and apps create significant challenges for clinicians and health systems (Hilty et al. 2017a). The majority of apps do not protect patient health data (Glenn and Monteith 2014) and have scarce evidence that they work (Firth et al. 2017a, b). Many are used spontaneously, rather than purposely as part of a patient-doctor or -clinician treatment plan (Hilty et al. 2019b). Trainees have grown up immersed in technology and assume that personal experience translates to professional work, but they may lack knowledge of these issues and skill in dealing with emergencies, ethical challenges, and data security. Indeed, many do not realize that content posted online is often permanent and searchable even after years, which has future implications for their career and professional lives. Suggestions about professionalism and technology for clinicians, faculty, and residents—via the American Association for Directors of Psychiatry Residency Training (AADPRT)—have been published (DeJong et al. 2012).

Educational reform with technology has been suggested by the World Health Organization (World Health Organization 2015) and the Institute of Medicine (IOM) (IOM Health Professions Educational Summit (HPES) 2003). The Summit's objectives for the twenty-first century health care professionals emphasized interdisciplinary teams, evidence-based practice, and information technology (IOM 2003, p. 45). As a start, telepsychiatric competencies were developed to improve clinical care and they serve as a prototype for institutions to adjust teaching methods (e.g., curricula), faculty development, and administrative policies (Hilty et al. 2015b). The use of mH, SP/Ds, and apps extends beyond the scope of in-person health care, as health systems' e-platforms facilitate clinical decision support, add synchronous and asynchronous technologies, and integrate service delivery. Overall, mH competencies may help and encourage clinicians to better screen what technology patients are using and select the "right" technology at the "right" time (e.g., not using an app or text to express suicidal ideation).

There are a number of faculty development issues with mH, SP/D, and apps—much like the case for social media competencies. The current generation of health care educators may not be as familiar with technology as much as trainees, so bridging that gap must be done purposefully. This paper will help with reference to mH, SP/D, and app competencies so the reader can:

1. Have an outline of the competency-based education movement for competencies from telepsychiatry/telebehavioral health to social media to mobile health
2. Grasp mH's components, concepts, operations, and processes, in comparison to in-person care with telehealth and other technologies like social media
3. Organize competencies for mH, SP/D, and apps using the Accreditation Council for Graduate Medical Education (ACGME) framework
4. Learn a basic approach to align teaching and evaluation with skill and patient outcomes for clinicians, departments, and health care systems.

Overview of Mobile Health and Other Technology Competencies

Mobile Health (mH)

mH architecture includes many settings, devices, and operational features—all of these facilitate access, timeliness, and integration. SP/Ds connect individuals and patients to national health systems, the public health sector, communities, acute and outpatient care settings, work, school, and home life (Fig. 1). In the UK, 25% of the National Health Service Mental Health Trusts recommended SP/D apps to patients (Bennion et al. 2017). In health care, mH components include monitoring, alerting, data collection, record maintenance, and detection and prevention systems (Silva et al. 2015). It involves mobile phones, tablet computers, and wearable devices (e.g., smart watches and sensors at home for remote patient monitoring for chronic disease management) (Torous et al. 2014). mH technology options include health apps, voice/video communications between professionals and patients, short message service (SMS) and multimedia message services (MMS) with video clips/sound files, multimedia functions for learning, and motion and global positioning system (GPS) sensors that simplify clinical assessment; and device connectivity.

Since mH alters communication, boundaries, and privacy/confidentiality, clinicians are encouraged to screen what technology is being used, how, when, and where (i.e., preferably on a secure framework or platform like an electronic health record (EHR)). Not all patients may be suitable for mH, which is very different than from in-person and telehealth care. The clinician needs to assess whether whatever technology is chosen is compatible and appropriate for the patient who will be using it. It is important to use the "right" technology at the "right" time (e.g., not using an app or text to express suicidal

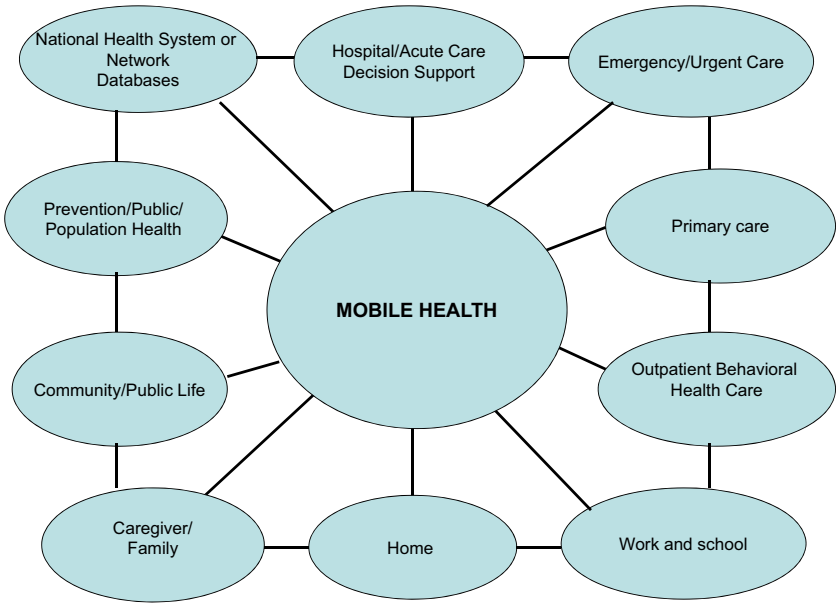

Fig. 1 How mobile health, smartphone/device and apps integrate information in the digital age

ideation) as part of a treatment plan. The legal and regulatory landscape is only beginning to take shape, with the Food and Drug Administration (major) and the Federal Trade Commission (minor) playing roles in evaluating the safety and marketing claims of mH.

For health systems and team-based care, technology may help with the adoption of standardized measures for evaluation (e.g., a self-report instrument), prospective data collection within an EHR, and regular evaluations (e.g., beginning and then 1, 2, 3, and 6 months). Technology is a "practice extender" by performing some clinical tasks in place of clinicians (Raney et al. 2017) and a "veritable team member" (Hilty et al. 2019c). Administrators need to adapt in-person policies and procedures in accordance with guidelines help to prevent problems and/or take corrective action. Finally, ethical and privacy issues are involved as SP/Ds collect sensitive information (e.g., personal information, geo-location, physiological activity, self-reports of mood and cravings, and the consumption of drugs) (Capon et al. 2016).

An Overview of Other Health-Related Technology Competencies

Competency-based education focuses on clinical skill development in addition to knowledge acquisition (Iobst et al. 2010). Assessment of learners' skills during patient care is required in training programs, and it is strongly suggested in addition to seminars for clinicians in practice, too. A straightforward competency framework is needed for technologies for trainees, faculty, departments, and administrators. The Accreditation Council for Graduate Medical Education (ACGME) is the most commonly used US framework, with six domains: patient care, medical knowledge, practice-based learning and improvement, systems-based practice, professionalism, and interpersonal skills and communication (ACGME 2013).

A telepsychiatry framework originally provided competencies, aligned standard andragogy/pedagogy methods for teaching and assessment, and highlighted faculty development issues (Hilty et al. 2015b). This was followed by social media (Hilty et al. 2018; Zalpuri et al. 2018) and mH (Hilty et al. 2019b) competencies. All of these competencies use a three-level skill gradation rather than the Dreyfus model of learners with five levels (Dreyfus and Dreyfus 1980): Novice/Advanced Beginner (e.g., early clinicians and/or those unfamiliar with technology); Competent/Proficient (e.g., able to translate in-person to technology-based care well); and Expert (e.g., advanced in clinical care and via technology).

The social media and networking competencies (Hilty et al. 2018; Zalpuri et al. 2018) share themes and challenges related to mH. Both pose substantial challenges compared to in-person and telepsychiatric care, in that the process of care: (1) is asynchronous not synchronous, so it cannot be "organized" or structured like traditional care; (2) affects the therapeutic frame and create additional boundary issues; (3) is conducted over public, private, and health system sites, making the data integration and security difficult, if not impossible; and (4) provides anonymity, as verification is needed since false identities are not uncommon (Hilty et al. 2018). The clinician may have to systematically screen what is used (e.g., Facebook®, LinkedIn®, Twitter®, Tumblr®, Instagram®, and Pinterest®), inquire what the purpose(s) of use are (e.g., entertainment, health care), and be prepared to manage

risks (e.g., privacy, self-disclosure, cyberbullying). The clinical work should be documented, since a clinician represents her/himself, the institution, and the profession.

The Coalition for Technology in Behavioral Science (CTIBS) developed the interprofessional, evidence-based framework for measurable telebehavioral health competencies in seven domains: (1) Clinical Evaluation and Care, with three subdomains addressing Assessment and Treatment, Cultural Competence and Diversity, and Documentation and Administrative Procedures; (2) Virtual Environment and Telepresence; (3) Technology; (4) Legal and Regulatory Issues; (5) Evidence-Based and Ethical Practice; (6) Mobile Health and Apps, and (7) Telepractice Development (Maheu et al. 2017). Overall, there are 51 discrete behavioral objectives, which are then distinguished by 149 cumulative and measurable behavioral practices (Hilty et al. 2017b; Maheu et al. 2017, 2018). These are based on a review of interprofessional (i.e., psychiatry/medicine, psychology, social work, counseling, marriage/family, behavioral analysis, and other behavioral sciences) literature, input from national organizations, and a consensus process.

A Competency-Based Framework for Mobile Health, Smartphone/Device, and Apps

The Conceptual and Consensus Approach to the mH Competencies

These consensus-based competencies are based on the ACGME framework and literature from the fields of technology, health care, pedagogy, and business. The methods are described in detail elsewhere (Hilty et al. 2019b), included expert option solicited in four ways: a series of medical educator conference calls focused on teaching competencies; discussion at national meetings (e.g., AADPRT); individual discussions with educational and technological experts in health services, mH, technology, medicine, and informatics; and input from national behavioral health organizations. Overall, a modified Delphi process was used to develop an initial framework of areas (Fig. 2) (Srinivasan et al. 2011) based on qualitative analysis of identified themes, which were then organized into competencies using the ACGME Milestones and in alignment with the IOM's HPES (IOM HPES 2003). While each of telepsychiatric, social media, and mobile health competencies follow the ACGME domain format, a technology domain was added to highlight additional themes for clinicians. For trainees, technology skills would be co-taught within/along site existing Milestones to adjust clinical skills rather than officially adding an additional domain or Milestone competency or subcompetency.

mH, SP/D, and Apps Competencies

The competencies are organized in ACGME domains of patient care, interpersonal skills, and communication, professionalism, systems-based practice, practice-based learning and improvement, knowledge, and technology (Table 1). The *Patient Care* competency mainly includes history taking, engagement and interpersonal skills, mental status examination, assessment, management, and treatment planning. The clinician needs to know if the patient uses SP/D and apps for personal life, health care, and/or behavioral health care, and check if the patient is aware of risks (e.g., privacy). The section also includes clinical decision support, patient and family education, administration and documentation, and medicolegal issues (e.g., privacy, confidentiality, safety, data protection/integrity, and security). Clinicians of the Novice, Competent/Proficient, and Expert levels should help patients reflect on the pros/cons of mH, SP/D and apps use as part of ongoing treatment and document this (e.g., as part of the consent form or in a progress note). This may include, but not be limited to, the competent/proficient clinician selecting the SP/D option based on patient preference, skill, and need (i.e., purpose).

The *Patient Care* competency includes a subdomain of *Clinical Decision Support* and *for Clinical Workflow Plan Between Visits.* Clinical decision support can be selected based on availability, linkage into EHR workflow clinical goals, and patient preferences/needs. In addition to in-person or telepsychiatric visits, mH technology can help collect data for accurate assessment of day-to-day life, which is known as ecological momentary assessment (EMA) (Carlson et al. 2017; van Os et al. 2014). The focus may be habits (e.g., smoking), mood changes (i.e., depression), activity, and vital signs (e.g., blood pressure). Momentary collection—rather than a daily diary at the end of the day—is subject to less recall bias, though bias related to social desirability may still happen. A signal-dependent system cues a patient to report symptoms at random intervals during the day in response to an alarm. An event-dependent system is geared for patient report of symptoms after predetermined and/or anticipated challenging event during the day.

Technology allows for collection of data more often and systematically—but with that comes expectations and responsibility. For the patient, signal- and event-dependent reports are more accurate and yet, they demand a level of engagement and motivation. For the clinician, it is important to discuss expectations with the patients (e.g., many assume the clinician will review a download automatically and some may expect a reply). Such customization is ideal in promoting excellent communication, but would require between visit workflow planning. Questions arise for clinicians, supervisors, and administrators like, "What is reasonable checking of data between visits? What standard of care is sought for? How is

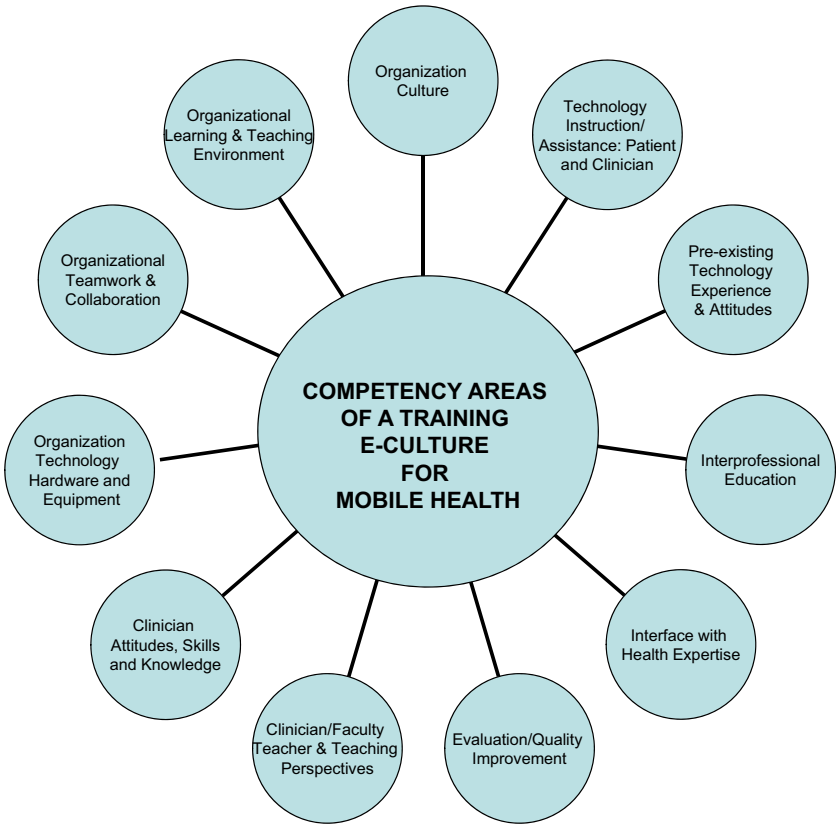

Fig. 2 Components of an e-culture for mobile health, smartphone/device and apps for training and faculty development

clinician time to review data paid for, if there is not a billing code for that (like there may be for a cardiac Holter monitor)?"

Training and Faculty Development Issues for Academic Health Centers Related to Mobile Health, SP/D, and Apps

Preferred Versus "Real" Scope of Practice

Many supervisors and clinics may pre-emptively decide that mH, SP/D, and apps are not part of care, while others may use an informal, spontaneous approach and discuss mH, SP/D, and apps if the topic spontaneously arises as a point of conversation. The trending experience nationally, though, is that patients—particularly child and adolescent ones—engage trainees and clinicians all the time. For social media use, there were so many issues arising for training that the Council of Emergency Medicine Residency Directors Social Media Task Force recommended that each residency program develop a social media policy, following discussions with the designated institutional officer, public affairs, legal/privacy officer, and information technology departments for a better understanding of any existing policies, procedures, and laws (Pillow et al. 2014).

Therefore, an approach to training and faculty is needed for mH. Learner (i.e., skill) and patient (i.e., care) outcomes should be measured and these should pre-determine teaching, supervision, and workflow activities. The supervisor's approach requires many things, including a plan for information flow and decisions during the day, and if applicable, after hours. Initial, ongoing (i.e., monitoring), and longitudinal documentation is needed (e.g., consent form; progress notes). Patient requests for non-phone contact between visits (e.g., apps, texts, e-mails) are increasing, such that pros/cons should be weighed and expectations agreed upon.

Curricular and Clinical Supervision of mH, SP/D, and Apps Competencies for Training Programs

In Table 2, teaching and assessment methods are suggested for programs to address the specific mH competencies outlined in Table 1. A six-step approach to curricular development includes: (1) problem identification and needs assessment, (2) learner needs assessment, (3) goals and objectives, (4) educational strategies, (5) implementation, and (6) evaluation and feedback (Kern et al. 2009). The instrumental effort is linking the learner, the teacher, the patient, and the desired outcome or goal (i.e., skill, attitude, and/or knowledge) (Pratt and Collins 1998). There is no shortcut for faculty observation, feedback, and evaluation in measuring the progressive acquisition of skills. Each patient, learner, and teacher walk different paths, such that meeting goals requires careful listening, systematic collection of information, reflection, and planning in order to

Table 1 A framework for mobile health, smartphone/device, and apps clinical competencies based on the accreditation council for graduate medical education domains

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
Patient care			
History taking	Screen for use of SP/device and/or apps. Add questions such as: • Are you using a SP/device and/or apps and for what? - Fun/social? - Health? • Would you like to use it/these for healthcare, if available?	Screen systematically with questions such as: • Which SP/device and/or apps do you use: Exercise? Entertainment? Social? Health? • For healthcare? - Communicate with your medical doctor (MD), nurse (RN) or others? - Discuss mental health issues? • Do you use SP/device and/or apps more or less than other technologies (e-mail/text, apps, Internet, social media (SM))? • What are the pros/cons? - Are you aware of risks (e.g. privacy, self-disclosure, time delays)? - Include in informed consent	Include SP/device, apps, and other technologies in informed consent Integrate details of personal and healthcare SP/device and/or apps use • Discriminate between types of personal use: significant other/spouse, friends, family; individual/group; personal vs. professional • Screen for the patient use of privacy settings for SP/device and/or apps and provide advice based on experience
Engagement and interpersonal skills	Reflect on impact of SP/device and/or apps use on • Relationships with others • Professional life • Healthcare	Ask preferences with SP/device and/or apps and how it/these influenced relationships with family, peers, and professional colleagues: • Positives vs. negatives? • Effect on processes of intimacy and emotion Reflect with patient about the effect on therapeutic relationship: • Communication • Intimacy • Boundaries (see Professionalism)? Compare to other technologies	Provide guidance to patient and family on effective communication using SP/device and/or apps Instruct on best ways to use mHealth: • An evidence-based app with • An evidence-based approach • Simplicity with purpose Instruct others on impact of asynchronous vs. synchronous—and combinations—on communication and the therapeutic relationship Discuss expectations of parties involved
Mental status examination (MSE)	Use SP/device and/or apps to collect information for the MSE	Compare SP/device and/or apps to in-person and/or telepsychiatric communication Use SP/device and/or apps to check MSE if applicable • Assess what can and cannot be realistically assessed with SP/device and/or apps	For MSE, use SP/device and/or apps • Judiciously vs. in-person • Adjust administration of tasks (e.g., substitute item for impossible task) Use proxy MSE and/or physical examination (PE) from other clinician or loved one, if applicable
Assessment	Assess if SP/device and/or apps use is a relevant issue in personal life and/or healthcare Assess how SP/device and/or apps should be used or "not" be used by a patient and document	Consider the need for collateral info from in-person care or others Assess healthy/unhealthy use of SP/device and/or apps in personal life and healthcare Integrate SP/device and/or apps components with overall in-person assessments Demonstrate flexibility and decide with the patient the role of SP/device and/or apps in patient's needs and preferences	Synthesize information from in-person or telepsychiatry, SP/device, and/or apps and other methods (including discordant data) Train, supervise, and consult to optimize assessment, including SP/device and/or apps use, problems, and need for collateral info Identify pros/cons of using SP/device and/or apps and for what purpose(s)
Management and treatment planning	Integrate SP/D and/or apps into the biopsychosocial (BPS) approach (see Decision Support in Knowledge) Consider pros/cons of the decision support tool or app (see Decision Support in Knowledge) Monitor ongoing SP/device and/or apps use, as well as documenting	Select SP/D option based on patient preference, skill, and need (i.e., purpose) (see Clinical Decision Support (CDS) in Knowledge); focus on one treatment goal: • App to monitor mood • Capture day-to-day accurate accounts of a patient's emotions, functioning,	Use BPS outline with prioritization, with adjustments for technology Select "best" mode for a given task: SP/device and/or apps, e-mail/text, telephone, and/or in-person Be aware of legal, billing and jurisdictional issues for medication

Table 1 (continued)

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
	memorable and problematic events as they occur If indicated, focus part of a visit on the use of SP/device and/or apps and other technologies to talk in-depth	and activity (i.e., ecological momentary assessment (EMA)) Blend SP/device and/or apps with regular clinical discussions, facilitate reflection, and assess effect on the therapeutic relationship—in and between sessions Identify safety/risk factors of SP/device and/or apps use (e.g., giving advice on medication); back-up plan for failure Triage complex, urgent/emergent issues to synchronous (telephone, in-person) care Weigh pros/cons of SP/device and/or apps use versus other technologies and discuss options for informed consent; document	Research and disseminate procedures to prevent problems and manage clinical and administrative issues Advise on specific mental health problems and specific patient populations with relative/absolute contraindications
Clinical decision support (CDS)	Use SP/device and/or apps within for decision-making and care Review examples with learner/supervisor	Adjust SP/device and/or apps within parameter(s) to for decision-making Help patients, learners, and staff use decision support tools based on evidence Prioritize SP/D and app options, e-mail, and tools that integrate into the EHR	Instruct on how to use pre- and intra-platform data feeds (e.g., questionnaire upload) into EHR to improve quality of care and be efficient
Patient and family education	Understand reliable/healthy and unreliable/unhealthy SP/device and/or apps options Value of using SP/device and/or apps in healthcare and when to use it	Recommend how to use SP/device and/or apps in healthcare (e.g., tips on how, when, and what uses are appropriate; what should be posted; and what should not) Offer "good" choices for specific purpose(s) for SP/device and/or apps use in personal life and healthcare	Instruct with examples, principles, and evidence for responsible SP/device and/or apps use by people, patients, and organizations (e.g., schools) Provide firsthand knowledge of the pros/cons of different SP/device and/or apps for healthcare
Clinical workflow plan between visits	Decide if between-visit data are helpful and the mechanism for collecting it (i.e., paper diary, technology option) Discuss with supervisor, as needed	Discuss if data are to be sent and where (e.g., EHR or clinician SP/D), if data are reviewed between visits and are there expectations for communication Discuss with clinic and administration	Instruct on best practices, scope, potential workflow, and reimbursement options Clarify worse practices to avoid
Administration and documentation	Adhere to clinic, health system, and professional requirements for in-person care and consider amendments for SP/device and/or apps and other technologies • Document in informed consent • Document key events Seek supervision/advice for non-routine events, if needed	Develop standard language for consent form, treatment plan, and sentinel events on the pros/cons of SP/device and/or apps use Adapt current practices and develop new policies/procedures for SP/device and/or apps and other technologies Seek advice in advance to plan; document Consider/attend to business and financial issues (e.g., pros/cons of time used)	Instruct on in-person, TP and SP/device and/or apps applications related to documentation, privacy and billing
Medico-legal issues[CM]: privacy, confidentiality, safety, data protection/integrity, and security	Identify and adhere to laws and regulations in the jurisdiction(s) of practice and of that of the patient Clarify if SP/device and/or apps access is public, private, and within the electronic health record (EHR) Advise patients to communicate and send data privately (e.g., secure e-mail within EHR not Gmail)	Apply in-person relevant laws and regulations in any/all jurisdiction(s) to mH, SP/device, and/or apps, and if necessary, adjust clinical care Educate patient about SP/device and/or apps and adapt existing laws if none exist for it/these and other telepractices Obtain clinical and/or legal advice, as applicable	Teach/consult on in-person laws and regulations for SP/device and/or apps and other technologies Develop strategies to adapt legal and regulatory principles from in-person to care SP/device and/or apps use Update/consult with regulatory boards, health authorities, and professional organizations

Table 1 (continued)

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
Interpersonal and communication skills			
Communication	Be flexible in discussing SP/device and/or apps use and communication Discuss problems if they arise with asynchronous options and arrange alternative options Seek advice on merit and method of responses, if any, to patient's communication	Discuss scope of communication with SP/device and/or apps, clarify expectations, and anticipate problems (e.g., feasibility of checking mH device at other sites, clinics) Discuss scope, timing, and agreed upon plan(s) for asynchronous options Make brief, clear SP/device and/or apps communications to acknowledge, clarify, and/or triage to in-person care	Identify and trouble-shoot communication issues related to technology and other Educate and provide consultation to colleagues about asynchronous technology use Clarify expectations and potential ambiguous (i.e., multiple) meanings of acronyms, abbreviations, and such communication
Evaluation and feedback	Periodically evaluate examples of decision-making and care with patient/supervisor	Evaluate SP/device and/or apps use, adjust regular evaluation parameter(s) and incorporate real-time examples in ongoing fashion with patient/learner/supervisor	Teach, consult, and role model feedback skills related to synchronous and asynchronous (i.e., mH) technologies Develop teaching cases/in situ examples
Cultural, diversity, and social determinants of health; attend to language issues	Consider culture and diversity issues, related to SP/device and/or apps and other technologies: • How social determinants affect synchronous and asynchronous healthcare • Access to SP/device and/or apps • Sentinel events	Ask patient if/how culture impacts use and preferences for SP/device and/or apps and other technologies Promote reflection and awareness of how social determinants and SP/device and/or apps intersect Observe, adjust, and manage language and communication issues (e.g., emoticon use)	Include SP/device and/or apps use in cultural formulation interview, if applicable Instruct on generalizations (and how to avoid stereotypes) of how culture may affect SP/device and/or apps use and impact treatment/patient care Consider consultation
Special populations	Notices positive and negative trends in patient populations (e.g., generation Y or Z, autism spectrum)	Consider preferences of SP/device and/or apps use (e.g., adolescent, Veteran with posttraumatic stress disorder) Be aware of trends across asynchronous technologies (e.g., e-mail/text, apps)	Instruct on how to adapt assessment and management approaches according to differences
Professionalism			
Attitude	Show interest about patient's use of SP/device and/or apps Demonstrate capacity for self and others' reflection	Express interest, be non-judgmental, and be spontaneous in discussing technology Engage via SP/device and/or apps within appropriate expectations, purpose(s), and safeguards in place	Provide leadership to colleagues on organizational policy or curricula for SP/device and/or apps and professionalism
Integrity and ethical behavior	Maintain integrity by adhering to professional and governmental guidelines Recognize boundary, privacy, and confidentiality issues with SP/device and/or apps communication	Uses clinical judgment and ethical principles to purposely use SP/device and/or apps to collect and transfer patient information Reflect on personal versus professional contexts and potential micro- and macro-boundary violations (e.g., texting patient after clinical hours as "convenient") Recognize that personal information (e.g. health) may be accessible and monitor	Role model, teach/consult others to manage complicated ethical issues related to the use of SP/device and/or apps in clinical practice and related to professional identity Research and develop approaches uphold quality of the therapeutic relationship and communication for care
Scope and therapeutic objective(s)	Practice within scope(s) and discuss expectations with patient Keep focus on shared primary objective of care	Attend to and evaluate how SP/device and/or apps may alter in-person scope issues Trouble-shoot problems Assess if SP/device and/or apps licensed and reputable, avoid fraudulent practices, and market within regulations (e.g., Federal Trade Commission substantiation rule)	Develop and teach/consult use on SP/device and/or apps to adjust for patient populations (e.g., age, illness/disorder) Evaluate and advise on complex cases (e.g., high-risk populations, legal complications)
Systems-based practice			

Table 1 (continued)

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
Interprofessional education (IPE) and team work	Learn about SP/device and/or apps and other technologies and share information with others	Discuss/teach SP/device and/or apps issues with team members to enhance care Weigh pros/cons of SP/device and/or apps related to communication, privacy, and clinical productivity	Assess technology info from the IPE team point-of-view in systems Adjust assignments/roles Role model/give feedback
Safety (see Patient Care and Professionalism)	Educate patient to call and/or set up additional appointment for emergencies Seek advice/consultation, when needed	Prevent, identify, and risk stratify potential problems based on past history in case SP/device and/or apps Educate patient to use in-person or synchronous (e.g., video, telephone) communication for emergencies	Adjust risk and its management to SP/device and/or apps, based on in-person and technology-based system practice Instruct others in pitfalls of SP/device and/or apps use in healthcare
Models, practices, and systems of care	Aware of consultation, evaluation, triage, and management clinician roles Practice with principles of evidence-, measurement-, and population-based care Incorporate workflow between technology devices (e.g., desktop, portable) into EHR	Give input to administration on (in)efficiencies and opportunities to integrate SP/device and/or apps data in workflow/EHR for decision-making Distinguish between principles of evidence-, measurement-, and population-based care related to mH, SP/device, and/or apps Choose when to use SP/device and/or apps vs. e-mail/text and other technologies when mobile across sites Apply sensors, remote monitors, and other devices (e.g., home) in accordance with medico-legal scope and standards	Engage providers and consultants about the role of SP/device and/or apps Consider what part, if any, of the "therapeutic hour" is used for SP/device and/or apps, e-mail/text, and other technologies Instruct on home health options related to SP/device and/or apps to enhance clinical evaluation and treatment
Practice-based learning			
Evaluation approach	Learn from/participate in global evaluations from patients, interdisciplinary team, and clinic/hospital about in-person and technology-based care related to SP/device and/or apps	Be aware that in-person, SP/device, and/or apps and other technology-based care have similarities and differences; suggest improvements Develop/promote attitudes and skills for consistency, quality/specificity, and stability of evaluation	Teach/consult on practice standards of evaluation and adjustments for SP/device and/or apps Compare/contrast information across professions, disciplines, fields, and states/provinces/countries Shift policies and procedures
Quality improvement (QI)	Participate in chart review, case/M&M conference and other activities related to in-person, and technology-based care	Apply/adapt in-person QI principles to SP/device and/or apps in order to adjust assessment and/or care Educate participants on technology-specific principles and measures	Develop QI strategies to adhere to and adapt legal, regulatory, and ethical standards (e.g., privacy, access) Teach/consult on how to analyze, select and evaluate QI options
Learning, feedback, and teaching practices	Add technology-based learning opportunities to regular activities Consider role of technology in care	Continue lifelong learning via seminars, cases and system discussions Seek out technology-specific education Develop additional technology-specific education short- and/or long-term Assess effect(s) of multiple technologies on care	Research learning and teaching methods to streamline educational approach and evaluation Determine best context(s) for teaching and learning SP/device and/or apps (e.g., supervision, seminar/case conference)
Knowledge			
Definition of SP/device and/or apps	Recall definition of mH, SP/device, and/or apps Name 2 or 3 mH, SP/device, and/or apps with pros/cons	Describe mH, SP/device and/or apps definitions and various uses, purposes, and risks/benefits to patients Professionally familiar with 2–3 SP/device and/or apps and a mH platform for professional use Serve as resource for others	Teach multiple SP/device and/or apps varieties; consults with colleagues Instruct on the approach to mH, selections of apps, and pros/cons

Table 1 (continued)

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
Evidence-base	Know basic "do's or don'ts" of SP/device and/or apps for clinical care, as adapted from in-person care	Knows the data, concepts, and principles of SP/device and/or apps use (e.g., standards, guidelines): • How to assess if an app is evidence-based • How to use an app in an evidence-based clinical approach	Teach/consult to healthcare colleagues locally and nationally to develop best practice guidelines using the clinical evidence on SP/device and/or apps
Problem-solving and prevention	Recognize and report problems Perform basic how SP/device and/or apps are part of assessment and treatment Explain ways in which a patient can better learn how to use a SP/device and/or apps product	Evaluate new products/options and the pros/cons Assess performance issues of current systems or products Assess user requirements and determine best match for patients and other participants with technology options Diagnose complex problems and/or resolve non-routine problems that affect team Serve as a resource to others Know how to request technical assistance	Research and disseminate personal versus professional aspects of SP/device and/or apps platforms Keep up to date with latest mH, SP/device, and/or app developments (e.g., privacy)
Patient care	Ability to answer questions, discuss and adjust mH, SP/device, and/or apps in comparison to in-person care, including consent, privacy, data protection/integrity and security safety, and documentation Aware of SP/device security measures (i.e., password protection)	Answer questions/teach, discuss/clarify, and adjust/develop options for mH, SP/device, and/or apps in comparison to in-person care in additional areas of scope of practice, communication, culture and diversity, ethics, and care models Aware of SP/device security measures (i.e., password protection bypassed if incoming call "goes around" security measure)	Demonstrate extensive knowledge of mH, SP/device, and/or apps to advise colleagues on practical knowledge of how to mitigate them
Decision support	Understand the role of technology in initiating, enhancing, and monitoring decision-making Use SP/device and/or apps within for decision-making and care Review examples with learner/supervisor	Find and evaluate the role of mH, SP/device, and/or apps in initiating, enhancing, and monitoring decision-making Compares the pros/cons of mH, SP/device, and/or apps in to manual operations (e.g., error identification, duplicative processes) for an acute vs. chronic condition Help patients, learners, and staff use decision support tools based on pros/cons Realize that adjustments to SP/device and/or apps parameter(s) are possible to aid in decision-making	Demonstrate extensive knowledge of mH, SP/device, and/or apps to advise colleagues on how to evaluate decision support tools Instruct on fundamentals of adjusting to SP/device and/or apps parameter(s) to aid in decision-making
Risks of using SP/device and/or apps	Identify one potential patient risk of SP/device and/or apps use (i.e., privacy violation) Identify one potential provider risk of SP/device and/or apps use (i.e., boundary or privacy violation)	Identify two–three potential patient risks of SP/device and/or apps use and advises how to prevent, mitigate, or eliminate them (e.g., use privacy settings, avoid self-disclosure, manage cyberbullying) Identify two–three potential provider risks of SP/device and/or apps use and prevent, mitigate, or eliminate them (e.g., use privacy settings)	Demonstrate extensive knowledge of SP/device and/or apps risks and advises colleagues Anticipate common pitfalls and how to prevent/mitigate them
Technology			
Adapt to technology	Use basic etiquette Identify differences between care in-person, TP and SP/device, and/or apps	Clarify expectations in-person rather than asynchronously	Generally, avoid humor, self-deprecatory remarks, and jokes via synchronous methods

Table 1 (continued)

Area/topic	Novice/advanced beginner (ACGME milestone levels 1–2)	Competent/proficient (ACGME milestone levels 3–4)	Advanced/expert (ACGME milestone level 5)
	Clarify/spell out brief communications	Engage the patient, as clinically indicated (e.g., depressed patient ability to use app) Prevent, identify, and manage barriers, obstacles, and miscommunications Adjust how to "project" self and express empathy	Analyze what actually happened and make adjustments for next time Show meaningful ways to express empathy
Technology operation	Pilot 1 or 2 SP/device and/or apps with peers to learn communication options	Gain experience with SP/device and/or apps Navigate options, if needed, and advise patients relative to goal and purpose	Research and teach/consult on best approaches for SP/device and/or apps operations for clinical quality (e.g., hard/software, accessories, and common trouble-shooting strategies)

Technically, mH options may be synchronous though most are asynchronous, so that term is used

S smartphone, *D* device, *mH* mobile health, *app* application, *PC* patient care, *K* medical knowledge, *PrBLI* practice-based learning and improvement, *SBP* systems-based practice, *P* professionalism, *IPSC* interpersonal skills and communication

optimize outcomes (Miller 1990). Ideally, a goal is defined, the instructional method (e.g., bedside/clinic, case/discussion format, or lecture) is picked, and the educational events are staged (Kolb 1984). Kirkpatrick stresses that evaluation should include four different levels: (1) reaction, (2) learning, (3) behavior, and (4) results (Kirkpatrick and Kirkpatrick 2009).

Example mH, SP/D, and Apps Competency *Patient Care* (e.g., High-Risk Behavior) and *Communication* (Table 1); Teaching Method of *Patient Care and Supervision* (Table 2)

An approach to teaching these competencies involves a wide range of methodologies, settings, and participants (Table 2). Trainee contacts with the patient throughout the week are best funneled "into" scheduled supervision as part of a caseload or quickly dealt with by a "curbside consultation" "in time." Time to reflect, consider options, and get advice before responding is suggested due to clinical and administrative ramifications. Trainees' work related to the *Patient Care* (e.g., High-Risk Behavior) and *Communication* competencies can be aligned with teaching methods for *Clinical Care with Patients* and *Professional Reflection, Monitoring and Hygiene related to Patient Care and Supervision* (Table 2).

An example might be that a resident added an app to track a Veteran's mood as soldiers prefer to complete psychometric measures (e.g., Patient Health Questionnaire or PHQ-9) by iPhone rather than paper or computer due to its interface, portability, and convenience (Bush et al. 2013). But an urgent issue arose, when an app transfer indicated new suicidal ideation (SI). The trainee had options: (1) do nothing if this is a chronic behavior, (2) to e-mail or text, (3) to telephone or schedule an urgent appointment, and/or (4) trigger an emergency response system. Texts with personalized, caring sentiments and other polite messages may be therapeutic and successfully prevent escalation (Odeny et al. 2014). The use of apps for patient communications may be part of an ongoing therapy and also be used for clinical impulsivity (e.g., self-mutilation, purchases). Overall, text approaches are of four types: reminders (14%), information (17%), supportive messages (42%), and cues for self-monitoring (42%) (or a combination) (Berrouiguet et al. 2016).

Reflection, peer advice, and/or faculty supervision may be required for these matters, since the temporal sequence may be fast and between supervision visits, and theoretically, depending on the clinical treatment plan, events could even occur after hours. Faculty cannot supervise in real time as with a scheduled visit, so standardization between supervisors and clinics is suggested, since on-site "on-call" or "faculty of the day" supervision may triage this very differently than an ongoing psychotherapy supervisor. Unlike a verbal conversation, the mH, SP/D, and app may leave a chronological diary—which is helpful from which to learn—and yet may pose complications from a medico-legal point-of-view (e.g., an alarming trajectory may require documentation that it was managed or trended downward in acuity). Regardless of the outcome, follow-up teaching methods of *Case Presentation* and/or *Quality Improvement Project* may help others learn and investigate how a clinic can move forward.

Example mH, SP/D, and Apps Competency: Patient Care and Knowledge (Clinical Decision Support); and Teaching Method of Knowledge and Patient Care (Table 2)

For example, a resident decided to use attendance notifications to communicate with a depressed outpatient, caregivers,

Table 2 Teaching, assessment, and evaluation methods for mobile health, smartphone/device, and apps clinical competencies

Teaching and/ or learning method	Context(s)	Competency domain(s) addressed	Learner assessment methods
Didactic Teaching			
All methods	Dependent on venue/setting	Knowledge, patient care, systems-based practice, technology—primarily knowledge at the pre-competency and competency levels Content knowledge, but less effective for developing attitudes and skills	Written tests: multiple-choice and short-answer questions Audience participation system
Brief didactic	Clinical setting with mH, SP/device, and/or apps applied to care (e.g., replace non-secure technology with one for privacy)	Focus: solve immediate question/dilemma (e.g., emergency, privacy) Focus: contextualize day-to-day events and gain further education	Application to context (e.g., pre- and post-test) Written tests: multiple-choice and short-answer questions
Grand rounds or longer didactic	Classroom in person, by video, or webinar	Focus: research, trends, and relevance of SP/device and/or apps; compare to e-mail/text and synchronous modes (e.g., in-person, TP or telephone)	
Case-based learning			
Brief vignettes Complex, multi-step cases	Individual, pair/share and problem-, and/or team-based learning about SP/device and/or apps issue for patients with primary in-person or TP care (e.g., triage patient report of suicidal ideation (SI) in Patient Health Questionnaire-9 (PHQ-9))	Patient care, system-based practice, technology—knowledge for all levels of competency Content knowledge and effective for developing attitudes and skills Focus: content knowledge and apply/generalize knowledge to real-life examples Focus: complex clinical situations to develop steps of treatment/management plans (e.g., emergency) Focus: key asynchronous events that are random and ill-timed between clinic visits and supervisory hours	Case-based written tests: multiple-choice, pre- and post-tests, and/or short-answer questions (e.g., next best step is…) Oral presentation with pre-assigned case (like flipped classroom) or in session case
Clinical care with patients (see "Patient Care" in Table 1)			
Observing faculty	Live patient interview in-person or TP (e.g., initial evaluation) in which SP/device and/or apps issue arises, is screened for, and/or the focus of the conversation	Patient care, communication, systems-based practice, technology—primarily at the pre-competency level Attitude shaping by faculty role modeling clinical skills Foci: interviewing skills about realistic expectations, uni- vs. bi-directional communication, and data transfer Focus: purposeful vs. random use of SP/device and/or apps, outcomes and monitoring Focus: inappropriate use (e.g., emergency, after hours, SI and homicidal ideation (HI) comments, sending an app on how to be a "better" anorexic) Focus: patient education about common errors/pitfalls (e.g., send SP/device and/or apps) Focus: culture to openly discuss key issues about mH, SP/device, and/or apps	Observation supplemented by review of SP/device and/or apps and chart Research/analysis of trends with SP/device and/or apps Policies clarify similarities/differences of technologies to in-person care
Group observed or co-interviewing	Group interview room (in-person or TP): learners take-turns with assessment; group and supervisor feedback Can also use separate room or one-way mirror	Patient care, communication, professionalism, technology—pre-competency and competency levels Systems-based practice (e.g., decision support)—primarily pre-competency level Focus: develop interviewing skills and apply knowledge to screen, evaluate,	Mini-CEX (Clinical Evaluation Exercise) completed by faculty on each learner and direct verbal feedback. Peer-recorded written evaluation; peer review

Table 2 (continued)

Teaching and/ or learning method	Context(s)	Competency domain(s) addressed	Learner assessment methods
		and plan mH, SP/device and/or apps options Focus: employ group/discussion and vreflection to explicitly explore elements of scope of practice, professionalism, and cultural and social factors Focus: build consensus on pros and cons of mH, SP/device, and/or apps; share experiences	
Professional reflection, monitoring and hygiene related to patient care and supervision			
Caseload-based self-reflection, presentation, discussion, and decision-making	Personal and professional use of SP/device and/or apps to identify pros/cons: • Similarities/differences • How projecting image • "Bad" outcomes Supervision: share findings in individual and/or therapy supervision: • Purpose(s), outcomes, and adjustments • Patient errors or those ill-equipped to use technology Unexpected events between live visits	Patient care, communication, systems-based practice, professionalism, technology—all levels of competency Effective for developing attitudes and skills, but less so for gaining knowledge Focus: synthesis in a complex case or pattern analysis across a population Focus: reactions and meaning of events, including transference and countertransference Focus: plans (e.g., triaging and next steps, preserving privacy and boundaries) Focus: policy factors and knowledge gaps Focus: systems- and population-level thinking, decision support, workflow, and resource allocation Correct inaccuracies, prevent/manage boundary violations (e.g., personal picture or video transferred; patient "friends" trainee on social media) Patient expectations (e.g., weekly app completion) Decision-making on correspondence	Oral presentation in supervision and/or group, with follow-up formal didactic one (e.g., grand rounds) Chart review of patient treatment plan for decisions Policy development/review/-adaptation Feedback through peer review process Workflow illustration for decision support Follow-up report on interventions and impact Longitudinal, cumulative evolution of clinical skills and relationship
In time supervision in-person or at distance on critical incident (e.g., emergency)	Untoward expected and/or unexpected event(s) (e.g., SI, HI, bullying and/or aggressive posturing/threat, sexual overtone using mH, SP/device and/or apps)	Patient care, systems-based practice, professionalism—primarily pre-competency to competency levels Content knowledge to manage situation and skills more so than attitudes Focus: immediate adjustment of management plans (e.g., triage patient to live visit, if necessary, for dangerousness assessment) Focus: engagement of emergency response systems including authorities for duty to warn Focus: engage/help learners contextualize day-to-day events and gain further education Focus: evaluate meaning of events (e.g., transference), adjust treatment plans, and pre-emptive planning (e.g., preventing, triaging events)	Timeliness of request for supervision Initial assessment of potentially emergent situation and plan of action Feedback in real time Follow-up report on interventions and impact Chart review (e.g., documentation related to specific language of SP/device and/or apps, triage, and response
Simulation on decision support—with video or standardized patients	Cases, standardized patients, or video clips: • Decision support tool(s) based on dataset • Decision-making focused on outcomes and/or dataset	Patient care, knowledge, systems-based practice, practice-based learning—all competency levels Content knowledge to manage situations, skills acquisition, and attitude development/adjustment Focus: ability to perform, analyze, receive feedback, and reflect on own performance and style	Feedback in real time Equivalent to a technology objective structured clinical examination (OSCE)

Table 2 (continued)

Teaching and/ or learning method	Context(s)	Competency domain(s) addressed	Learner assessment methods
		Focus: ideal for more advanced skills that require start-stop and in-action reflection and feedback (e.g., administering tools, challenges with safety/ risk, rapidly changing data input)	
Quality improvement (QI), evaluation, and research			
Case write-ups Literature reviews QI presentation/project with interprofessional team, informatics team, and administration QI-related (e.g. length of stay, informatics) committee	Trainee and mentor submission for committee, conference presentation, and/or final report/publication Evidence-, measurement-, and population-based care; systems-level thinking; and health planning/resource allocation	Systems-based practice, practice-based learning—all levels of competency Attitudes and skills more than knowledge Focus: case short- and long-term and application to other cases Focus: administration, evaluation, and policy-oriented factors (e.g., advanced knowledge gaps) Focus: apps evaluation to see if they are outcome- and evidence-based; develop an approach to use them in an evidence-based fashion	Evaluation of literature search Evaluation of written synopsis Verbal presentation, discussion, and group feedback Peer, interprofessional, supervisor, and administrator feedback
Role as educator			
Didactic sessions	Seminars, cases, discussions on mH, SP/device, and/or apps	Knowledge, technology, systems-based practice, practice-based learning—all competency levels Attitudes and skills more than content knowledge Focus: work with an interprofessional team Focus: communication to multiple people Focus: advanced skills, such as enhancing capacity and competencies in distance staff (e.g., teaching to use technology, decision support tools, and integrate data throughout the system) Focus: apps evaluation to see if they are evidence-based and develop and approach to use them accordingly	Reflection journal for observation Questions by participants Evaluation forms completed by participants Feedback solicited from participants of interest (e.g., content expert, training director, informatics director)
Group and interprofessional learning (e.g., journal club)	In-person, video, and/or web-based	Systems-based practice, practice-based learning—all competency levels Attitudes and skills more so than content knowledge Focus: interprofessional and collaborative skills Focus: professionalism skills Focus: community/culture of practice and outreach across institutions	Evaluation forms completed by participants

S smartphone, *mH* mobile health, *BH* mental/behavioral health, *app* application, *TP* telepsychiatry, *SM* social media, *TBH* telebehavioral health

and other social supports. Over 3 months, it did not work, even though the depression had apparently started to lift with medication initiation and supportive therapy. The faculty supervisor reviewed the treatment plan, which was in order, but suggested to combine it with a tool for remote psychoeducation with motivational suggestions and personalized supportive messages (Gonzalez et al. 2005). This led to an occasional homework assignment (Harrison et al. 2011) and a "correction" of two issues: momentary logging symptoms revealed that the mood had not improved, but the augmented treatment plan was helping (Luxton et al. 2011), particularly in the home setting (Luxton et al. 2016).

Clinical decision support tools may also help with diagnosis and/or treatment by combining a workflow management tool with a decision support system to help re-evaluate and diagnose a patient, by using an algorithmic and otherwise extensive approach to the treatment (Kemppinen et al. 2013). Patient-report questionnaires and rating scales completed via a self-report portal can automatically send scores to a clinician in real time (e.g., Carepaths[R] system at www.carepaths.com). These use disease-specific scales and

integrate data into an online behavioral health EHR offering (e.g., Q-logic[R] system at psychcorp.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=P02010). A web-based clinical decision support system for depression care managers and other collaborative care team members uses the Brief Symptom Inventory (BSI-18) (e.g., Net Decision Support System; https://www.netdss.net/) (Derogatis and Savitz 1999).

Case-based learning (Table 2) is a good teaching and learning method which uses real-life examples or vignettes in seminars, site-based case conferences, and/or quality improvement (QI)/grand round presentations. It is important to draw from trainees' own experience with patients about mH, SP/D, and apps. Many misunderstand clinical decision support as simply an alert, notification, or explicit care suggestion, but case conferences are good for exploring clinical decision support tools including, but not limited to, condition-specific order sets, patient data reports and summaries, documentation templates, diagnostic support, guidelines, and contextually relevant reference information (Centers for Medicare and Medicaid Services 2013). Case conferences may also more easily employ interactive methods like role-plays to flush out the issues, practice communication skills, and identify options for decisions and propose solutions for patients. In-depth learning occurs through group input and feedback from peers and faculty. Furthermore, this provides an opportunity to build and/or solidify the resident *Role as an Educator* in teaching others (Table 2).

Academic Health Centers and Technology

Traditionally, clinicians depend on research and clinical measures for care, so better customized measures for technologies are needed. The need for an evidence-based guideline for app use may have many "levels" (Agarwal et al. 2016; Chan et al. 2015; Gonnermann et al. 2015). Level 1 considers the global app level, that is, its purpose, where it fits in or provides an alternative, conflicts of interest, and registration (if any). Level 2 focuses on content and process based on evidence-based systems and reporting (e.g., Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA); preselection of studies provided by an app cannot be classified as a systematic review) (Liberati et al. 2009). Level 3 considers structured, formal assessment with outcome data. Current "guidelines" on e-mail, social media, and other technologies, though, are essentially just suggestions for clinicians integrating technology into practice (Hilty et al. 2015b; Hilty et al. 2018; Zalpuri et al. 2018; Maheu et al. 2018).

Faculty development—which has at times gotten left behind due to the competing demands of patient care, training, and research (Armstrong et al. 2004; Bowe et al. 2003)—is being reprioritized (Hilty et al. 2019a). Clinicians/faculty are at the center of paradigm shifts since they lead teams, provide care, and supervise trainees, though trainees inspire others into organizational change. One disturbing study revealed that students' digital professionalism deteriorated during core clinical clerkships, as measured by behavior, privacy, and attitudes (Mostaghimi et al. 2017). QI and scholarship/research projects (e.g., writing project, co-presentations) are becoming standard practices to meet patient (i.e., Joint Commission, reimbursement), training, and other standards. This requires a shift in philosophical approach, from seeing what happens with clinical care to planning the outcomes and then designing the services—in advance. A grant may also facilitate system changes related to technology use (e.g., IOM as a Profession, the Josiah Macy Jr. Foundation social media grant).

People have expectations about technology as it is used in health care. Undergraduate universities, business (Christensen 2007), banking, and even dating firms learned that in order to survive, they had to adjust to people's preferences for electronic and online modalities. Businesses readily address change to remain viable and find new markets (Christensen 2007; Kotter 1996). Medicine and business have one thing in common: the need to understand the person who is the patient/customer, their needs, and their behaviors (Miles and Mezzich 2011). Behavioral health professions, which technically includes both mental health and substance use care, have unique (e.g., psychiatric prescribing, pastoral counseling) and common processes (e.g., informed consent, assessment, triage, treatment planning, termination) (Hilty et al. 2018). None of these professions have mH, SP/D, and apps guidelines.

Organizations variably discuss technology as part of care and education (Hilty et al. 2017b). Some discuss video use, privacy, and data matters. The American Counseling Association (ACA) Code of Ethics addressed technology related to clinical practice and education (e.g., H.2. discusses Distance Counseling, Technology, and Social Media; F.2.c. covers Online Supervision) (ACA 2014). The Association of Marriage and Family Therapy (AAMFT) Ethics Code Standard VI includes Technology Assisted Professional Services, including online assessments, the impact of technology on client systems, and the conducting of online therapy (AAFMT 2015). The Association of Marital and Family Therapy Regulatory Board's (AMFTRB) Examination in Marital and Family Therapy Task Statement 06.17 recommends use of technology in accordance with legal, ethical, and professional standards (AMFTRB 2015). The American Psychological Association Guideline for the Practice of Telepsychology includes clinical (informed consent, documentation, confidentiality, adjusting assessments), educational, ethical, legal, and regulatory and security and management of data (APA 2013). The National Association for Social Work (NASW) Standards for Technology in Social Work Practice were developed to maintain and improve the quality of technology-related services. These also suggest informing

clients, government regulatory bodies, insurance carriers, and others (NASW 2017).

New paradigms like institutional competencies (Hilty et al. 2015b)—which integrate information technology, business, and medicine—and change management are needed to ensure technology infrastructure is in place, is evidence-based, and is supported by policy environment (Hilty et al. 2018). For mH, this means: (1) patient- and learner-centered technology approaches, (2) effectiveness research (Hilty et al. 2013), (3) training focused on skills/competencies in addition to knowledge (Hilty et al. 2015b; Iobst et al. 2010), (4) an e-platform with information systems as a foundation for clinical care (Hilty et al. 2015b), and (5) financing and reimbursement adjustments (Centers for Medicare and Medicaid Services 2013) The mH paradigm is—and this may be the hardest part to "see"—is a completely different, new, and strategic way to "frame" health care. It may augment and innovate health care in completely new ways.

Limitations to this set of mobile health and app competencies include the need for a broader consensus across health and medicine (e.g., American Medical Association, American Psychiatric Association, American Telemedicine Association). Second, while some input from other behavioral health professions occurred via the CTIBS competencies mH component, a more in-depth process is indicated. Third, iterative feedback is suggested to iteratively improve the process both cross-sectionally and longitudinally. Fourth, the competencies need to be implemented and evaluated using measurable metrics. Finally, research is needed on organization change with technology and how a paradigm shift like mH re-contextualizes digital health care.

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