Implementation of technology-based approaches to behavioral health care: Research directions

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Center for Technology and Behavioral Health

P30 “Center of Excellence”
 funded by the National Institute on Drug Abuse

- Enhance quality, pace of achievement, and impact of innovative scientific research focused on the development, evaluation, and dissemination of technology-based therapeutic tools
- Harness existing and emerging technologies with effective learning and intervention strategies
- Transform the delivery of evidence-based behavioral health care

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- Web-based and mobile applications for substance use and mental health screening, assessment, prevention, treatment, recovery support
  - Alcohol, marijuana, tobacco, opioids
  - HIV/STI, co-occurring conditions
- Mobile applications to support self-management of psychotic symptoms associated with serious mental illness
- Use of social media as assessment and implementation platforms
  - Tobacco, marijuana, opioid recovery groups
- Wearable sensors and mobile phone sensing to gather data to inform predictive models of substance use relapse or mental illness symptom exacerbation – with ultimate goal of just-in-time interventions
- Care management platform to enhance delivery of evidence-based supported employment and other patient-centered team-based care approaches
- Proximal marketing approaches to college student stress – health promotion
Enables widespread reach of evidence-based care across care continuum
  
  - On demand access to therapeutic support, 24/7
  - Extension of care - Anytime, anywhere

Promotes personalization responsive to individual needs, preferences, culture, level of cognitive functioning, learning styles, etc.

Improves standardization and quality
  
  - Consistent delivery ➔ Fidelity
  - Decreased training, lower cost

Helps reduce stigma and barriers/disparities in access to care endemic to many traditional settings
Research has demonstrated that technology-based behavioral health tools can:

- Be **useful** and **acceptable** to diverse populations
- Have a large **impact on health behavior** and health outcomes
- Produce **outcomes comparable to clinicians**
- Increase **quality, reach, and personalization** of care
- Be **cost-effective**
- Be **responsive** to individuals’ health behavior trajectory over time

➢ If developed well and in collaboration with the target audience
Case Example: 
Online STD Prevention for College Students

Scope of the Problem:
- 18.9 million infected each year
- 9 million (48%) between 15-24
- Up to 90% may not know
- Associated with HIV risk
- $6 billion direct medical cost

Opportunity:
- Majority of students “wired”
- Majority use Web for health information
- Private, confidential, 24/7
- Broad dissemination, targeted experience
- Time- and cost-effective
- Represent diverse experiences (e.g., gender, culture, lifestyle)
User Centered Development Process

✧ Phase I: Formative Research
  ✧ Scientific literature
    ✧ Information, Motivation, Behavior (IMB)
  ✧ Interviews with experts
  ✧ Focus groups with frontline (5 colleges)
    ✧ College health professionals
    ✧ Students & Peer educators

✧ Phase 2: Iterative Development and Testing
  ✧ Student Advisory Board
What Students Want

✧ Basic Information (HIV, STDs, health)
  ✧ How To’s:
  ✧ Communicating about condom use and testing *
    * Getting tested
    * Going to the doctor * Using condoms
  ✧ Testing positive
  ✧ How to help a friend
  ✧ Peer Stories
  ✧ Resources
Crabs

**What is it?**

AKA pubic lice, crabs are parasites found mainly in the genital area and are common worldwide. Usually spread through intimate sexual contact. Occasionally through contact with infected sheets, clothes and towels.

**Common symptoms?**

- Itching may or may not occur.
- Lice or small egg sacks in pubic hair.

**Testing & Treatment:**

You can see the lice eggs by site or by using a magnifying glass. If you are not sure, make an appointment with your doctor. Can be treated by non-prescription creams, rinses and shampoos. Wash everything that may have been exposed.
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Match Game

Rollover the images to get STD descriptions. Click to select a description, and then select the STD you think matches it!

STDs:

- Chlamydia
- Herpes
- Pubic Lice
- Hepatitis B
- HIV
- HPV
- Trichomoniasis
- Gonorrhea
**Anatomy 101: Female**

Select a BODY PART from the list below or rollover the bubbles for more info.

- UTERUS
- CERVIX
- OVARIES

**Fallopian Tubes**

Tubular transportation system through which **eggs** travel from the **ovaries** to the uterus.
Randomized, controlled trial 316 students

Seven 4-year colleges/universities nationwide
  Four sessions two weeks
  Guided versus free roam experience

Text-based web and no treatment controls
  Knowledge, Attitudes, Behaviors
  Online Assessment

Lord, Cousineau, Green et al, 2007
Results

- At 6 months, significantly improved:
  - Knowledge
  - Positive attitudes about condom use
    - ↑ pleasurable, ↓ perceived difficulty to use
  - Preparatory intentions to use condoms
  - Condom use
    - 3 times more likely to have protected sex with any partner (OR=3.1)
  - Predictors: baseline knowledge and intentions to use
  - Testing (trend)
  - Free roam → structured experience

Lord, Cousineau, Green et al, 2007
<table>
<thead>
<tr>
<th>They Liked It!</th>
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<tbody>
<tr>
<td>Information is interesting and useful: 85%</td>
</tr>
<tr>
<td>Site would be useful for college students: 88%</td>
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<tr>
<td>Confident that site can answer questions: 86%</td>
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<tr>
<td>More effective than typical STD education: 81%</td>
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<tr>
<td>Successful at addressing STDs, HIV, safer sex: 89%</td>
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<tr>
<td>Should be incorporated on campus/in classes: 90%</td>
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**Average time on site PER VISIT:** 28 MINUTES

Lord, Cousineau, Green et al, 2007
STAYConnected: Web Intervention to Promote HIV/STI Testing and Condom Use

- Community-based outreach-to-care model
- Urban high-risk young adults
- HIV/STI Testing and Condom Use

- User-centered development: Young Person Advisory Board
  - Web: Comprehensive education and skill building
  - Text Message: Reminders, quick educational/motivational tips

- Pilot: 90 young adults aged 18 to 24
  - Preliminary efficacy → knowledge, motivation, behaviors
  - Optimization of implementation
STAYConnected: Web Intervention to Promote HIV/STI Testing and Condom Use

✧ Common misperceptions:
 ✧ Oil-based lubricants OK with condoms: 37% true or not sure
 ✧ Herpes open sores for transmission: 33% true or not sure
 ✧ Automatic testing for STI at physical: 46% true or not sure
 ✧ Automatic STI testing when HIV test: 56% true or not sure
 ✧ Only females get HPV: 41% true

✧ Why not tested:
 ✧ Time: 21%
 ✧ Didn’t see the need to: 16%
 ✧ Not offered test: 15%
 ✧ Didn’t know where to go: 9%
 ✧ Worried about someone finding out: 9%
 ✧ Embarrassed: 7%

Lord et al, in preparation
**STAYConnected: Stress and sexual risk**

- Experienced stress past 3 months
  - Single item: None/low/some/a lot/worse possible
  - 41% a lot/worse possible, females > males
- Stress positively associated with:
  - number of male partners, history of STI diagnosis, and reported sexual trauma (non-consensual sex – 18% of female and 7% of male participants).
- 34% felt they needed mental health services
  - females (40%)/ males (22%)
- Only 29% accessed services
- Reasons for not accessing services: not knowing where to go, stigma, inconvenient appointment times, affordability and readiness
STAYConnected: Web Intervention to Promote HIV/STI Testing and Condom Use

Potential implementation platforms:
- Primary care/community health centers
- Community-based organizations
- Schools, training programs
- Social media
You can build it, but will they use it?

• Diffusion of Innovation (Rogers, 1962)
  • Adoption of innovations
  • Early adopters, late adopters

• Consolidated Framework for Implementation Research [CFIR] (Damschroder et al, 2009)
  • Characteristics of innovation (intervention)
  • Characteristics of inner and outer settings
  • Characteristics of potential end-users (providers, consumers)
  • Implementation process

The diffusion of innovation

- 2.5% Innovators
- Early Adopters 13.5%
- Early Majority 34%
- Late Majority 34%
- Laggards 16%
Implementation Process

✧ Planning
  ✧ Design a course of action
  ✧ Consider needs and perspectives of end-users
  ✧ Tailor strategies for client subgroups

✧ Engagement
  ✧ Work closely with external change agent (i.e., development team)
  ✧ Identify internal change agent, champions
Addiction Comprehensive Health Enhancement Support System (A-CHESS: Gustafson et al., 2014)

- Mobile application for smartphones targeting recovery support and relapse prevention
  - Virtual peer support groups, on-demand support, location-based alerts, coping skill building, meeting finder

- In RCT, demonstrated short-term decrease in risky drinking days and higher rates self-reported abstinence relative to controls

- What about with naturalistic implementation?
Conducted a qualitative study of provider and staff perspectives on implementation of A-CHESS with clients during a naturalistic demonstration trial

- 4 settings, 12 participants (leadership, clinicians, support staff)
  - VA addiction treatment
  - Drug court
  - Addiction treatment
  - Community behavioral health

Consolidated Framework for Implementation Research (CFIR: Damschroder et al., 2009) as organizing framework
Intervention Characteristics

✧ Design and packaging
   Facilitators: Social network (discussion board), use of phone
   Barriers: Phone as platform (accessibility, connectivity, cost), challenges to clinical care (boundaries, liability), giving people phones to use for the study (and then taking back), potential iatrogenic effects (GPS-based alerts)

✧ Evidence of strength and impact
   Facilitators > Barriers
   Facilitators: Staying connected in context of recovery
   Barriers: Usability and technical glitches (support groups, outreach)

✧ Perceived relative advantage
   Facilitators > Barriers
   Facilitators: staying connected, peer support, fun, self-directed, recovery oriented
   Barriers: fast evolving technology, short term client engagement
Inner Setting

✧ Compatibility
Facilitators > Barriers
Facilitators: Client-centered - ease of communication, immediate relapse prevention response, empowerment
Barriers: Provider-based - reimbursement, counter to therapeutic beliefs (e.g., boundaries), liability concerns

✧ Implementation Readiness
Facilitators: Availability of resources to support effort
Implementation Process

✧ Facilitators
  ✧ Clear plan of action
    ✧ Phones and phone plans, target clientele, role out, monitoring of intervention features (e.g., peer discussion forums), implementation measurement
  ✧ Early identified team with clear roles
  ✧ Communication, communication, communication
  ✧ Continuous measurement of implementation and tweaks if necessary
  ✧ Collaboration with development team
Sustainability

- VA Addiction Treatment
  - Gave phones
  - Solid team – clear plan of action, communication
  - Plan for sustainability

- Addiction Treatment Program
  - Only clients with phones
  - Identified most appropriate client sub-population

- Drug Court
  - Gave phones originally – not sustainable due to cost

- Community Behavioral Health
  - No plan
  - No clearly identified team – one person
• Mental health and substance use issues are common
  • Approx. 1 in 5 adults with ≥1 mental health problems
  • Approx. 1 in 10 adults with ≥1 substance use problems
  • 11% of 12 – 17 year olds had past year Major Depressive Episode
  • Past year alcohol dependence: 12-17 (2.7%), 18-25 (12.3%)
  • Past year drug dependence: 12-17 (3.5%), 18-25 (6.6%)

• Substance use and mental health conditions frequently co-occurring and can compound chronic disease

• Marijuana and opioids (prescription and heroin)
Substance Use and Mental Health: Scope of the problem

- Only **15%** of those in need receive services
  - Identification and appropriate linkages to care
  - Accessibility
  - Stigma associated with traditional care
  - **Of note:** Treatment rates among 12-17 and 18-25 year olds in need are the lowest among all age groups (approx. 10%)

- Costs exceed **$57 billion** per year (ED visits, health complications)
Why Primary Care?

✧ Patient Protection and Affordable Care Act (2010)
  • Mental Health Parity and Addiction Equity Act (2008)

✧ Increase in service delivery demands in traditional healthcare settings

✧ Window of opportunity for early identification and treatment path

✧ Technology can help address current service gaps
  ✧ Across care continuum: screening, assessment, education, prevention, brief intervention, treatment and recovery support
What are primary care clinicians’ perspectives on behavioral health care?

Pilot project funded through Community Engagement Core of the Dartmouth Clinical Translational Science Award (CTSA)

Stage 1: Quantitative survey
- Current substance use and mental health practices
- Attitudes and practice priorities
- Readiness to use technology-based therapeutic approaches to address needs
- Potential facilitators and barriers to adoption

Who: Primary Care practices throughout NH and VT
- Dartmouth CO-OP Primary Care Research Network
- Vermont Blueprint for Health
- Practice clinicians and frontline staff

Stage 2: Qualitative interviews with primary care clinicians from practices designated as “high readiness” from surveys
## Practice Characteristics

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community Health Center</td>
<td>30%</td>
</tr>
<tr>
<td>Hospital/University Affiliated Medical Center</td>
<td>41%</td>
</tr>
<tr>
<td>Private Practice</td>
<td>29%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Practice Type</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family Practice</td>
<td>70%</td>
</tr>
<tr>
<td>Internal Medicine</td>
<td>13%</td>
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<tr>
<td>Pediatrics</td>
<td>14%</td>
</tr>
<tr>
<td>Other</td>
<td>3%</td>
</tr>
<tr>
<td>Participants (N=394)</td>
<td>%</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Physician</td>
<td>25%</td>
</tr>
<tr>
<td>Physician Assistant</td>
<td>5%</td>
</tr>
<tr>
<td>Nursing</td>
<td>45%</td>
</tr>
<tr>
<td>Medical Assistant</td>
<td>10%</td>
</tr>
<tr>
<td>Behavioral Health Specialist</td>
<td>11%</td>
</tr>
<tr>
<td>Community Health Worker</td>
<td>4%</td>
</tr>
</tbody>
</table>
How much of a priority is improvement of _____ services in your practice?

- Substance Use
- Mental Health

- Highest
- High
- Medium
- Somewhat
- Not At All
Screening and Referral Practices

<table>
<thead>
<tr>
<th></th>
<th>Substance Use</th>
<th>Mental Health</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>70%</td>
<td>75%</td>
</tr>
<tr>
<td>Standardized measures</td>
<td>50%</td>
<td>86%</td>
</tr>
<tr>
<td>No typical approach to care</td>
<td>37%</td>
<td>29%</td>
</tr>
<tr>
<td></td>
<td>% Agree/Strongly Agree</td>
<td></td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Facilitators</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Computers and tablets integral part of workflow</td>
<td>90%</td>
<td></td>
</tr>
<tr>
<td>Can see how technology tools could improve substance use and mental health care</td>
<td>82%</td>
<td></td>
</tr>
<tr>
<td>Leadership and staff support for use of technology for substance use and mental health care</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td><strong>Barriers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concern about costs to support use of technology</td>
<td>56%</td>
<td></td>
</tr>
<tr>
<td>Concern about privacy issues with use of technology</td>
<td>52%</td>
<td></td>
</tr>
<tr>
<td>Limited internet access</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>Most of my patients cannot afford phones</td>
<td>31%</td>
<td></td>
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<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
</tr>
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<td>-----------------------------------------------------------------</td>
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</tr>
<tr>
<td>To identify SU and MH problems through patient self-report tools</td>
<td>2.97</td>
<td>1.28</td>
</tr>
<tr>
<td>To educate patients and families about SU and MH conditions</td>
<td>3.21</td>
<td>1.26</td>
</tr>
<tr>
<td>To foster skill-building and self-management to reduce problematic SU and MH issues</td>
<td>3.23</td>
<td>1.25</td>
</tr>
<tr>
<td>To remind patients about medication and treatment adherence</td>
<td>3.21</td>
<td>1.25</td>
</tr>
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</table>
### Other Perspectives on Use of Technology

<table>
<thead>
<tr>
<th>Areas of Care</th>
<th>% Endorsed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevention and Wellness Education</td>
<td>87%</td>
</tr>
<tr>
<td>Chronic Disease Management</td>
<td>86%</td>
</tr>
<tr>
<td>Training of clinicians about substance use</td>
<td>83%</td>
</tr>
<tr>
<td>Training of clinicians about mental health</td>
<td>81%</td>
</tr>
<tr>
<td>Illness support for patients and families</td>
<td>69%</td>
</tr>
<tr>
<td>Parenting support</td>
<td>64%</td>
</tr>
<tr>
<td>Patient skill building</td>
<td>36%</td>
</tr>
<tr>
<td>Medication and treatment adherence</td>
<td>34%</td>
</tr>
<tr>
<td>Vocational support</td>
<td>33%</td>
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</table>
What would it take?

✧ Clear evidence
  ✧ Does it work? Does it work for our patients? Does it work for us?
✧ “Integration” with EHR
✧ Fostering buy-in among administrative decision makers
  ✧ private practices and CHCs have fewer administrative layers => easier to integrate innovation
Successful implementation of technology-based care approaches requires support - not unique to technology

- Technology significantly outpaces science
  - Rush to use, perceived panacea

- Questions of privacy and security associated with use of mobile phones, text messages, mobile applications, social media
  - Data collection, data storage, data sharing
  - Effective, transparent communication needed

- Accessibility is still an issue
  - Technologies, connectivity

- Compatibility is key – Developing technology to meet the needs of stakeholders is enhanced through community-engaged research

- Trust: Academic-Industry-Community Partnerships
Want More Information?

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