## Upcoming CRISP Seminars

<table>
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<tr>
<th>Date</th>
<th>Topic</th>
<th>Presenter(s)</th>
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<tr>
<td>Jan 13</td>
<td>New and Future Directions in Implementation Science</td>
<td>Russell E. Glasgow, PhD, Borsika Rabin, PhD, PharmD, MPH</td>
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<td>Jan 27</td>
<td>Digital Marketing and Applications in Healthcare</td>
<td>Patrick DuParcq, PhD (Northwestern)</td>
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<td>Feb 24</td>
<td>Community Outreach-Obesity Prevention Trial</td>
<td>Art Davidson MD, MPH (UCD, Denver Health)</td>
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<td>Mar 24</td>
<td>GEM-Dissemination and Implementation Initiative</td>
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<td>Apr 14</td>
<td>Reminder/Recall Methods to Increase Immunization Rates in Young Children</td>
<td>Allison Kempe, MD, MPH (UCD, Pediatrics)</td>
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<td>May 19</td>
<td>Improving Cardiovascular Screening and Management Through a Bi-Directional Personal and Technological Interface</td>
<td>Ray Estacio, MD (UCD, Denver Health)</td>
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For the full listing of seminars check out our website:

www.ucdenver.edu/implementation
Text Messaging in Healthcare

Lisa Schilling, MD, MSPH

CRISP Seminar Series

9 Dec 2013
Competing Interests

• I do not have any competing or conflict of interests
Objectives

- Reach
- Technology infrastructure
- Research requirements
- Intervention design - method of delivery
Text Messaging in Healthcare

- Disease management and monitoring- DM, asthma
- Promoting healthy behavior- wt loss, exercise
- Health behavior intervention- smoking cessation
- Reminders - IZ
- Notifications
- Data collection
- Disease surveillance
Key Theories for Uptake

• Everett Rogers’s - Diffusion of Innovation Theory – uptake and use of innovation, e.g., EHR

• Clayton Christensen’s – Disruptive Innovation Theory – innovations have the capacity to change the way we do our work
Disruptive Technology

• Innovator’s Dilemna, Innovator’s Solution, Innovator’s Prescription- Clayton Christensen
• Disruptive technology – unexpectedly displaces an established technology
• McKinsey Global – identified 12 DTs that will transform the US economy - #1 mobile Internet
Hype vs Hope- Texting

- Hope for disruptive technology that is transformational
- Real-time/right-time/right information
- Individualized
- Unfettered pilots and implementation without rigorous evaluation
- Call for evidence-based information
- Clinicaltrials.gov with increase in RCTs- in 2012, 215 relevant studies, 82% were RCTs – yesterday 393 focusing on text messaging.
mHealth Hype?

• Weakening of communication
• 30,000 – 90,000+ health apps, US-FDA has reviewed 100+
Mobile Phone Reach

• 2012 - ~ 322 million US wireless subscribers
• 184 billion text messages per month US
• 6.8 billion mobile subscriptions worldwide, ~ 96% of the world’s population
• 4.5 billion mobile subscribers
Text Messaging Stats

• 95-98% read within minutes of receipts
• 86% of consumers send or receive at least one per week
• 2.12 trillion sent in 2011
• Mobile coupons 10 times more likely to redeemed than print coupons

Ref
2) http://blog.nielsen.com/nielsenwire/online_mobile/40-percent-of-u-s-mobile-users-own-smartphones-40-percent-are-android/
3) http://www.ctia.org/media/industry_info/index.cfm/AID/10323
**SMS Basics**

- Person to person
- Bulk messaging – requires specialized software
Basic of Text Message
160 characters

Short code

• Short Short – dedicated or shared, leased from short code adm
  – common short codes – common to all providers vs some recognized by only one provider
  – Vanity codes- COKE - 2653

Long codes

• Long codes- 10 or 11 digit dedicated phone #
• Originally intended for person to person only but now supported for bulk and frequently used
SMS Application Features

- Uni- or bi-directional
- Scheduling texts, queuing
- Tailored/personalized texts
- Responses – closed ended (1-Yes, 2-No) or open ended
- Response branching logic – (If 1= Yes, then reply..) or automated replies
- Multimedia messages
- Voting/polling
Management features

- Opt-in/Opt-out- updating recipient lists
- Creating multiple groups
- End-user web portal access
- Integration with other information systems
- Back-up systems, hosting
Reporting-Administrative Features

• Tracking messages-sent, delivered, opened, and responses
• Usage metering
• Exportability of data
Implementing Text Intervention Component

- Interfacing with other components of intervention
- Engage target audience in design
  - #, timing, frequency of messages
- Use communication and behavioral change theory
  - Gain or loss frame appeals
  - Tailoring
    - Feedback
## Algorithm for cessation messages

Message type | Number of messages per quitting stage
--- | ---
### Prequit and day 2
- Preparing to quit
  - Number of messages: 17
- Benefits of quitting
  - Number of messages: 4
- Coping and coping strategies
  - Number of messages: 14
- Discomfort and difficulties
  - Number of messages: 1
- Encouragement
  - Number of messages: 3

### Quit day and day 2
- Early quit
  - Number of messages: 0
- Late quit
  - Number of messages: 0
- Relapse
  - Number of messages: 0
- Encouragement
  - Number of messages: 0

### Late quit
- Number of messages: 0

### Relapse
- Number of messages: 0

### Encouragement
- Number of messages: 0

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*J Med Internet Res. 2012 Jul-Aug; 14(4): e103.* Design Considerations in Developing a Text Messaging Program Aimed at Smoking Cessation

Michele L Ybarra, MPH, PhD, 1 Jodi Summers Holtrop, PhD, 2 A Tülay Bağci Bosis, PhD, 3 and Salih Emri, MD, 4
Developing SMS Intervention

• Gain frame – reminded of positive reward
  – Smoking cessation aimed at smoking mothers of young children-reminding them of the benefits to their young children

• Loss frame – reminded on negative consequences
  – Lack of sun protection leads to wrinkles and skin cancer

• Tailoring messages- specifically modified to the recipient
Gain vs Loss Frame

• Framing impacts an individual’s willingness to incur risk either to encourage a desirable outcome or to avoid an unwanted outcome
• Prospect theory espouses that when benefits are fairly certain, gain-frame messaging may be more effective.
• Some evidence to suggest that gain-frame messages better than loss-frame for preventive behavior
• Lack of consistency in results, poor to med quality evidence


Mammography Example

- If you get mammography you will be less likely to die of breast cancer (gain-frame)
- If you do not get mammography you will be more likely to die of breast cancer (loss-frame)
Tailoring

• Expectation of great impact, improved outcomes
• Typically tailored messages are more effective than non-differentiated
• Using information about an individual to determine:
  – Content
  – Context or framing of the content
  – Delivery method- by whom, how
Tailoring Goals

• Enhance cognitive pre-conditions for message processing
• Enhance message impact – affect behaviors
• Need to know what aspects of tailoring matter?
Continua of Tailoring

Health Educ Res. 2008 June; 23(3): 454–466. Understanding tailoring in communicating about health Robert P. Hawkins,1 †* Matthew Kreuter,2 † Kenneth Resnicow,3 † Martin Fishbein,4 and Arie Dijkstra5
Mechanisms of Action

- Attention- paying better attention
- Effortful processing - wt control messages- tailored messages stimulated greater processing of the information
- Peripheral or Emotional Processing – “they understand me”, “I trust the source”
- Self-reference- linking material to one’s own needs
Tailoring Strategies

• Personalization - enhance processing, may also directly impact behavior
  – This communication is for ‘you’.., tailoring material for new mothers
• Feedback – may impact behaviors
  – Presenting pts with information about themselves - descriptive, evaluative, comparative
• Content matching –
  – Direct messages to individuals’ position on key determinants (knowledge, outcome expectations, normative beliefs, efficacy and/or skills) of the behavior of interest

## Text messaging library matrix

<table>
<thead>
<tr>
<th>Message Type/Outcome</th>
<th>Message Content</th>
<th>Character Count</th>
<th>Date</th>
<th>Time</th>
<th>Tailoring</th>
<th>Theoretical Construct</th>
</tr>
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<tbody>
<tr>
<td>Reminder: regular exercise for increased fitness and weight loss</td>
<td>30 minutes of exercise each day can improve your mood, increase your energy, and help you get back into your favorite pair of jeans!</td>
<td>132</td>
<td>4/8</td>
<td>8am</td>
<td>Women ages 35-50</td>
<td>Gain frame: Exercise, Gain: mood, energy, and appearance</td>
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Security & Privacy

- Restrict the amount of information sent
- Advise participants to
  - Protect their phone-login passwords
  - Anti-theft, remote locking, wiping of data
  - Restrict amount of information displayed with incoming text notification
- Encryption – text messages are encrypted in the air, encryption strength is debatable, 3rd party systems exist to ensure encryption in air and at rest
- Self-destructing
Health Insurance Portability and Accountability Act

• Security rule- includes specific standards for disclosure and storage of electronic health data and safeguarding of PHI – includes text messaging

• The Federal Trade Commission (FTC) enacted the CAN-SPAM – applies to text messaging campaigns – opt-in/opt-out options are required
Parting Thoughts

• Widespread use of text messaging potential for disruptive innovation or diluted value due to increasing noise:value ratio
• Intervention method of delivery
• We need more evidence about the best way to construct & deliver information to impact outcomes
• Rapidly evolving technologies & applications – need rapid prototyping
• Academic-industry partnerships
Discussion