What is osteoarthritis?

- Degeneration of cartilage, bone and other joint tissues
  - Also called Degenerative Joint Disease (wear and tear arthritis)
- Knees, hips, back, hands most commonly affected
- More than one joint may be affected
Knee osteoarthritis: Epidemiology

- **9.2** million adults have painful knee OA
  
  *Lawrence et al., Arthritis Rheum 2008;58(1):26–35*

- The risk for knee OA is 46% by age 85 years, almost **1 of 2** adults
  
  *Murphy et al., Arthritis Rheum 2008;59(9):1207–1213*

- No cure

- Chronic and often progressive disease, leading to extensive joint damage, muscle weakness and mobility issues

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Knee OA: Joint Pain

- Pain during weight-bearing activities; stairs, standing and walking

- Pain at night and or at rest indicates severe disease

- “Stiffness” is a common complaint after prolonged inactivity
Knee OA: Steals Movement

- 44% have difficulty or are unable to walk 1/4 mile
- 46% have difficulty or are unable to climb 10 steps

Dillon et al, *J Rheumatol* 2006;33:2271-2279

Treatment: Exercise

- Walking, strength training and weight loss can decrease pain and improve functional activity
Knee OA and Strength Training

- Clinical guidelines recommend strength training in the management of knee OA
- 85% of adults with knee OA do **no** strength training
- Long-term adherence is poor: Majority of people in strength training trials do not perform exercises **1 year later**  
  Pisters et al., *Arthritis Care Res* 2010;62(8):1087–1094  
  van Gool et al., *Contemp Clin Trials* 2006; 27: 227-237
What is **Telephone-Linked Communication (TLC)**?

- A way to provide health services to patients that complements the care given by physicians and other health professionals.

Friedman RH, Stollerman JE, Mahoney DM, Rozenblyum L. The virtual visit: using telecommunications technology to take care of patients. JAMIA 1997; 4:413-425.

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**TLC Behavior Interventions**

- **Goal:** To help individuals learn and use cognitive and behavioral strategies, skills, and techniques that promote healthy behaviors and decrease risk behaviors
  - **Healthy Eating**  
  - **Regular Physical Activity**  
  - **Smoking Cessation**  
    *American Medical Informatics Association* 2003; 539–543
Features of TLC

- Users can converse with TLC systems using land or mobile phones from any location
- Call initiation by TLC (outbound) or by user (inbound)
- TLC uses digitally recorded human voices
- Users communicate with TLC by pressing buttons or by speaking into the telephone receiver
- Speech recognition technology helps make the interaction “feel” like a natural conversation

Continued: Features of TLC

- Scripts are designed to resemble a typical conversation between a health counselor and a patient/client
- Rules determine which voice scripts to play based on user response at each step of the conversation
- Data collected on user utilized to personalize future conversation
- Data can be provided to users and health professionals to summarize progress
- Alerts can be generated and sent by phone, email, or fax
TLC: Example

- Assessment of Goal Attainment

“Mrs. Smith, in your last TLC call, you set a goal for yourself of exercising three days a week for 20 minutes each day. It looks like you didn’t quite do it.”

TLC: Example

- Assessment of Goal Attainment (continued)

“But you are being active as much as you were when we spoke last. That’s OK! Sometimes, we’re not able to do as much as we would like. You should take satisfaction in the fact that you are holding your own.”
different title? I'm not sure what this means.
Keysor, Julie J, 4/10/2013

different title?
Keysor, Julie J, 4/10/2013
TLC: Example

- Counseling Intervention
  
  “This is a very natural feeling. Change is difficult for all of us, but it can be done. Think about how you made those tough changes in your life. Try the same path with exercise. I’ll help you each step of the way. I know you can do it.”

TLC Knee OA Strength Training Pilot Study Aims:

- Test an evidence-based 6-week strength training class in subjects with Knee OA
  Baker et al., *J Rheum* 2001;28(7): 1655-65
- Test the TLC intervention for 3 months following the 6-week strength training class
different title?
Keysor, Julie J, 4/10/2013
Pilot Study Design:

1. Participants recruited from South Boston Neighborhood Center and Senior Center
   - N=11
   - Adults 55+
   - Knee OA
   - WOMAC pain score ≥ 4 or knee pain on most days of month
2. 6-week exercise class
3. Enrolled to the TLC intervention for 3 months
4. Group met again to provide feedback

Pilot: Exercise Class

- Twice weekly x 6 weeks
- Strength training program with use of ankle weights and body weight
- Rate exercise intensity
- Instruction in completing log books
- Requested that exercise continue at home
  - 3 x week
Pilot: TLC Intervention

- Bi-monthly counseling calls by TLC for 3 months
- Individualized exercise program inputted into TLC system (days per week of exercise)
- Goal attainment review
- Goal setting review
- Counseling

Pilot: Assessments

- Pre and post the 6-week exercise class
  - Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) for knee pain and physical function
  - Timed Up and Go (TUG) test
  - 10 chair stand time
- Post 3-month TLC intervention
  - Qualitative data on TLC and strength training class
Pilot: Results-Demographics

- **Gender**
  - Female = 9
  - Male = 2

- **Age**
  - Mean 70  range 55-83 years

- **WOMAC pain (0-20)**
  - Mean 6.4  range 2-13

Results: Quantitative

<table>
<thead>
<tr>
<th>Question</th>
<th>Pre Exercise class</th>
<th>Post class</th>
</tr>
</thead>
<tbody>
<tr>
<td>WOMAC pain (0-20)</td>
<td>6.4 +/- 3.8</td>
<td>5.4 +/- 2.6</td>
</tr>
<tr>
<td>WOMAC function (0-68)</td>
<td>17.6 +/- 9.8</td>
<td>15.4 +/- 9.4</td>
</tr>
<tr>
<td>TUG (seconds)</td>
<td>9.9 +/- 2.7</td>
<td>9.0 +/- 3.2</td>
</tr>
<tr>
<td>*Chair stand x10</td>
<td>36.0 +/- 9.9</td>
<td>25.1 +/- 5.0</td>
</tr>
</tbody>
</table>

Lower scores reflect less pain and better function
Results: Qualitative

Attitudes towards TLC System using likert scale

<table>
<thead>
<tr>
<th>Variable (score range)</th>
<th>Mean (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability (1-5)</td>
<td>3.4 (2-4)</td>
</tr>
<tr>
<td>Helpfulness (1-5)</td>
<td>3.0 (1-4)</td>
</tr>
<tr>
<td>Motivation to strength train (1-5)</td>
<td>3.3 (3-4)</td>
</tr>
<tr>
<td>Confidence to adhere (1-5)</td>
<td>4.4 (4-5)</td>
</tr>
</tbody>
</table>

Higher scores are more favorable

Results: Qualitative Comments

Positive Comments
- “A reminder should be doing exercises”
- “Keep moving”
- “Exposure to exercise that helped me”
- “You can’t improve on perfection can you?”

Negative Comments
- “Too much information – needs to be simpler”
- “Make it cleaner – more to point”
Randomized Trial: BOOST
Boston Overcoming Osteoarthritis through Strength Training

- 100 participants with self reported, painful knee osteoarthritis
- 6 week strength training class
- Randomized to TLC and control groups
- TLC intervention: Regularly scheduled calls to assess, remind, and promote exercise
- Control: Monthly automated message call (reminder to complete exercise logs)
- Outcomes: 2-year adherence; 2-year pain and function outcomes

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Promoting Activity and Participation among Persons with Arthritis

The NIDRR Arthritis State of the Science Meeting

April 6-7, 2014
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