Innovations Using Technology to Closing the Gap between Clinic and Workplace
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Imagine the following scenario...
Learning Objectives

• Define telehealth
• Discuss models of care in telehealth
• Describe a pilot study in tele-ergonomics
Ergonomics

“the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimize human well-being and overall system performance”

(www.iea.cc/01_what/What%20is%20Ergonomics.html)
Telehealth

“...the application of evaluative, consultative, preventative, and therapeutic services delivered through telecommunication and information technologies”

(Cason, et al., 2013)
Telehealth Benefits

• Reduce inequities in access to health resources by remotely delivering services to underserved areas.
• Improve efficiency in delivery of services by eliminating travel time, providing instantaneous access, and improving the coordination of care.
• Reduce the costs of assessments, interventions, and education.
• Promote client-centered care, since health professionals can observe clients in their own environments.
Methods

• Information gathering
  • POTS
  • Electronic forms
  • Webcams/video conferencing
  • Sensors
• Immediate vs stored
• “Direct” or through and intermediary

Considerations

• Capacity of technology
• Access to technology
• Skill of client/therapist
Models of Care in Telehealth

Supervision

Evaluation

Consultation

Intervention

Monitoring

(Richmond, 2013)
Tele-evaluation

- Diagnosis or identification of problem areas using telecommunication technologies
  - Considerations
    - Type of evaluation (self-report/observational)
    - Validity of evaluation methods
### Evidence: Tele-evaluation

#### Evaluation areas

<table>
<thead>
<tr>
<th>Category</th>
<th>Evaluation Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelchair prescription</td>
<td>• Functional Reach Test and European Stroke Scale</td>
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<td></td>
<td>• Palsbo et al., 2007</td>
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<td></td>
<td>• Kohlman Evaluation of Living Skills and the Canadian Occupational Performance Measure</td>
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<td></td>
<td>• Dreyer et al., 2001</td>
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<tr>
<td>Neurological assessment</td>
<td>• Functional Independence Measure</td>
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<td></td>
<td>• Hoffman et al., 2008</td>
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<tr>
<td>Adaptive equipment prescription and home modification</td>
<td>• Jamar Dynamometer, Preston Pinch Gauge, Nine Hole Peg Test, and Unified Parkinson’s Disease Rating Scale</td>
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<tr>
<td></td>
<td>• Hoffman et al., 2008</td>
</tr>
<tr>
<td>Ergonomic assessment</td>
<td>• Baker &amp; Jacobs, 2013</td>
</tr>
</tbody>
</table>

#### References

- Barlow, Liu, & Sekulic (2009)
- Schein et al., 2008
- Schein, et al., 2010;
- Schein, et al, 2011
- Savard et al., 2003
- Sanford et al., 2007
- Baker & Jacobs, 2013

Example of Tele-evaluation

Videoconferencing technology between provider and client

Occurred in client’s natural environment

Assessed Activities of Daily Living (ADL)

(Richmond, 2013)

Teleconsultation

Teleconsultation defined

- Virtual consultation for the purpose of obtaining and sharing medical information or advice between:
  - Expert provider and client; or
  - Expert provider and local provider with the client present; or
  - Expert provider and local provider without client present

Key Support Studies

- Play performance in children with special needs
  - Wakeford et al., 2002
- Veterans with traumatic brain injury
  - Girard, 2007
- Wheelchair seating consultations between distant and local providers
  - Schein, et.al, 2008

Example of Teleconsultation

Consultation between expert provider and local provider with client present

Tele-intervention

- Interventions using telecommunication technologies
  - Clinic/Home
  - Methods to provide guidance
    - Person (visual/auditory)
    - Built in reminders
    - Sensor
  - Analytics
Evidence: Teleintervention

Evidence supports the use of telehealth to deliver interventions in the areas of:

- Children and Youth
- Productive Aging
- Mental Health
- Rehabilitation and Participation
- Health and Wellness
- Work and Industry

**Interventions**

**Key Support Studies**

- Early intervention services
  - Cason, 2009, 2011; Heimerl & Rasch, 2009
  - Kelso et al., 2009
- Older adults
  - Bendixen et al., 2007; Harada et al., 2010
  - Hori et al., 2009
- Stroke
  - Chumbler et al., 2010a; 2010b; Hermann et al., 2010
- Work space modifications
  - Bruce & Sanford, 2006
- Chronic Diseases
  - Darkins et al., 2008; Steel, Cox & Garry, 2011

Evidence: Telemonitoring

<table>
<thead>
<tr>
<th>Use of telecommunication technology to:</th>
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<tbody>
<tr>
<td>• Monitor a client’s adherence to an intervention program</td>
</tr>
<tr>
<td>• Monitor and facilitate progressive therapy program</td>
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<tr>
<td>• Monitor and support client in natural environments (i.e. home, work, community)</td>
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</table>

<table>
<thead>
<tr>
<th>Key Support Studies</th>
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</thead>
<tbody>
<tr>
<td>• ADLs (Smartphones)</td>
</tr>
<tr>
<td>• Tang &amp; Venables, 2000</td>
</tr>
<tr>
<td>• Home exercise programs</td>
</tr>
<tr>
<td>• Popescu et al., 2000</td>
</tr>
<tr>
<td>• Chronic disease management</td>
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<tr>
<td>• Darkins et al., 2008</td>
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(Cason, et al., 2013)
Example of Telemonitoring

Monitoring or tracking a client’s therapeutic progress remotely through telecommunication technology

### Evidence: Tele-supervision

<table>
<thead>
<tr>
<th>Supervision</th>
<th>Key Support Studies</th>
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<tbody>
<tr>
<td>- Tele-supervision requires consideration of:</td>
<td></td>
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<tr>
<td>- State licensure laws</td>
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<tr>
<td>- Institution specific guidelines</td>
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<tr>
<td>- Professional Societies’ Guidelines for Supervision, Roles, and Responsibilities During the Delivery of Treatment</td>
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<tr>
<td>- Professional Societies Code of Ethics and Ethics Standards</td>
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<tr>
<td>- Telehealth technologies can be used to support students and practitioners working in isolated or rural areas, and nontraditional fieldwork placements that cannot offer on-site supervision</td>
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<tr>
<td>- Miller et al., 2003</td>
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<td>- Hubbard, 2000</td>
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(AOTA, 2009; AOTA 2010; Cason, et al., 2013)

Example of Tele-supervision

Image from http://www.infanthearing.org/telehealth/index.html

Exemplar: Tele-ergonomics
Tele-ergonomics – Pilot Studies

• Purpose
  • Establish proof-of-concept for the feasibility of delivering ergonomics assessments & interventions for computer users via web-based Tele-CES
Tele-ergonomics – Pilot Studies

Study 1 – Baker et al., 2013

- Validity of remote assessment of workstations
  - Design – Single group pre/post test
  - Participants - 30
- Remote assessment compared to live assessment (gold standard)

Study 2 – Jacobs et al., 2012

- Validity of remote delivery of ergonomic intervention
  - Design: Single-subject AB design
  - Participants: 10
- Implementation of recommendations made through remote ergonomic intervention assessed
Tele-ergonomics

• Telerehabilitation Computer Ergonomics System (Tele-CES)

• Using existing previously validated ergonomic instruments
• Input from healthcare professionals and consumers
• Conducted by ergonomically trained health professionals
• Remotely assess the computer workstation
• Generate explicit participant-specific workstation modification recommendations
Tele-CES Assessments: Worker Characteristics

- Demographic information
  - Demographic survey

- Computer Workstation Checklist
  - Self-report assessing computer use

(Baker, Livengood, & Jacobs, 2013)
You need to mention that this is our pilot work on this system and that it involves people with arthritis - otherwise a lot of these forms don't make sense (why the AIMS for example) Show the BU study as an exemplar of what we are doing to test the system and as an exemplar of what we think we can get out of it. We have the basic system - this is how we adapt to different people/problems

reviewer 1, 9/22/2010
Tele-CES Assessments: Worker Characteristics

- **Pain**
  - Joint Pain Homunculus (JPH)/Pain Visual Analog Scale (P-VAS)

- **Comfort**
  - Comfort Visual Analogue Scale (C-VAS)
Tele-CES Assessments: Workstation Use

- Computer Use
  - The Computer Problem Survey (ComPS)

- Computer Usage
  - RSIGuard Software
Tele-CES Assessments: Workstation Use

- Multiple photographs of worker in workstation
Validity of Tele-CES Assessment

(Baker et al., 2013)

Arthritis State of the Science Meeting
Pentagon City, Virginia | April 7, 2014
Recommendations implemented by participant

(Jacobs et al., 2012)
Recommendations implemented by category

(Jacobs et al., 2012)
Tele-CES Assessments: Workstation/Worker

Blackboard Learn™

Photographs and video recordings
Tele-CES Assessments: Workstation/Worker
Thank you!
References

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