A Physical Simulator for Training Clinical Palpation Skills in Exams of the Prostate Gland

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Research Goal
Our interdisciplinary team - from medicine, nursing, and engineering - has designed and is currently building a physical simulator to teach palpation skills of the prostate gland to medical and nurse practitioner students. These skills are important for clinical assessment and detection of the normal and abnormal prostate. The long term focus of this research is to ensure that practitioners’ clinical skills are systematic, time-effective, and highly accurate. The aim is to design a simulator to effectively train students to detect prostate hypertrophy, prostatitis and cancers at the earliest possible stages.

Three Cases, 96 Scenarios
- Single tumor cases of 4 different sizes
- Multiple tumors of different sizes
- Entire prostate is cancerous
- No tumors on the outside of skin

Four Cases
- Left lobe only inflamed
- Right lobe only inflamed
- Left lobe and center inflamed
- Prostatitis with cancer (34 scenarios)

Simulators with Corresponding Disease State Representations

<table>
<thead>
<tr>
<th>Simulator</th>
<th>Normal Prostate</th>
<th>Prostatitis</th>
<th>BPH</th>
<th>Carcinoma</th>
</tr>
</thead>
</table>
| Nasco (with torso) | One Case  
Normal state | No Cases | No Cases | Three Cases, 3 Scenarios  
- Under skin tumor  
- Small tumor on the outside of skin  
- Entire prostate is cancerous |
| Nasco (without torso) | One Case  
Normal state | No Cases | Two Cases  
- BPH only  
- BPH with early cancer nodule | Three Cases, 3 Scenarios  
- Early cancer in normal prostate  
- Early cancer in hyperplastic prostate  
- Late invasive cancer |
| Virginia Prostate Examination Simulator (VPES) | One Case  
Normal state | Four Cases  
- Left lobe only inflamed  
- Right lobe only inflamed  
- Left lobe and center inflamed  
- Prostatitis with cancer (34 scenarios) | Four Cases  
- Left and right lobes inflamed with sulcus intact, no tumors  
- Mild inflammation with sulcus mostly obliterated, no tumors  
- Left and right lobes inflamed with sulcus mostly obliterated, no tumors  
- BPH with cancer (17 scenarios) | Three Cases, 96 Scenarios  
- Single tumor cases of 4 different sizes  
- Multiple tumors of different sizes  
- Entire prostate is cancerous  
- 62 different cancer scenarios  
- No tumors on the outside of skin, this is not necessary to replicate |

Scenarios Modeled by Virginia Prostate Exam Simulator
- Normal  
- Prostatitis  
- BPH with and without Carcinoma  
- Carcinoma