The Capacity of the Prosthetic Profession to Provide Lower Extremity Prosthetic Limbs Within the State of Georgia

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APPH 8901
Background & Significance

• Due to an aging population and a rise in conditions known to increase the risk of amputation, demand for prosthetic services is thought to be increasing nationwide.

• 20% of certified practitioners will reach retirement age within the next ten years.
  (Nielsen 2002)

• A recent National Commission on Orthotic and Prosthetic Education (NCOPE) study highlights the need to substantially increase the number of educational programs and the number of graduates becoming certified to meet the demand for services.
  (Nielsen 2002)
Background & Significance

• While there are a handful of published articles examining the incidence of limb loss in the USA, there are very few studies which consider the demand for prosthetic services.

• Very little is known about actual services rendered.

Background & Significance

• It is difficult to know where to go if you don’t know where you are!

“How does it know?”
• What is the scale of the shortage in Georgia?
<table>
<thead>
<tr>
<th>Capacity</th>
<th>Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Manufacturers’ prosthetic foot sales data</td>
<td>• Incidence &amp; Prevalence</td>
</tr>
<tr>
<td>• Prostheses billed to Medicare</td>
<td>• Amputation risk factors</td>
</tr>
<tr>
<td>• Number of practitioners</td>
<td>• GA population</td>
</tr>
<tr>
<td>o The American Board for Certification (ABC)</td>
<td>o age strata</td>
</tr>
<tr>
<td>o The Board for Orthotist / Prosthetist Certification (BOC)</td>
<td>o occupation</td>
</tr>
<tr>
<td></td>
<td>o sex</td>
</tr>
<tr>
<td></td>
<td>o race</td>
</tr>
<tr>
<td></td>
<td>o economic status</td>
</tr>
</tbody>
</table>
Aims

• To determine the number of lower limb prostheses fabricated per ABC and BOC certified prosthetist in GA during the years 2000 and 2004.

• Investigate the lifespan of a prosthesis.

• In light of services rendered, estimate the ability of Georgia’s prosthetists to meet demand based on published incidence and prevalence data.
Methods: Foot Sales

• 2000 & 2004 prosthetic foot sales and returns data was solicited from the following:

Manufacturers
• Bauerfeind
• Campbell-Childs, Inc.
• College Park Industries
• Dycor
• Endolite
• Freedom Innovations
• Kingsley Mfg. Co.
• MICA Mfg. Corp.
• Ossur
• Otto Bock
• Ohio Willow Wood
• Trulife-Seattle

Distributors
• Cascade Orthopedic Supply
• Fillauer LLC
• PEL Supply Co.
• Smith Global
• Southern Prosthetic Supply
Methods: Prostheses billed to Medicare

- Palmetto GBA was asked to identify the number of times the “Base” L-Codes for lower limb prostheses were submitted for billing in the years 2000 and 2004.

*Palmetto GBA is the Durable Medical Equipment Regional Carrier (DMERC) for Medicare Region C.*
Methods:
Prostheses billed to Medicare

- Prosthetic Base Codes for Symes – proximal. Endoskeletal, exoskeletal, post-op & preparatory.
Methods:
Prostheses billed to Medicare

• Total sales was then estimated by extrapolating the Medicare information assuming Medicare sales represent 58% of total sales.

(Nohre)
Methods:

# of Practitioners

- The number of Georgia based American Board for Certification (ABC) and Board for Orthotist / Prosthetist Certification (BOC) certified prosthetists was solicited from their respective certifying agencies.
Methods:
Prostheses fabricated per practitioner

- Certified Prosthetist Orthotists (CPOs) will be treated as half a prosthettist.
- Assume 95% of prosthetists are in clinical practice.

(Nielsen - 2002)

\[
\frac{\text{# of lower limbs fabricated}}{\text{“Clinical prosthetists”}} = \text{limbs fabricated per practitioner}
\]
Results

• Prosthetic Foot Sales:
  – Of the 17 companies solicited, 13 have provided data.
  – All distributors have provided data.
  – 1 company discontinued sales of prosthetic feet prior to the time period studied.
  – 3 companies have not provided data on their direct sales.
Results

- Total number of prosthetic feet sold to facilities within Georgia:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>FEET SOLD MINUS RETURNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2,578</td>
</tr>
<tr>
<td>2004</td>
<td>3,377</td>
</tr>
</tbody>
</table>
Results

- Total number of lower-limb base codes submitted to Medicare from Georgia providers:

<table>
<thead>
<tr>
<th>YEAR</th>
<th>Total units</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1,408</td>
</tr>
<tr>
<td>2004</td>
<td>1,521</td>
</tr>
</tbody>
</table>
Results

<table>
<thead>
<tr>
<th>Year</th>
<th>Codes Billed / Feet Sold</th>
<th>Medicare Data</th>
<th>Prosthetic Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>1,408</td>
<td>2,578</td>
<td>54.6% of foot sales</td>
</tr>
<tr>
<td>2004</td>
<td>1,521</td>
<td>3,377</td>
<td>45.0% of foot sales</td>
</tr>
</tbody>
</table>

Legend:

- Medicare Data
- Prosthetic Feet
Results

- Total sales assuming Medicare sales represent 58% of total sales.

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicare</td>
<td>1,408</td>
<td>1,521</td>
</tr>
<tr>
<td>Total Sales</td>
<td>2,427</td>
<td>2,622</td>
</tr>
</tbody>
</table>
Results

Estimated Total Sales from Medicare Data

Foot Sales

Prostheses Fabricated

Year

2000
2004

2,427
2,578
2,622
3,377
## Results

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPs + BOCPs</td>
<td>37</td>
<td>37</td>
</tr>
<tr>
<td>CPOs + BOCPOs</td>
<td>43</td>
<td>53</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>80</td>
<td>90</td>
</tr>
</tbody>
</table>
Results:
Prostheses fabricated per prosthetist*  **

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on Medicare as 58% of total sales:</td>
<td>44</td>
<td>44</td>
</tr>
<tr>
<td>Based on total foot sales:</td>
<td>46</td>
<td>56</td>
</tr>
</tbody>
</table>

*CPOs & BOCPOs are considered ½ a prosthetist.
**Assume 95% of practitioners are in clinical practice.
Conclusion

- Medicare sales represented 54.6% of total foot sales in 2000, and 45.0% in 2004.

- Medicare sales increased by 235 units while foot sales increased 799 units.

- Insufficient evidence to explain this change in payer mix.
Conclusion

• Taking foot sales to represent total number of limbs fabricated, practitioners increased their efficiency by 22%.

• Possible explanations:
  – Increased use of central fab and CAD/CAM.
  – Hired more technicians and/or certified fitters.
Conclusions

• Assuming Medicare sales to represent 58% of total limbs produced, the rates of production remained equal. (44/practitioner).

• In 2000, the extrapolated Medicare sales are 151 units short of foot sales, but 755 units short in 2004.
Conclusion

• Limitations:
  – Why the inconsistency in the Medicare data to foot sales ratio in the years studied?
    • Incomplete prosthetic foot sales data.
      – Proprietary data is difficult to obtain.
    • Possible incorrect foot sales data.
    • Medicare data may be skewed by attempts at fraud and abuse.
    • Medicare policy changes.
    • Possible change in the GA amputee patient demographics.
Conclusion

• The data collected represents the only estimate of lower limb prostheses fabricated in GA in 2000 & 2004.
  – Nielsen, in a 2002 report to NCOPE, suggested a prosthetist can see up to 250 patients a year.

• The data also represents the only estimate of prostheses fabricated per practitioner, and the only study to capture services rendered beyond Medicare beneficiaries.
Conclusion

• Limitations:
  – Assumed 1 prosthetic foot per lifespan of the prosthesis.
  – Assumed all facilities operate in the same manner and at 100% capacity.
  – Assumed CPO’s spend 50% of their time on prosthetics.
  – Assumed 95% of practitioners are in clinical practice.
Conclusion

• We have a good idea where we are, but we’re still lacking sufficient information to know where to go.
Future Study

• Investigate incidence & prevalence of amputees in need of prosthetic services.
• Investigation of payer mix.
• Investigate percentage of certified practitioners in clinical practice.
• Expand existing study to a national scale.
Discussion

- 1996 incidence rates of major LL amputation per 100,000 US population standardized to 1988 population by age, sex, geographic region:
  - 2° dysvascular condition: 24.8
  - 2° trauma: 1.05
  - 2° cancer: 0.17
  - Per 100,000 live births: 6.19

(Ephraim – 2002)
Incidence

- 2000 GA population: 8,186,453
- 2004 GA population: 9,072,576
  - (U.S. Census Bureau)

<table>
<thead>
<tr>
<th>Major LEA 2°</th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>dysvascular</td>
<td>2,030</td>
<td>2,250</td>
</tr>
<tr>
<td>trauma</td>
<td>86</td>
<td>95</td>
</tr>
<tr>
<td>cancer</td>
<td>14</td>
<td>15</td>
</tr>
<tr>
<td>congenital LE limb deficiency:</td>
<td>8</td>
<td>?</td>
</tr>
<tr>
<td>Total</td>
<td>2,138</td>
<td>2,360</td>
</tr>
</tbody>
</table>
## Prevalence

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA Population (US Census Bureau)</td>
<td>281,421,906</td>
<td>296,410,404</td>
</tr>
<tr>
<td># Amputees in USA - excluding fingers &amp; toes (Nielsen)</td>
<td>1,752,838</td>
<td>1,904,035</td>
</tr>
<tr>
<td>Subtract 3% - UL amputations (Dillingham)</td>
<td>- 52,585</td>
<td>- 57,121</td>
</tr>
<tr>
<td>Subtract 10% - partial foot (Dillingham)</td>
<td>- 170,025</td>
<td>- 190,404</td>
</tr>
<tr>
<td>Major lower limb amputations in USA</td>
<td>1,530,228</td>
<td>1,656,510</td>
</tr>
<tr>
<td>% of population</td>
<td>0.54%</td>
<td>0.56%</td>
</tr>
</tbody>
</table>
## Discussion

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>GA population</td>
<td>8,391,282</td>
<td>9,072,576</td>
</tr>
<tr>
<td><em>Assume GA demographics = USA demographics</em></td>
<td>0.54% = 45,313</td>
<td>0.56% = 50,806</td>
</tr>
<tr>
<td>Assume 75% of amputees use prostheses – (Nielsen)</td>
<td>33,958</td>
<td>38,104</td>
</tr>
<tr>
<td>Assume lifespan of prosthesis = 3 yrs (informal survey)</td>
<td>11,328</td>
<td>12,701</td>
</tr>
</tbody>
</table>
## Discussion

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limbs fabricated</td>
<td>2,578</td>
<td>3,377</td>
</tr>
<tr>
<td>(est. from foot sales data)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demand</td>
<td>11,328</td>
<td>12,701</td>
</tr>
<tr>
<td>Shortage</td>
<td>188 CPs</td>
<td>163 CPs</td>
</tr>
</tbody>
</table>
References

Thank You!

- Robert Kistenberg, MPH, CP, FAAOP
- Stephen Sprigle, PhD, PT
## Survey Results

<table>
<thead>
<tr>
<th></th>
<th>How often need new prosthesis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>14 CPs</strong></td>
<td>2.86 years ( \sigma = 0.99 )</td>
</tr>
<tr>
<td><strong>9 CPOs</strong></td>
<td>3.11 years ( \sigma = 1.06 )</td>
</tr>
<tr>
<td><strong>3 Unknown</strong></td>
<td>2.67 years ( \sigma = 0.47 )</td>
</tr>
<tr>
<td><strong>26 Total</strong></td>
<td>2.92 years ( \sigma = 1.00 )</td>
</tr>
</tbody>
</table>
How often does an individual require a new prosthesis?

- CPOs (9) \( \sigma = 0.99 \)
- CPs (20) \( \sigma = 1.06 \)
- Unknowns (3) \( \sigma = 0.47 \)