Patient Outcomes from Care Provided by Advanced Practice Nurses in U.S.

Julie Stanik – Hutt PhD, CRNP, CCNS, FAAN
Kathleen White PhD, RN, NEA, FAAN

Johns Hopkins University
Baltimore, MD USA
Newhouse, Stanik-Hutt, White, Johantgen, Zangaro, Heindel, Steinwachs, Weiner, Bass, Fountain & Wilson

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Session Objectives

• Describe processes used to systematically review APN outcomes research

• Describe results from systematic review of APN outcomes research by APN role (CNS, NP, CNM, CRNA)
Critical Policy Questions in US: Access, Cost & Quality

• Number / Distribution of providers
  – Primary care & underserved areas
• Spiraling costs
  • chronic disease & aging population
• Quality and safety priorities
• APNs assuming greater role
Evaluating accumulated evidence to answer policy questions

• Review of the literature
• **Systematic review**
  – Clear question
  – Systematic, explicit methods to identify, select, & critically appraise
  – Collect & analyze data from studies
• **Meta-Analysis**
  – Use of statistical techniques
  – Integrate, analyze & summarize data
  – From multiple studies
Previous Reviews & Analyses

- **CNS**
  - Fulton & Baldwin 2004
- **CNMs**
  - Brown & Grimes 1995
  - Hatem et al 2008
- **NPs**
  - Edmunds 1978
  - Sox 1979
  - OTA 1981 & 1986
  - LaRochelle 1987
  - Ventura et al 1991
  - Brown & Grimes 1995
  - Horrocks et al 2002
  - Laurant et al 2005
What do we know from previous reviews?

CNS

• improve
  – pain management
  – patient satisfaction with nursing care
• reduce
  – hospital costs
  – length of stay
  – emergency room use
  – hospital complications
What do we know from previous reviews?

NP

- Blood pressure**
- Glucose**
- Symptom management
- Health status
- Functional status

- Satisfaction
- ED use
- Hospitalizations
- Length of stay**

- Better**
What do we know from previous reviews?

CNMs

Lower
- early (< 24 wk) fetal loss
- analgesia & anesthesia
- episiotomy
- operative vaginal birth
- Infant length of stay

Increased
- breastfeeding
- spontaneous vaginal birth
- Mother perception of control during labor

Comparable
- C-section rates
- Fetal distress
- Apgar scores
Purpose

• Synthesize evidence 1990 - 2009
• Assess how US APNs affect patient outcomes
• Quality, Safety & Effectiveness
• US – education, regulation, healthcare environment
Definitions

• Quality =
  degree of excellence meets expectations

• Safety =
  prevention of injury or loss

• Effectiveness =
  consistent with guidelines and/or produces desired result
Why only patient outcomes?

• **Ways to assess Quality**
  – Structures
  – Processes
  – Outcomes

• **Patient outcomes the ultimate measure**
  – Incorporate structures & processes
  – “the proof is in the pudding”
Methods Used

1. Focused but thorough search of literature
2. Independent judgment by $\geq$ 2 individuals at each step - Titles -> Abstracts -> Articles
3. Study quality evaluated with rigorous criteria – Modified Jadad Scale
4. Quantity of data had to meet preset threshold - $\geq$ 3 studies / outcome
5. Overall quality & quantity evaluated again based on rigorous criteria - GRADE aggregated evidence
Inclusions & Exclusions

- 1990 - 2009
- US Studies
- RCT or Observational Comparative
- APRN vs other provider type
- Patient Outcomes

- Non-English
- Outside of US
- Descriptive, correlation, qualitative
- No quantitative data
- Processes or Structures
- Outcome could not be affected by APRN
Exhaustive Evidence Search

- Variety of databases (e.g., MEDLINE, Proquest, CINAHL).
- Systematic reviews (e.g., Cochrane Database, Joanna Briggs Institute, Institute of Medicine/National Research Council Reports).
- Government reports (i.e. AHRQ or HRSA).
- Prior published literature reviews
- Peer reviewed non-profit organization reports
- Doctoral dissertations & HRSA grants
- Hand searching
  - References of key review articles and articles included in review.
  - Footnote chasing
  - Query of experts about literature in their personal files.
  - Professional organizations affiliated with APNs
What did we retrieve?

- Titles = 27,993
  - Abstracts = 7113
    - Articles = 1673
- Articles included = 109
  - NP (49); CNS (24); CNM (23); CRNA (4);
  - CNS and NP combined (9)
- Articles with aggregated outcomes = 75
  - NP (37); CNS (13); CNM (21); CRNA (0)
  - CNS and NP combined (4)
Evaluate Study Quality

Modified JADAD

- Patient samples similar?
- Settings similar?
- Adequate sample size?
- Reliable & Valid measures?
- Research bias controlled?
- Can outcome be attributed to the APRN?
Evaluate Study Quality

Modified JADAD

• 0 – 8 scale

• Break point
  – High quality ≥ 5
  – Low quality ≤ 4
### Sample: JADAD Study Quality Scores

<table>
<thead>
<tr>
<th>Author, year</th>
<th>Were participants similar</th>
<th>Setting of comparison groups similar</th>
<th>Sample Size Less than 30 per group</th>
<th>Sample Size 31-60 per group</th>
<th>Sample Size &gt;60 per group</th>
<th>Measurements R &amp; V adequate</th>
<th>Bias controlled</th>
<th>Attribution of intervention to outcomes</th>
<th>Strength of effect</th>
<th>Score</th>
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</table>
Aggregation & Initial Interpretation:

at least 3 studies to report outcome

• High strength evidence =
  2 RCTs or
  1 RCT + 2 high quality Observational

• Moderate strength evidence =
  1 RCT + 1 high & 1 low Observational

• Low strength evidence =
  \( \leq 3 \) high Observational
Evaluate Aggregated Evidence

  - Assess quality, quantity, and consistency of the evidence for outcome
Downgrade if aggregated evidence:
GRADE Working Group Criteria
- Sparse (< 3 high quality studies or < 2 RCT)
- Design strength (RCT best * rare outcomes)
- Quality (≥ 5 High; ≤ 4 Low)
- Inconsistent (consistent vs conflict in results)
- Directness
  (participants, measures, & outcomes relate to reality)
- Reporting bias (selective reporting)
## Sample Aggregated Evidence Grading

<table>
<thead>
<tr>
<th></th>
<th>Hospitalization</th>
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<tr>
<td><strong>Total studies</strong></td>
<td>4 (2 RCT)</td>
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<tr>
<td><strong>Evidence grading</strong></td>
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<tr>
<td>Number sparse?</td>
<td>0</td>
</tr>
<tr>
<td>Design best?</td>
<td>0</td>
</tr>
<tr>
<td>Quality acceptable?</td>
<td>0</td>
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<tr>
<td><strong>Inconsistencies?</strong></td>
<td>-1</td>
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<tr>
<td>Directness of effect?</td>
<td>0</td>
</tr>
<tr>
<td>Reporting bias?</td>
<td>0</td>
</tr>
</tbody>
</table>

### Study summary

#### Reference 1<sup>st</sup> author (study quality)

- *Naylor, 2004<sup>99</sup> (7)†
- *Naylor, 1999<sup>100</sup> (6)†
- Naylor, 2007<sup>101</sup> (5)
- Uzark, 1994<sup>132</sup> (5)

### Assigned grade

Moderate: lower number of admissions favoring APN group
<table>
<thead>
<tr>
<th>Overall Quality</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Further research very unlikely to change confidence in estimate of effect.</td>
</tr>
<tr>
<td>Moderate</td>
<td>Further research is likely to have important impact on confidence in estimate of effect &amp; may change estimate.</td>
</tr>
<tr>
<td>Low</td>
<td>Further research very likely to have important impact on confidence in estimate of effect &amp; likely to change estimate.</td>
</tr>
<tr>
<td>Very Low</td>
<td>Any estimate of effect is very uncertain.</td>
</tr>
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</table>
Quality Outcomes: CNS

High level of evidence:

– Reduce LOS* 7 (2 RCT)

– Decrease cost* 4 (2 RCT)

– Do not affect Satisfaction 3 (1 RCT)
Quality Outcomes: CNS

Low level of evidence:

– Affects quality of life*  4 (1 RCT)
Effectiveness Outcomes: CNS

Moderate level of evidence:

– Lower complications*  5 (1 RCT)
Quality Outcomes: NP

High level of evidence:

- Satisfaction 6 (4 RCT)
- Perceived health 7 (5 RCT)
- Functional status 10 (6 RCT)
- Unexpected ED or Urgent care visit 5 (3 RCT)
- Hospitalization 11 (3 RCT)
Effectiveness Outcomes: NP

- High level of evidence:
  - Lipid* 3 (3 RCT)
  - Glucose 5 (5 RCT)
  - Blood pressure 4 (4 RCT)
Effectiveness Outcomes: NP

- Moderate level of evidence:
  - Length of stay 16 (2 RCT)

- Low level of evidence:
  - Duration of ventilation 3 (0 RCT)
Safety Outcomes: **NP**

- High level of evidence:
  - Mortality 8 (1 RCT)
Quality Outcomes: CNM

• High level of evidence:
  – Episiotomy* 8 (1 RCT)
  – Operative vaginal birth* 8 (1 RCT)
  – Caesarian birth* 15 (1 RCT)
Quality Outcomes: CNM

• Moderate level of evidence:
  – Breastfeeding rates* 3 (0 RCT)
  – Vaginal birth p caesarian 5 (0 RCT)
Effectiveness Outcomes: CNM

- High level of evidence:
  - APGAR Scores 11 (1 RCT)
  - Low birthweight infants 8 (1 RCT)
Safety Outcomes: CNM

• High level of evidence:
  – Perineal laceration*  5 (1 RCT)

• Moderate level of evidence:
  – NICU admission  5 (0 RCT)
Quality Outcome: NP & CNS

• Moderate level of evidence:

  – CNS / NP led team interventions reduced readmission / hospitalization* 4 (2 RCT)
What does this add?

- US providers & care system
  - Master’s prepared CNSs, NPs, CNMs
- US patients
- Over last 20 years
- Echoes previous reviews
Limitations

- Descriptions
  - Relationships among NPs/CNMs & MDs
  - APRN care processes & procedures
  - Usual care provided by MDs
Limitations

Methods

• Designs & measurements
  – CNM studies nearly all observational

• Samples
  – Patient self-selection for CNS samples
  – L & D care only for CNS

• Assessment of pre-existing between group differences

• No report of means, SD, statistic, power
Uses: Policy Applications

- APN educational preparation
- Rescind barriers to autonomy
  - Governmental
  - Institutional privileges & policies
- Change payment
  - Any qualified provider
  - Performance rather than years of education
- Target research & education $
Uses: Future APRN Research

- Outcomes compared to benchmarks
- CNS impact on systems outcomes
- CNS role in primary, ambulatory care
- “Let the NP be an NP”
- CRNA studies
- RCTs of care models & processes