Nursing Classifications: Effects in clinical practice and EHR requirements

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Accuracy of nursing diagnoses: Knowledge and knowledge sources
Conference Promotion Wolter Paans, Feb. 8, Groningen NL

Background / State of research

- Nursing has a mandate to strive for
  - quality
  - efficiency
  - measurability (Institute of Medicine, 2004, KVG, 2001)

- Unspecific diagnoses, need for accuracy
  (Lunney, 2001, 2011; Paans 2009)

- To attain favorable nursing-sensitive patient outcomes:
  nursing diagnoses must be stated accurately, and linked with effective nursing interventions
  (Björwell, 2002; Lavin, 2005, Müller-Staub et. al, 2009; Florin, 2005; Thoroddsen et al., 2010; Paans et al, 2010)

M. Müller-Staub, PhD, Groningen Feb 2011 2
Theoretical framework

Frameworks and definitions

- Diagnoses: NANDA International
- Interventions: NIC
- Outcomes: NOC

Transfer of NNN into nursing process:

- Nurse’s Pocket Guide
  (Doenges, Moorhouse, & Murr; 2008; NANDA-I, 2010)

M. Müller-Staub, Promotion Paans, Feb. 2011
### TABLE 7.1 NANDA, NIC, and NOC Taxonomic Linkages

<table>
<thead>
<tr>
<th>GORDON'S FUNCTIONAL HEALTH PATTERN</th>
<th>NANDA NURSING DIAGNOSIS</th>
<th>NIC PRIORITY INTERVENTIONS</th>
<th>NOC EVALUATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive-Perceptual Pattern</td>
<td>Adaptive Capacity, Intracranial, Decreased</td>
<td>Cerebral Edema Management Cerebral Perfusion Promotion Intracranial Pressure (ICP) Monitoring Neurologic Monitoring</td>
<td>Neurological Status Neurological Status: Consciousness Seizure Control Tissue Perfusion: Cerebral</td>
</tr>
<tr>
<td>Confusion, Acute and Chronic</td>
<td>Acute Delirium Management Dementia Management</td>
<td>Acute Cognitive Orientation Distorted Thought Self-Control Information Processing Neurological Status: Consciousness</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>Chronic Dementia Management Dementia Management: Bathing Mood Management</td>
<td>Chronic Cognition Cognitive Orientation Decision-Making Distorted Thought Self-Control Identity Information Processing Memory Neurological Status: Consciousness</td>
<td></td>
</tr>
<tr>
<td>Decisional Conflict (Specify)</td>
<td>Decision-Making Support</td>
<td>Decision-Making Information Processing Participation in Health Care Decisions Personal Autonomy</td>
<td></td>
</tr>
<tr>
<td>Environmental Interpretation</td>
<td>Dementia Management</td>
<td>Cognitive Orientation (table continued on page 448)</td>
<td></td>
</tr>
</tbody>
</table>

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**PHYSICAL MOBILITY, IMPAIRED**

**DEFINITION**

A limitation in independent purposeful physical movement of the body on one or more extremities

**DEFINING CHARACTERISTICS**

1. Postural instability during performance of routine activities of daily living
2. Limited ability to perform gross motor skills
3. Limited ability to perform fine motor skills
4. Uncoordinated or jerky movements
5. Limited range of motion
6. Difficulty turning
7. Decreased reaction time
8. Movement-induced shortness of breath
9. Gait changes (e.g., decreased walk-speed, difficulty initiating gait, small steps, shuffles foot, exaggerated lateral position sway)
10. Engages in substitutions for movement (e.g., increased attention to other’s activity, controlling behavior, focus on pre-illness or disability activity)
11. Slowed movement
12. Movement-induced trauma

**RELATED FACTORS**

1. Medications
2. Prescribed movement restrictions
3. Discomfort
Classifications: WHY??

• Main question: Are patient outcomes better after implementing nursing classifications?

• Evaluate the implementation of classifications: nursing diagnoses, interventions and outcomes

Research questions

After staff education in nursing diagnoses, interventions and outcomes, do nursing records contain:

- accurate nursing diagnoses?
  - including signs/symptoms (def. characteristics) and etiology (related factors)
- effective nursing interventions = specific to the identified etiology? (including planning and implementation)
- measurable, achievable nursing outcomes, describing the improvement in patients?
Implementations and study designs

• Introductory class and eight case meetings on all wards – duration of implementation: 1 year.
  *Pre-post implementation design*

• Introductory class and 6 case study sessions for 12 multiplicators (1st year), coaching (2nd year):
  *Descriptive evaluation study/qualitative interviews*

• Guided clinical reasoning v.s. case studies on wards (3 months): *Cluster randomized, controlled experimental design*

Some research results…….

• „Without diagnoses no meaningful care!“

• „Using classifications (D/I/O) enhanced my professional role and understanding“

• „I focus more on individual care needs“

• „My communication changed: I’m closer to patients, know more about their problems and needs such as anxiety, coping, nutrition, pain…. Nursing became more interesting!“
### Results: Diagnoses

<table>
<thead>
<tr>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
</table>
| **Nursing problem**
“Patient has a decubitus at left heel” | **Nursing Diagnosis:**
**Impaired tissue integrity: Pressure ulcer, grade II** |
| **Etiology/related factors:**
- Altered circulation
- Mechanical (pressure, shear, friction)
- Impaired physical mobility
- Nutritional deficit |
| **Signs/symptoms** (def. characteristics)
Distroyed tissue at left heel, 2x3 cm wide, 1mm deep) |

### Results.... Nursing Outcomes

<table>
<thead>
<tr>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
</table>
| **Nursing outcomes**
1) “Skin still read, small tissue damage” | **Nursing outcomes**
1) „Tissue integrity/observable healing with epithelized, dry, irritation- and odorless skin, free of pain
2) Unimpaired mobility of joint
3) Improved self-care ability = patient performs skin observation and care, changes of position, mobility and constant pressure free positioning of heel
4) Patient can explain her condition, the etiology (pressure, immobility, nutritional status and meaning of risk management). |
**Results, other:** examples of diagnoses...

<table>
<thead>
<tr>
<th>Pre-intervention</th>
<th>Post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nursing problem</strong></td>
<td><strong>Nursing Diagnosis</strong></td>
</tr>
<tr>
<td>Urinary incontinence; no PES</td>
<td>Urinary incontinence, total. inclus.signs/symt. + etiol. fact.</td>
</tr>
<tr>
<td>• -----</td>
<td></td>
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<tr>
<td>• -----</td>
<td></td>
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<tr>
<td>• -----</td>
<td></td>
</tr>
<tr>
<td>• Confusion, no PES</td>
<td></td>
</tr>
<tr>
<td>• ----</td>
<td></td>
</tr>
<tr>
<td>• Risk for falling; sometimes…</td>
<td></td>
</tr>
</tbody>
</table>

**Nursing interventions and outcomes**

T-Tests + Mann Whitney Significance Tests $p < 0.0001$
## Results

<table>
<thead>
<tr>
<th></th>
<th>Pre-Mean (SD)</th>
<th>post-intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nursing diagnoses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2.69 (SD = .90)</td>
<td>3.70 (SD = .54) *</td>
</tr>
<tr>
<td>Control group</td>
<td>3.13 (SD = .89)</td>
<td>2.97 (SD = .80)</td>
</tr>
<tr>
<td><strong>Nursing interventions</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>2.33 (SD = .93)</td>
<td>3.88 (SD = .35) *</td>
</tr>
<tr>
<td>Control group</td>
<td>2.70 (SD = .88)</td>
<td>2.46 (SD = .95)</td>
</tr>
<tr>
<td><strong>Nursing outcomes</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention group</td>
<td>1.53 (SD = 1.08)</td>
<td>3.77 (SD = .53) *</td>
</tr>
<tr>
<td>Control group</td>
<td>2.02 (SD = 1.27)</td>
<td>1.94 (SD = 1.06)</td>
</tr>
</tbody>
</table>

*Intervention group: t-Tests $p < 0.0001$

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## Nursing outcomes

T-Tests und Mann Whitney Signifikanz Test $p < 0.0001$
Classifications = Quality improvement

After implementing nursing diagnoses (NANDA-I):

- Assessments/diagnoses → accurate
- Nursing interventions → effective
- Patient outcomes → enhanced

(Björwell et al, 2002; Curell & Urquart 2003; Duly 2002; Müller-Staub 2007; Müller-Staub et al. 2007, 2008, 2009)

Nurses: Significantly better knowledge
Nurses: Significantly higher satisfaction
- Diagnoses, interventions + outcomes effective
- Measuring workload and staffing levels
- Grade und Skill-Mix

(Keenan et al, 2008)

EHR requirements

- Concept oriented (knowledge based) classifications
- Standardized, research-based language to represent the unique function of nursing
- Standardization and coding of concepts
- Include full NNN into EHRs, PES-Format and Indicators
- Apply nursing process based on classifications:
  link diagnoses, interventions and outcomes
- Intelligent expert systems: Decision support

= Individualized, evidence-based care
### POC Episode

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Date / Shift Initiated</th>
<th>Date / Shift Received/Delivered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety</td>
<td>11/02/2007 7p - 7a</td>
<td>11/03/2007 11a - 7p(PR)</td>
</tr>
<tr>
<td>Hypoxia, Tissue Perfusion (Cerebral, Cardiogenic, Sequestrated, Peripher)</td>
<td>11/02/2007 7p - 7a</td>
<td></td>
</tr>
<tr>
<td>Impaired Swallowing</td>
<td>11/02/2007 7p - 7a</td>
<td>11/03/2007 7a - 7a(PR)</td>
</tr>
<tr>
<td>Radiation/Severe Syndrome</td>
<td>11/02/2007 7a - 7a</td>
<td></td>
</tr>
</tbody>
</table>

### NOC Outcomes

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Date/Shift Initiated</th>
<th>Date/Shift Initiated Rating</th>
<th>Initial Rating</th>
<th>Rating in last 3 shifts</th>
<th>Date/Shift Final Rating</th>
<th>Final Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluid Balance</td>
<td>11/02/2007 7a - 7a</td>
<td>4</td>
<td>4</td>
<td>3</td>
<td>11/03/2007 11a - 7a</td>
<td>2</td>
</tr>
<tr>
<td>Swallowing Status</td>
<td>11/02/2007 7a - 7a</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>11/03/2007 11a - 7a</td>
<td>4</td>
</tr>
<tr>
<td>Tissue Perfusion Cerebral</td>
<td>11/02/2007 7a - 7a</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>11/03/2007 11a - 7a</td>
<td>4</td>
</tr>
<tr>
<td>Knowledge: Illness Care</td>
<td>11/02/2007 7a - 7a</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>11/03/2007 11a - 7a</td>
<td>4</td>
</tr>
<tr>
<td>Social Support</td>
<td>11/02/2007 7a - 7a</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>11/03/2007 11a - 7a</td>
<td>4</td>
</tr>
</tbody>
</table>

### NOC Interventions

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Date/Shift Initiated</th>
<th>Date/Shift Last Recorded</th>
<th>Provider Category</th>
<th>To Date Tally</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anxiety Reduction (oral)</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Cerebral Perfusion Promotion (HBO 38 day)</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Medication</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Swallowing Therapy (oral)</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Teaching: Disease Process</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Teaching: Physical Therapy</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
<tr>
<td>Family Involvement Promotion</td>
<td>11/02/2007 7a - 7a</td>
<td>11/03/2007 7a - 7a</td>
<td>Nurse</td>
<td>2</td>
</tr>
</tbody>
</table>

### Episcope of Care Hx

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Date/Shift Initiated</th>
<th>Expected Rating</th>
<th>Initial Rating</th>
<th>Rating in last 3 shifts</th>
<th>Date/Shift Final Rating</th>
<th>Final Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive Orientation</td>
<td>10/30/2007 7p - 7a</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>10/31/2007 11a - 7a(PR)</td>
<td>5</td>
</tr>
<tr>
<td>Swallowing Status</td>
<td>10/30/2007 7p - 7a</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Tissue Perfusion Cerebral</td>
<td>10/30/2007 7p - 7a</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Knowledge Illness Care</td>
<td>11/01/2007 7a - 7p</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Social Support</td>
<td>11/01/2007 7a - 7p</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>
Datenreihe1

Percentage NANDA out of Total EOL Episodes (1425)

NANDA_Label_Name
1. Death Anxiety
2. Acute Pain
3. Impaired Gas Exchange
4. Anticipatory Grieving
5. Risk for Falls
6. Deficient Knowledge
7. Impaired Physical Mobility
8. Activity Intolerance
9. Deficient Fluid Volume
10. Imbalanced Nutrition: Less Than Body Requirements
11. Impaired Skin Integrity
12. Ineffective Health Maintenance
13. Ineffective Tissue Perfusion (Renal, Cerebral, Cardiopulmonary, Gastrointestinal, Peripheral)
14. Chronic Pain
15. Risk for Aspiration

HANDS

NOC Ratings Report

Downtown Hospital
UNE 1
Total Care Plans: 9635
Total Unique Patients: 1011
From Date: 01/19/2007-09/19/07

<table>
<thead>
<tr>
<th>NOC</th>
<th># Unique Pt</th>
<th># of POCs</th>
<th>Avg Initial Rating</th>
<th>Avg Expected Rating</th>
<th>Avg at Discharge</th>
<th>Avg Change</th>
<th>% Met Expected at Discharge</th>
<th>% Met Expected Rating</th>
<th>% Met Expected Rating Within 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Level</td>
<td>100</td>
<td>1430</td>
<td>3.95</td>
<td>4.66</td>
<td>4.17</td>
<td>0.52</td>
<td>64.29</td>
<td>64.29</td>
<td>65.03</td>
</tr>
<tr>
<td>Cardiac Pump Effeciency</td>
<td>120</td>
<td>1031</td>
<td>3.17</td>
<td>4.50</td>
<td>3.95</td>
<td>0.75</td>
<td>56.86</td>
<td>56.56</td>
<td>55.63</td>
</tr>
<tr>
<td>Wound Healing, secondary intention</td>
<td>49</td>
<td>261</td>
<td>2.74</td>
<td>4.14</td>
<td>3.30</td>
<td>0.55</td>
<td>38.00</td>
<td>38.00</td>
<td>63.25</td>
</tr>
<tr>
<td>Fall Prevention Behavior</td>
<td>392</td>
<td>3159</td>
<td>4.18</td>
<td>4.87</td>
<td>4.66</td>
<td>0.51</td>
<td>78.86</td>
<td>81.54</td>
<td>66.02</td>
</tr>
<tr>
<td>Blood Loss Severity</td>
<td>54</td>
<td>428</td>
<td>3.11</td>
<td>4.17</td>
<td>4.47</td>
<td>0.30</td>
<td>72.21</td>
<td>72.21</td>
<td>65.36</td>
</tr>
</tbody>
</table>

NANDA NOC

Acute Pain | Pain Control | 78 | 863 | 3.04 | 4.45 | 3.95 | 0.02 | 51.25 | 51.25 | 83.86 |
Hypothermia | Thermoregulation | 24 | 229 | 3.23 | 4.63 | 4.47 | 1.10 | 75.00 | 75.00 | 90.22 |
Including NDx with DRGs

Sample: 123,241 patients

- Nursing diagnoses significantly associated with DRGs ($p \leq 0.0001$)
- By adding nursing diagnoses to DRGs the explanatory power ($R^2$) and model discrimination ($c$ statistic) improved by 30% - 146%

DRGs & Nursing diagnoses

Variables explained by Nursing Diagnoses

- Length of stay (LOS): 30%
- ICU length of stay: 72.5%
- Probably of death: 115%
- Discharge to nursing home: 146.4%
- Total charges (costs): 40.3%

(Welton & Halloran, 2005)
Nursing Related Groups (NRG) explain overall care needs in concordance with DRGs

(Fischer, 2002)

Literatur


Conclusions/Recommendations

- Significant quality improvements by using classifications
- Implement NNN into EHRs
- Include linkages: diagnoses, interventions, outcomes into EHR
- Interactive, automated nursing assessments and reports
- Include Nursing Diagnoses to DRG-based funding models

THANK YOU!

Literature: www.pflege-pbs.ch
Measurement Instrument Q-DIO

Content validity: Expert validation
- 100% agreement on key-concepts and items
- 88.25% interrater agreement on scores given

Internal consistency: Cronbach’s alpha < 0.83
- Nursing Diagnoses as Process = 0.83
- Nursing Diagnoses as Product = 0.97
- Nursing Interventions = 0.90
- Nursing Outcomes = 0.98

23. Acute, changing diagnoses are assessed daily or from shift to shift; enduring diagnoses are assessed every fourth day

24. The nursing diagnosis is reformulated

25. The nursing outcome is documented

26. The nursing outcome is observably/measurably documented according to NOC

27. The nursing outcome shows
   - improvement in patient’s symptoms
   - improvement of patient’s knowledge state
   - improvement of patient’s coping strategies
   - improved self-care abilities
   - improvement functional status

28. There is a relationship between nursing sensitive patient outcomes and nursing interventions

29. Nursing outcomes and nursing diagnoses are internally related

7 Items, maximum score = 28, mean = 4

Total items 28
### Measurement Instrument Q-DIO

#### Nursing diagnoses as product

<table>
<thead>
<tr>
<th>Item</th>
<th>Statement</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Nursing problem/nursing diagnosis label is documented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Nursing diagnosis label is formulated according to NANDA and numbered</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>The etiology (E) is documented</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>The etiology (E) is correct, related/ corresponding to the nursing diagnosis (P)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>16</td>
<td>Signs and symptoms are formulated</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>17</td>
<td>Signs and symptoms (S) are correctly related to the nursing diagnosis (P)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>18</td>
<td>The nursing goal relates/ corresponds to the nursing diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>19</td>
<td>The nursing goal is achievable through nursing interventions</td>
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<td></td>
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</table>

**3 Items, maximum score = 32, mean = 4**

#### Nursing interventions

<table>
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<tr>
<th>Item</th>
<th>Statement</th>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>Concrete, clearly named nursing interventions according to NIC are planned</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(what will be done, how, how often, who does it)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>The nursing interventions affect the etiology of the nursing diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Nursing interventions carried out, are documented (what was done, how, how often, who did it)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**5 Items, maximum score = 12, mean = 4**