STUDENT'S DECISION MAKING USING AN EDUCATIONAL MODEL FOCUSED ON PATIENT SAFETY

DEVELOPING NURSES THINKING (DNT) MODEL

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**PURPOSE**

The *purpose* of this presentation is to describe the theoretical framework and use of the DNT model in facilitating student nurses' diagnostic reasoning and clinical decision making in the context of patient safety.
BACKGROUND

- Clinical decision making is complex.
- Accurate interpretation of patient data facilitates effective interventions.
- Nursing programs should teach students how to make clinical decisions in the context of patient safety.
- Faculty should use evidence-based teaching methods.
- Nurses play a major role in patient safety.
DEVELOPING NURSES’ THINKING (DNT) MODEL

- Constructs
  - Patient safety
  - Domain knowledge
  - Critical thinking processes
  - Repeated practice
- Operationalized through corresponding worksheets
DEVELOPING NURSES’ THINKING (DNT) MODEL

CRITICAL THINKING PROCESSES

- Logical Reasoning
- Creativity
- Open Mindedness
- Intellectual Integrity
- Transforming Knowledge
- Intuition: Pattern Recognition
- Reflection
- Analyzing
- Information Seeking

Assess Notice
Patient Data

Hypotheses Generation

Identify Diagnose
- Patient’s Problem(s)
- Risk States
- VALIDATE
  Defining Characteristics
  Related Factors
  Risk States

Plan
Plan of Care
Implement
Interventions

Evaluate
Patient Data

PATIENT SAFETY CONSIDERATION

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DEVELOPING NURSES' THINKING (DNT) MODEL

PATIENT SAFETY CONSIDERATION

CRITICAL THINKING PROCESSES

Inquisitiveness
Logical Reasoning
Creativity
Flexibility
Transforming Knowledge
Intuition: Pattern Recognition
Reflection
Open Mindedness
Intellectual Integrity

Analyzing
Information Seeking

Assess Notice
Patient Data
HR 114

Hypotheses Generation
Anxiety, Infection, Hypoxemia, Bleeding, Pain

Identify Diagnose
- Patient's Problem(s)
- Risk States

Validate Defining Characteristics Related Factors Risk States

Desired outcomes Plan
Plan of Care Implement Interventions

Medicate
Escalate

Reassess
Evaluate Patient Data

Pain Infection
### Developing Nurses' Thinking (DNT) Model

<table>
<thead>
<tr>
<th>Critical Thinking Skills</th>
<th>Patient's presentation and assessment findings</th>
<th>Habits of the Mind</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Analyzing</strong></td>
<td></td>
<td><strong>Confidence</strong></td>
</tr>
<tr>
<td>- Break up the presentation/question into parts (cues) to determine meaning (i.e. normal vs. abnormal).</td>
<td>Are you confident in your reasoning abilities?</td>
<td></td>
</tr>
<tr>
<td>- Identify cues.</td>
<td></td>
<td><strong>Contextual perspective</strong></td>
</tr>
<tr>
<td>- Cluster cues to determine meaning.</td>
<td>Have you considered the entire content of this problem? Age, co-morbidities, medication, etc.</td>
<td></td>
</tr>
<tr>
<td>- Generates hypotheses.</td>
<td></td>
<td><strong>Creativity</strong></td>
</tr>
<tr>
<td><strong>Applying standards</strong></td>
<td></td>
<td>Were you creative when you generated or restructured ideas? Did you think of alternatives?</td>
</tr>
<tr>
<td>- Use research based standards/rules to rule in or rule out hypothesis.</td>
<td></td>
<td><strong>Flexibility</strong></td>
</tr>
<tr>
<td>- NDX defining characteristics, related factors and risk states; patho</td>
<td>Did you consider multiple possibilities? Did you get stuck on one train of thought?</td>
<td></td>
</tr>
<tr>
<td>- Making a judgment as to “fit”</td>
<td></td>
<td><strong>Inquisitiveness</strong></td>
</tr>
<tr>
<td><strong>Discriminating</strong></td>
<td></td>
<td>Were you eager to correctly interpret the situation/problem and did you use observation and thoughtful questioning to explore possibilities?</td>
</tr>
<tr>
<td>- Look for differences and similarities</td>
<td></td>
<td><strong>Intellectual integrity</strong></td>
</tr>
<tr>
<td>- Does this help confirm or disconfirm hypothesis</td>
<td>- Did you use a research-based process and research-based criteria to interpret the situation/problem?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Guessing without a basis for deriving meaning does not count</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Did you recognize anything that seemed familiar from past experiences?</td>
</tr>
<tr>
<td><strong>Information seeking</strong></td>
<td></td>
<td><strong>Open-mindedness</strong></td>
</tr>
<tr>
<td>- Do you need more information to solve this problem? Information from patient/FO? Lab data? Further physical assessment?</td>
<td>- Were you open to other possible interpretations of the situation/data?</td>
<td></td>
</tr>
<tr>
<td><strong>Logical reasoning</strong></td>
<td></td>
<td><strong>Perseverance</strong></td>
</tr>
<tr>
<td>- Draw conclusions</td>
<td></td>
<td>Were you determined to accurately interpret the situation/problem?</td>
</tr>
<tr>
<td>- If this then probably that</td>
<td></td>
<td><strong>Reflection</strong></td>
</tr>
<tr>
<td>- Confirm or disconfirm DX</td>
<td></td>
<td>Did you constantly reflect on your thinking, assumptions, and decisions to assure accurate interpretation of data?</td>
</tr>
<tr>
<td><strong>Predicting</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Predict potential patient problems and envision a plan &amp; desired outcomes.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- How will this prob/plan affect patient safety? If I do this then...</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Transforming knowledge</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- How will you recognize this same concept/problem in other situations?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Identify patient problems and strengths to consider:*

**Possible Problems**

**Possible Strengths**

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**Critical Thinking Skills and Habits of the Mind**  
(Scheffer and Rubenfeld, 2000)
Developing Nurses’ Thinking (DNT) Model

Problem sheet: these can be NANDA (decreased cardiac output), possible medical problem (infection, MI), or description of the problem (change in mental status)

<table>
<thead>
<tr>
<th>Problem</th>
<th>Confirming Characteristics</th>
<th>Disconfirming</th>
<th>Patient Safety</th>
<th>Expected Outcomes</th>
<th>Interventions/ Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
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</tbody>
</table>

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Study 1: Use of the DNT Model during 2 Weeks of Clinical Post Conference

- **Study hypothesis:**
  - Students who are taught and practice use of the DNT model will have improved diagnostic accuracy compared to those who do not use the DNT model. (Lunney Scores, Lunney 2001)

- **Design:**
  - Quasi experimental, control & treatment groups, Pre/Post test

- **Sample:**
  - N = 83 students in first clinical semesters from 2 schools

- **Measurement:**
  - Diagnostic Accuracy using validated case studies, student perceptions
# Results

- **Sample characteristics (N = 83)**

<table>
<thead>
<tr>
<th>School 1</th>
<th>Pretest</th>
<th>Age</th>
<th>Gender</th>
<th>Education</th>
<th>ESL</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 47</td>
<td>p = .001</td>
<td>p = .001</td>
<td>p = .253</td>
<td>p = .335</td>
<td>p = .023</td>
</tr>
<tr>
<td></td>
<td>2.03(1.19)</td>
<td>&lt; 21 (11%)</td>
<td>F = 79%</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; deg. 83%</td>
<td>Eng 1&lt;sup&gt;st&lt;/sup&gt; 64%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>21-30 (66%)</td>
<td>M = 21%</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; deg. 17%</td>
<td>Eng 2&lt;sup&gt;nd&lt;/sup&gt; 36%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 30 (23%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School 2</td>
<td>3.28(1.17)</td>
<td>&lt; 21 (78%)</td>
<td>F = 89%</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; deg. 92%</td>
<td>Eng 1&lt;sup&gt;st&lt;/sup&gt; 86%</td>
</tr>
<tr>
<td>n = 36</td>
<td></td>
<td>21-30 (22%)</td>
<td>M = 11%</td>
<td>2&lt;sup&gt;nd&lt;/sup&gt; deg. 8%</td>
<td>Eng 2&lt;sup&gt;nd&lt;/sup&gt; 14%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 30 (0%)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Following Randomization into Control and Intervention Groups

<table>
<thead>
<tr>
<th>Control</th>
<th>p = .912</th>
<th>p = .239</th>
<th>p = .300</th>
<th>p = .556</th>
<th>p = .110</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 37</td>
<td>2.55(1.27)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>2.59(1.38)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
HYPOTHESIS: SUPPORTED

• Paired t-test

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Lower CL*</th>
<th>M(SD)</th>
<th>Upper CL*</th>
<th>t(DF)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posttest-Pretest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>37</td>
<td>-0.49</td>
<td>0.12(1.85)</td>
<td>0.74</td>
<td>0.4(36)</td>
<td>.691</td>
</tr>
<tr>
<td>Posttest-Pretest</td>
<td>46</td>
<td>0.43</td>
<td>0.99(1.89)</td>
<td>1.55</td>
<td>3.56(45)</td>
<td>.001</td>
</tr>
</tbody>
</table>

• Independent sample t-test

<table>
<thead>
<tr>
<th>Treatment</th>
<th>N</th>
<th>Lower CL*</th>
<th>M(SD)</th>
<th>Upper CL*</th>
<th>t(DF)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>37</td>
<td>2.18</td>
<td>2.68(1.48)</td>
<td>3.17</td>
<td>-2.78(81)</td>
<td>.007</td>
</tr>
<tr>
<td>Intervention</td>
<td>46</td>
<td>3.14</td>
<td>3.58(1.45)</td>
<td>4.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• General linear regression
  • Both the treatment (p=.031) and school (.005) impacted diagnostic accuracy however there was no combined effect (p=.31)
  • Students in school 2 had less improvement than students in school 1.
STUDY 2: DEVELOPING NURSES THINKING USING ONLINE STRATEGIES WITH THE DNT MODEL AS PROMINENT STRATEGY IN INSTRUCTION

• Design:
  – Exploratory pilot program

• Sample:
  – Registered nurses completing their BS degrees in nursing enrolled in 2 sections of an online Clinical Decision Making class

• Measurement:
  – Diagnostic accuracy *(pre test, post test)*
  – Student perceptions
    – Clinical decision making abilities in the context of patient safety *(exit survey, focus group)*
    – Usefulness of the DNT model to guide clinical decision making *(exit survey, focus group)*
    – Impact of class on actual patient care *(focus group)*
RESULTS

• Diagnostic accuracy:
  o n = 21
    o Some improvement in accuracy scores: however not significant (p=.3 Wilcoxon)
    o Patient problem descriptions in the post test were more comprehensive

• Student perceptions
  o Usefulness of the DNT model to guide clinical decision making
    o 31/32 identified use of DNT model as an effective framework to analyze patient conditions and plan care
  o Clinical decision making abilities in the context of patient safety
    o 32/32 students identified safety as integrally related to making clinical judgments and felt that their diagnostic reasoning skills had improved
RESULTS

• Focus group: N=3
  ○ Themes:
    ○ patient safety is a critical component in all nursing plans of care
    ○ not to just “follow doctors orders”
    ○ examples of how they used new thinking habits……..
    ○ importance of instructor engagement and feedback
    ○ online class gave them more time to think
STUDY 2:

- Notable findings.
  - The DNT model can be effectively taught and used by students in an online format.
  - Students expressed their satisfaction with using a framework to breakdown the diagnostic reasoning process.
  - At the end of the class students wrote more comprehensive nursing diagnoses suggesting that they were using diagnostic reasoning skills learned during the class.
  - Evaluation of registered nurses’ diagnostic accuracy may need to be measured using a more comprehensive format.
  - Instructor engagement, particularly in responding to discussion board posts, may improve student perception of the importance of all other teaching strategies used during the course.
NURSING FUNDAMENTALS

Student Engagement
Patient's presentation and assessment findings

Mary Whittaker is an 82-year-old woman who was admitted to the nursing home after sustaining a broken hip following a hospital admission for pneumonia. She has been adjusting well to her new surroundings and has made a friend on the unit with whom she shares meals. Her family, a son and daughter, visit her every week.

PMH: Chronic Obstructive Pulmonary Disease, Hypertension, and Arthritis. She denies any history of smoking but states that her deceased husband used to smoke "a lot." She ambulates with a cane because of knee pain.

Over the past 4 days, Ms. Whittaker has had nasal congestion and a loose, non-productive cough! Shift report included the following:
- Max: 94.8/m, BP 120/80, pulse 84, respirations 20. She was given antihistaminic and nebulized treatment during the first shift for chest congestion and wheezing. It was effective.

Current assessment findings are as follows:
- Vital Signs: BP 130/80, pulse 100, respiratory rate 24, temperature 98.6 degrees.
- Respiratory assessment reveals bilateral scattered rhonchi throughout lung fields.
- Patient is afebrile. She has a non-productive loose cough.

Unusual finding: At risk for future pneumonia.
- Risk factors: Not specific at risk for respiratory problems.
- Good coping.
- Social support.
- Pain.
- Fatigue.
- Laboratory test results.
- Education / Breathing sounds.
<table>
<thead>
<tr>
<th>Problem</th>
<th>Confirming</th>
<th>Disconfirming</th>
<th>Does this problem affect patient safety? If yes how?</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>I HC</td>
<td>Adventitious breath sounds</td>
<td>Absent cough</td>
<td>Risk to Patient Safety</td>
<td>Assess vital signs every 15 mins.</td>
</tr>
<tr>
<td>Ineffective Airway Clearance</td>
<td>Changes in respiratory rate 20 to 25</td>
<td>Cyanosis</td>
<td>Give intravenous fluids.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ineffective cough</td>
<td>Hypoxemia</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Orthopnea</td>
<td>Difficult ventilation</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Retained secretions</td>
<td>Dyspnea</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>Excessive secretions</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Wide-eyed</td>
<td>Restlessness</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
<tr>
<td>BP</td>
<td>Nausea</td>
<td>Oxycephalia</td>
<td>Fluids hydration.</td>
<td></td>
</tr>
</tbody>
</table>

I B P = nothing
IMPLICATIONS FOR USE OF DNT MODEL

- Supports recommendations of QSEN and IOM
- May help students and nurses interpret patient data and develop effective thinking habits in context of patient safety
- May be used throughout curriculum
- Further research needed: generalizable results, number of repeated practice necessary to realize improvement and mastery
**Student Perceptions: Use of DNT Model**

“When I first entered the nursing program I felt a bit lost. I was pretty much always an A student but my usual methods of studying and thinking were not as helpful. After using the model I noticed it was easier to identify priority risks and interventions, while still keeping me aware of other potential problems. Because it is a way of thinking, it is a tool that I can use in the classroom, at the clinical site and while taking an exam. For me, the DNT model has been an essential part of the curriculum.”

Marisol Rivera
Nursing Student
THANK YOU, DĚKUJU, VIELEN DANK, KÖSZÖNÖM!!!!

REFERENCES

- Please contact mary.tesoro@lehman.cuny.edu for a full reference list.