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**CURRICULAR CONSTRUCTION WITH VEE HEURISTICS:  
LINKING SCIENTIFIC THEORY AND SKILL PERFORMANCE**

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Introduction

Educators realize the significance of theory driven critical thinking for students as they learn skill performance in laboratory experiments, technical skills, and practice professions. In order for skill performance to take on rational meaning, the learner needs to be able to identify the specific scientific theory base upon which skill performance is built. Consequently, educators stress connecting underlying scientific theory and skill performance.

Students at the State University of New York at Binghamton's Decker School of Nursing are taught nursing skills in an upper division nursing major after completing two years of prerequisite work including natural sciences courses. Knowledge of physics, anatomy, physiology, biology, microbiology is fundamental to nursing as a practice profession (Smith, 1992). Theoretical input from the sciences should guide nursing students to understand concepts, principles, and theories so as to clarify rationales for nursing practice ("more than mere knowledge of the reasons") (Akinsanya, 1987, p. 272).

In addition to the emphasis on theory driven practice, teaching skills focuses on accurate performance which is essential to safe practice. However, students often are motivated simply to do procedurally driven, rote mode steps of a skill rather than theory driven performance of that skill. Teaching and learning strategies are needed which foster theory driven skill performance.

Theoretical Framework

This paper is based on the cognitive educational theories of Ausubel, Novak & Hanesian (1986) and Novak and

Gowin (1984) which claim (a) meaningful learning occurs when new knowledge is connected to prior knowledge in ways that strongly link the two, and (b) links between theory and practice can be constructed with the use of Vee heuristics.

Although many curricula include prerequisite courses, students often do not make connections between prior course content and present course work. When learning is focused on skill acquisition, learners typically are more comfortable with rote mode performance than recalling and integrating prior theoretical knowledge with the new knowledge.

To guide students to identify and build on scientific theory learned in prerequisite courses, students can be taught skill performance with a strategy that connects theory and practice, namely the Vee heuristic, which concretely identifies the theory and practice components of a given skill. Concepts, principles, theories and philosophies are specified on the left side of the Vee which forms the theory base undergirding practice. The right side of the Vee denotes the actual performance criteria of the skill by recording the event (observing the skill performance), transforming the data (evaluating the performance), making knowledge claims (identifying each step of the skill to be performed), and value claims (validating the worth of the performance). Fundamental to the Vee is the focus question (how to perform a skill) which is answered by the educative event (learning accurate skill performance). The interconnectedness of theory and practice in the Vee reinforces the theory driven nature of the procedure.

#### Methodology

Research Questions: Are students who are taught the practice of basic skills in a simulated college laboratory setting with Vee heuristics rather than with traditional modes better able to (1) identify the scientific theory base for specific [nursing] skills, and (2) perform basic [nursing] skills in practiced situations.

Research Design: The research was quasi-experimental with a nonequivalent control group design (n=42). Three instructors each taught weekly labs for a semester long nursing practice course in (a) a traditional mode (demonstration, practice, return demonstration), and (b) a treatment mode (demonstration, practice and return demonstration with the discussion of instructor-made Vees about weekly skills). Short answer questionnaires were administered in which students were asked to state the underlying scientific principles for ten skills. Qualitative analysis of answers was based on inclusion of specific theoretical knowledge from the natural sciences. Analysis of variance (SAS general Linear Models Procedure) was used controlling for groups and instructors (see Appendix A). Taped clinical interviews were conducted to collect subjective data from students who learned with Vee heuristics. Return demonstrations of skill performances were studied to see if performance was significantly different for students taught with traditional or treatment modes.

As part of the research, extensive Vee heuristics were produced (as shown in Appendix B) for a semester long basic skills course.

### Findings and Implications

Students using Vee heuristics were significantly better able to articulate the scientific principles specifying why actions were appropriate. Students answered ten short answer questions by explaining theoretical principles underlying why certain skills were performed as they were. For example, one question asked "Why do you bend your knees and shift your weight when moving a client up in bed?" Answers ranged from vague replies such as "to be more steady" to clearly articulate understanding of principles such as "bending the knees lowers center of gravity and shifting weight keeps the line of gravity over the base of support both of which increase stability". Analysis of variance for the short

answers (Appendix A) indicates the mean of responses for all ten short answer questions given by all students. Students who learned with Veas gave answers that were significantly better (with a level of significance of  $p=.005$ ).

TABLE  
 Analysis of Variance for Short Answers  
 (SAS General Linear Model Procedure)  
 By Group and Instructor  
 (n=42)

Short Answer Questions	$\bar{X}_C$	$\bar{X}_t$	F	p
1 Body mechanics	2.77	3.65	5.44	.03 *
2 Palpation of pulses	2.77	3.60	5.23	.03 *
3 Orthostatic hypotension	2.64	2.70	.02	.90
4 Clean/sterile gloves	3.28	3.40	.07	.79
5 Choice of stethoscope	2.55	3.60	5.97	.02 *
6 Pressure sores	2.59	3.40	3.10	.09
7 Skin inspection	2.41	2.90	4.30	.05 *
8 Blood pressure	3.09	3.75	2.63	.11
9 Percussion technique	2.09	3.35	7.17	.01 *
10 Isolation precautions	3.41	2.65	2.34	.14
Mean of Short Answers	2.76	3.30	8.98	.005 *

\*  $p<.05$

(Note: This table also appears as Appendix A.)

Data from taped clinical interviews showed that students felt positively about learning with Vee heuristics (81%). Student response to instructor-made Vee heuristics included such comments as "Veas helped make me see why we do it, and what's not so important", "Veas pointed out exactly why;... I need to know why I do things; used them to review for the mid term", and "since I learn by figuring out, they helped me to see why to do certain things".

Students who learned with Vee heuristics did not perform skills significantly better in return demonstrations. Satisfactory performance of specific skills was necessary to pass the course and proceed to sequential nursing courses.

The researcher was not surprised that all students performed skills satisfactorily since students practiced in a mastery learning mode until able to perform skills satisfactorily. What cannot be understood by the educator observing a skill performance is the theoretical meaning underlying the action. Actions with theoretical bases are theory driven rather than procedurally driven. Without an accurate theory base, student could perform steps of a procedure accurately but not understand the significance of the actions. Consequently, when critical thinking and judgement are necessary in actual patient care situations, students performing without theory driven skill performance may chose an unsafe performance alternatives.

The implication for teaching and learning skill performance is that a strategy is available which advances meaningful learning by linking prior scientific knowledge to present learning. Vee heuristics help students see the interrelationships between prerequisite natural science courses and skill performance. The incorporation of theory into practice results in theory driven skill performance.

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APPENDIX A

TABLE

Analysis of Variance for Short Answers  
(SAS General Linear Model Procedure)  
By Group and Instructor  
(n=42)

Short Answer Questions	$\bar{X}_C$	$\bar{X}_t$	F	p
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Mean of Short Answers	2.76	3.30	8.98	.005 *

\* p<.05



APPENDIX B

FOCUS QUESTION for week #3:

How can a nurse begin mobilizing a patient safely?

THEORY

PRACTICE

PHILOSOPHY:

Humans want to feel healthy and secure.

THEORY:

Theory of gravity.  
Body system homeostasis.  
Physiology of cardiovascular system.

PRINCIPLES:

1. Body constantly attempts to maintain homeostasis.
2. Baseline data is necessary to evaluate change accurately.
3. Rapid position change may not allow for body' homeostatic mechanisms to occur efficiently enough to avoid orthostatic hypotension [O.H.]
4. O.H. can be a physiologic response of moving from prolonged lying to sitting "dangling".
5. O.H. occurs when veins dilate and blood pools in muscles, extremities and abdominal spaces so that adequate blood supply cannot circulate to brain tissues.
6. Inadequate circulating blood volume results in pallor and decreased blood pressure.
7. Body response to decreased circulation blood volume is an increased heart rate for faster circulation of blood available.
8. Decreased oxygen supply to brain tissue results in dizziness and fainting.

CONCEPTS:

Homeostasis, Blood pooling  
Dangle, Vasodilation  
Orthostatic hypotension  
Dizziness, Fainting, Pallor

VALUE

CLAIMS:

Anticipating untoward patient responses:  
a. avoids injury.  
b. validates the quality of nursing judgments.

KNOWLEDGE

CLAIMS:

1. Assess patient's color and pulse before "dangling".
2. Make position changes (lying to sitting to standing) gradually.
3. Assess patient's dizziness, pulse, skin color and moistness as soon as in sitting position.
4. If untoward effects noted, return patient to lying position and check for decreased blood pressure.
5. Wait to repeat "dangling" more gradually.

TRANSFORMATIONS:

Performance evaluation.

RECORDS OF

EVENTS:

Observe nurse.

EVENT:

"Dangle" the immobilized patient.

**FOCUS QUESTION** for weeks #1 [plus 3,5]:  
How can the nurse maintain  
his/her own safety while working?

THEORY	PRACTICE
<p><u>PHILOSOPHY:</u> Nurses value own well being.</p> <p><u>THEORY:</u> Theories of gravity, physics, physiology.</p> <p><u>PRINCIPLES:</u></p> <ol style="list-style-type: none"> <li>1. A line of gravity which goes through the base of support increases stability.</li> <li>2. A broad base of support increases stability.</li> <li>3. A low center of gravity increases stability.</li> <li>4. Bending knees while standing forces use of thigh muscles.</li> <li>5. Large muscles can move weight with less strain than small muscles.</li> <li>6. Energy is needed to overcome inertia.</li> <li>7. Lifting to oppose force of gravity uses more energy than pulling.</li> <li>8. Fulcrums applied to levers reduce force needed for lifting.</li> </ol> <p><u>CONCEPTS:</u> Safety, (Line of) gravity Base of support (width) Fulcrum, Stability Center of gravity Muscle strain Muscles (large, small) Muscle Energy Inertia</p>	<p><u>VALUE CLAIMS:</u></p> <ol style="list-style-type: none"> <li>1. The greater the nurse's stability, the safer she/he and patient are.</li> <li>2. Accountability for safety increases quality of care.</li> </ol> <p><u>KNOWLEDGE CLAIMS:</u></p> <ol style="list-style-type: none"> <li>1. Keep weight being moved close to you.</li> <li>2. Keep elbows near body by lowering side rails when moving patients.</li> <li>3. Shift weight from one foot to other when moving objects.</li> <li>4. Spread feet to about the width of your shoulders when moving/lifting.</li> <li>5. Bend knees when moving/lifting.</li> <li>6. Use large muscles rather than small muscles to (upper arms versus hands, hands versus fingers, thighs versus back) move/lift.</li> <li>7. Do not bend, stretch or twist small back muscles.</li> <li>8. Use one continued smooth move rather than several short moves.</li> <li>9. Pull an object rather than lift it.</li> </ol> <p><u>TRANSFORMATIONS:</u> Performance evaluation. Nurse's report of discomfort.</p> <p><u>RECORD OF EVENT:</u> Observe nurse working.</p>
<p><b>EVENT:</b> Nurse uses own body when working.</p>	

**FOCUS QUESTION** for week 2 [plus 8]:  
How does the nurse  
maintain sterile technique?

THEORY	PRACTICE
<p style="text-align: center;"><u>PHILOSOPHY:</u> Healthy state is valued.</p> <p style="text-align: center;"><u>THEORY:</u> Physics, Biology, Nightingale's nursing theory.</p> <p style="text-align: center;"><u>PRINCIPLES:</u></p> <ol style="list-style-type: none"><li>(1) A sterile object or field is free of all microorganisms and spores.</li><li>(2) Unobserved sterile fields cannot be assumed to remain sterile.</li><li>(3) Gravity causes microorganisms to fall on a sterile field when a non sterile object is held over it.</li><li>(4) Microorganisms migrate from area to area by direct contact, air currents or gravity.</li><li>(5) Microorganisms from mouth or nose spread into air with coughing, sneezing or talking.</li><li>(6) Microorganisms do not move easily from one side of a dry surface to another; rather they travel slowly along the surface.</li><li>(7) When a sterile field becomes wet, capillary action draws microorganisms from non sterile to sterile surface.</li></ol> <p style="text-align: center;"><u>CONCEPTS:</u> sterile field, sterile indicators sterile technique/asepsis contamination, sterilization capillary action, air currents microorganisms; spores migration, gravity</p>	<p style="text-align: center;"><u>VALUE CLAIMS:</u> Proper nursing actions prevent infections and their spread.</p> <p style="text-align: center;"><u>KNOWLEDGE</u> <u>CLAIMS:</u></p> <ol style="list-style-type: none"><li>(1) Check packages labeled sterile for expiration indicators, tears and wetness.</li><li>(2) Face sterile field.</li><li>(3) Keep sterile field no lower than waist or table height.</li><li>(4) Do not reach (or hold unsterile objects) over sterile field.</li><li>(5) Do not touch sterile objects or fields with non sterile/contaminated objects.</li><li>(6) Do not talk, cough or sneeze over sterile field.</li><li>(7) Assume one inch border around sterile field is contaminated.</li><li>(8) Discard a sterile field which is wet.</li></ol> <p style="text-align: center;"><u>TRANSFORMATION:</u> Performance evaluation.</p> <p style="text-align: center;"><u>RECORD OF EVENT:</u> Observe nurse using surgical asepsis.</p>
<p style="text-align: center;"><u>EVENT:</u> Nurse uses surgical asepsis.</p>	

**FOCUS QUESTION for week #2:**

How does the nurse  
maintain a clean environment?

THEORY

PHILOSOPHY:

Health/cleanliness are  
valued.

THEORY:

Physics, Biology,  
Nightingale's nursing  
theory.

PRINCIPLES:

- (1) Microorganisms are present on all matter unless adequate sterilization has occurred.
- (2) Microorganisms are transferred when touched or moved in air currents.
- (3) Presence of microorganisms may lead to disease.
- (4) A physical barrier decreases spread of microorganisms.
- (5) Friction loosens micro-organisms from a surface.
- (6) Soap lowers surface tension.
- (7) Water flushes loosened micro-organisms away.

CONCEPTS:

Microorganisms Pathogens  
Physical barriers (gown,  
gloves, mask)  
Isolation precautions  
Clean field  
Sterile field  
Friction  
Soap

PRACTICE

VALUE CLAIMS:

Proper nursing actions  
decreases spread of  
germs.

KNOWLEDGE CLAIMS:

- (1) Wash hands vigorously before and after any patient care, and when ever soiled.
- (2) Work from clean to dirty areas.
- (3) Do not:
  - a. hold linens against your nurse's uniform.
  - b. shake linens.
  - c. put patient's linen on another patient's bed, chair etc.
  - d. put linens on floor.
- (4) Maintain isolation precautions as follows:
  - a. mask near air borne and droplet microorganisms.
  - b. glove if hands are in contact with pathogens.
  - c. gown if uniform may contact pathogens.
  - d. use non permeable material when touching blood or body secretions.

TRANSFORMATION:

Performance evaluation.

RECORD OF EVENT:

Observe nurse using  
medical asepsis.

EVENT:

Nurse uses medical asepsis.

FOCUS QUESTION for week #3:

How does nurse safely transfer  
patient from bed to chair?

THEORY

PHILOSOPHY:

Nurses are  
competent care givers.

THEORY:

Theories of gravity,  
physiology, physics, and  
psychology.

PRINCIPLES:

1. Prior understanding  
decreases anxiety.
2. Sitting with feet flat  
on floor gives patient  
sense of balance and  
orientation.
3. Leading with  
unaffected side allows  
for "dragging" affected  
side.
4. Use of proper body  
mechanics avoids  
injuries.
5. Hinge joints may flex  
without control if  
muscles are weak.
6. Pivoting uses less  
energy than walking.
7. Abnormal assessments  
indicate health  
deviations.

CONCEPTS:

Anxiety  
Body mechanics  
Hinge joints  
Pivoting  
Leading  
Unaffected side

PRACTICE

VALUE CLAIMS:

Being out of bed has  
psychological and  
physical  
benefits for patient.

KNOWLEDGE CLAIMS:

1. Explain procedure  
patient.
2. Position patient in  
sitting position with  
feet flat on surface.
3. Assess patient for  
anxiety or orthostatic  
hypertension.
4. Place chair so patient  
can lead with  
unaffected side and  
pull affected side (if  
applicable).
5. As patient stands,  
support his/her weight  
and shift own weight  
from front to back  
foot.
6. Maintaining good body  
mechanics.
7. Support patient's  
knees.
8. If patient is weak  
pivot from bed to  
chair.
9. Assess patient after  
transfer.

TRANSFORMATION:

Performance evaluation.

RECORD OF EVENT:

Observe nurse moving the  
patient.

EVENT:

Transfer patient from "dangling"  
position (on edge of bed) to chair.

FOCUS QUESTION for week #5:

How does the nurse assess the patient's skin during the bath?

THEORY:

PHILOSOPHY:

Nurses are patient advocates.

THEORY:

Human anatomy and physiology, Nightingale's theory.

PRINCIPLES:

1. Pressure between bony prominences and external sources decreases blood supply to skin and underlying tissue.
2. Decreased blood supply to skin and underlying tissue [ischemia] leads to cell and tissue death [necrosis].
3. Moist skin is more likely to macerate than dry skin.
4. Chapped, overly dry skin is likely to crack.
5. Lesions which break skin integrity produce pathways for microorganisms to enter the body.
6. Texture of skin may be related to amount of moisture within skin and underlying tissue.
7. Abnormal accumulation of body fluid in interstitial spaces [edema] may result from inadequate venous circulation [return of blood to heart].
8. Heart pumping against gravity increases likelihood of edema in extremities positioned below heart [dependent edema].

CONCEPTS:

Bony prominence, Ischemia  
Necrosis, Asymmetric, Edema  
Supple, Tenting, Turgor  
Lesion, Pressure, Macerate  
Protocol, Dependent Edema

EVENT: Nurse assesses patient's skin.

PRACTICE:

VALUE CLAIM:

Assessment and intervention of health problems avoid further problems.

KNOWLEDGE CLAIMS:

1. Assess skin for progression of ischemia and necrosis.
  - a. red [as capillaries try to compensate for pressure in specific area by dilating]
  - b. then pale [decreased blood supply from pressure]
  - c. black [rotted tissue]
2. Reposition immobile patient intermittently at least every two hours.
3. Use pillows, rolls and special mattresses to support body parts and avoid pressure.
4. Assess skin turgor, contour and moistness.
5. Keep skin clean, dry, supple and separated from other skin surfaces.
6. Document open lesions and follow established protocols for treatment.
7. Assess for abnormal and asymmetric swelling.
8. Elevate extremities of immobilized patient to/or above heart level to help avoid dependent edema.

TRANSFORMATIONS:

Performance evaluation.

RECORD OF EVENT:

Observe nurse bathing patient.

FOCUS QUESTION for week #6 [plus 7,8]  
How can the nurse  
auscultate the patient?

<u>THEORY</u>	<u>PRACTICE</u>
<p><u>PHILOSOPHY:</u> Nurses are patient advocates.</p> <p><u>THEORY:</u> Theory of physics (sound conduction).</p> <p><u>PRINCIPLES:</u></p> <ol style="list-style-type: none"><li>1. A closed cylinder will transmit sound waves (vibrations) from source and up the column.</li><li>2. Vibrations under the skin can be transmitted to the nurse's ear via a closed cylinder.</li><li>3. The longer and thinner the cylinder, the more distortion of sound waves will occur.</li><li>4. Any vibration contacting the closed cylinder system will be transmitted up the column.</li><li>5. Sounds are altered when the movement of sound waves is interrupted.</li><li>6. A firm diaphragm (flat surface) on the skin and attached to closed cylinder best transmits high pitched sounds and (screens out low pitched sounds).</li><li>7. A concave (bell curved surface) pressed lightly to skin and attached to closed cylinder best transmits low pitched sounds.</li></ol> <p><u>CONCEPTS:</u> Cylinder, Auscultate Sound waves (vibrations) Distortion, Bell end piece Diaphragm end piece High/low pitches</p>	<p style="text-align: center;"><u>VALUE</u></p> <p><u>CLAIMS:</u> Assessment of abnormalities is first step in problem solving.</p> <p style="text-align: center;"><u>KNOWLEDGE</u></p> <p><u>CLAIMS:</u></p> <ol style="list-style-type: none"><li>1. Place stethoscope on areas to be auscultated while listening to sounds.</li><li>2. Use stethoscope with short, thick tubing.</li><li>3. Use one or two fingers to touch only the end piece.</li><li>4. Do not allow stethoscope tubing to touch or rub against anything.</li><li>5. Use diaphragm end piece with firm pressure to hear high pitched sounds.</li><li>6. Use bell end piece with light pressure to hear low pitched sounds.</li></ol> <p><u>TRANSFORMATION:</u> Performance evaluation.</p> <p style="text-align: center;"><u>RECORD OF</u></p> <p><u>EVENT:</u> Observe nurse.</p>
<p><u>EVENT:</u> Nurse auscultates patient.</p>	

FOCUS QUESTION for week #4 [plus 5,6,7,8,13,14,15]  
How does the nurse palpate the patient?

THEORY

PRACTICE

PHILOSOPHY:

Nurses are patient advocates.

THEORY:

Theories of physiology, earth science, psychology.

PRINCIPLES:

1. Touching patient is a physical invasion of his/her space.
2. Palpation uses the sense of touch through hands and fingers:
  - a. finger pads are especially sensitive due to numerous nerve endings.
  - b. palmer surfaces and finger pads are sensitive to discriminating textures, consistencies and size.
  - c. ulnar surfaces are especially sensitive to vibrations.
  - d. dorsal surfaces are especially sensitive to crude temperatures.
3. Palpations provide touch sensitivity for varying depths:
  - a. light: < than .5 inch (1cm)
  - b. deep: < than 2 inches (4cm)
4. Deep palpation may illicit pain or movement of tissue/fluid with subsequent patient fear.
5. Touch sensitivity is decreased during application of deep pressure.
6. Skin temperature reflects amount of blood under skin, metabolism and exposure.

CONCEPTS:

Space invasion, Vibrations  
Palpation (light/deep)  
Sensitivity, Finger pads  
Palmer surface, Ulnar surface  
Dorsal surface, Temperature  
Texture, Masses

VALUE CLAIM:

Assessment of abnormalities is first step in problem solving.

KNOWLEDGE CLAIM:

1. Introduce self and explain plans before touching patient.
2. Use gentle warm hands with short fingernails.
3. Use palmer surface and finger pads to feel for masses, texture, moisture, consistency.
4. Use ulnar surface when feeling vibrations.
5. Use dorsal surface to assess crude temperatures.
6. Do light palpation before deep palpation.
7. Palpate tender areas last.
8. Use non dominant hand to apply pressure over relaxed dominant hand for deep palpation.

TRANSFORMATION:

Performance evaluation.

RECORD OF EVENT:

Observe nurse.

EVENT:

Nurse palpates parts of patient.



FOCUS QUESTION for week 4 [plus 5,6,7,8,13,14,15]

How does the nurse inspect the patient?

THEORY

PHILOSOPHY:

Nurses are patient advocates.

THEORY:

Theories of physiology and psychology.

PRINCIPLES:

1. Actions and body language reflect meanings and emotional states.
2. Inspecting some parts of the body is an invasion of privacy.
3. Inspection uses the senses of sight and smell.
3. Adequate visibility is needed for accurate observation.
4. Knowledge of baseline data ("normals") gives basis to assess change.
5. Inspection may include measurements to quantify observations.
6. Opposite lateral sides of the body are crudely symmetric unless an abnormality exists.
7. Skin color reflects:
  - a. pigmentation.
  - b. quality and quantity of underlying blood flow.
8. Contour changes reflect fluid accumulation, displacement or masses in underlying tissue.

CONCEPTS:

Inspection, Body language  
Baseline/"normals", Edema  
Quantified observation  
Color (pigmentation)  
Displacement, Turgor  
Contour, Symmetry  
Orifice, Blood flow  
Lesions, Temperature

EVENT:

Nurse inspects patient.

PRACTICE

VALUE CLAIMS:

Assessment of abnormalities is first step in problem solving.

KNOWLEDGE CLAIMS:

1. Observe patient's actions and body language.
2. Expose body areas to be inspected adequately with good light.
3. Maintain patient privacy by:
  - a. only exposing areas being inspected.
  - b. close door/curtain to indicate to others to signal (knock) prior to entering.
4. Look and smell when inspecting skin, lesions and orifices.
5. Assess area for color, contour, odor and size.
6. Obtain baseline data from patient, chart, and/or actual measurements.
7. Compare left and right sides of body for symmetry when appropriate.

TRANSFORMATION:

Performance evaluation.

RECORD OF EVENTS:

Observe nurse.

FOCUS QUESTION for week #7 [plus 8]:

How does the nurse percuss his/her patient?

THEORY

PHILOSOPHY:

Nurses are patient advocates.

THEORY:

Theory of physics (sound conduction).

PRINCIPLES:

1. Percussion ("tapping") produces vibrations (sound waves moving through underlying tissue).
2. Prolonged finger or hand contact on area vibrated will dampen (slow) sound waves.
3. Percussion tones are related to density of matter as it vibrates.
4. Loudness of tone is inversely proportional to density of matter:
  - a. tympany (loudest): over gas bubbles (ie, stomach).
  - b. hyperresonant: over air filled lungs (ie, emphysemic lungs).
  - c. resonant: over "normal" lungs.
  - d. dullness: over fluid filled or solid organ or mass (ie, cyst, liver, tumor).
  - e. flat (softest): over solid and dense mass (ie, bone, muscle).

CONCEPTS:

percuss, tone, density  
vibration, sound waves  
tympany, hyperresonant  
resonant, dull, flat

PRACTICE

VALUE CLAIM:

Assessment of abnormalities is first step in problem solving.

KNOWLEDGE CLAIM:

1. Percuss body parts to assess density of air, fluid or solid matter in underlying tissue.
2. To percuss directly, tap tip of one finger directly on patient's skin.
3. To percuss indirectly, tap tip of one finger on the only finger of other hand which lies firmly on patient's skin.
4. Use short, sharp, rapid tap which originates from snap of loose wrist action or a percussion hammer.

TRANSFORMATION:

Performance evaluation.

RECORD OF EVENT:

Observe nurse.

EVENT:

Nurse percusses parts of body.

**FOCUS QUESTION** for week # 7:

How does the nurse assess  
a patient's respirations?

**THEORY:**

**PHILOSOPHY:**

Nurses are patient  
advocates.

**THEORY:**

Theory of physiology/anatomy  
of respiratory system.

**PRINCIPLES:**

1. Air passing through healthy  
respiratory tract causes  
rhythmic, soft, rustling  
sounds which are bilaterally  
equal upon auscultation.
2. Air passing through  
moisture causes intermittent  
crackly sounds upon  
auscultation.
3. Air passing around  
obstructions causes coarse  
musical sounds upon  
auscultation.
4. Air passing around an  
obstruction in an upper  
airway causes a harsh,  
inspiratory "crow" heard  
without auscultation.
5. Accessory chest muscles  
facilitate expansion and  
contraction of lungs.
6. Sudden onset of cyanosis  
indicates acute inadequate  
tissue perfusion of  
oxygenated blood.

**CONCEPTS:**

auscultation, breath sounds  
(bronchial, bronchovesicular,  
vesicular), rales, rhonchi,  
wheeze, stridor, retractions  
cyanosis, hypoxia

**PRACTICE:**

**VALUE CLAIMS:**

Assessment of  
abnormalities  
is first step in  
problem  
solving.

**KNOWLEDGE CLAIMS:**

1. Assess rate,  
rhythm, depth,  
and quality of  
respirations.
2. Assess breathing  
for abnormal  
noises without  
stethoscope.
3. Auscultate  
posterior,  
anterior and  
lateral breath  
sounds  
systematically  
comparing left to  
right.
4. Observe use of  
accessory muscles  
for breathing.
5. Assess skin,  
buccal membranes  
and nail beds for  
color changes.

**TRANSFORMATIONS:**

Performance  
evaluation.

**RECORD OF EVENT:**

Observe nurse.

**EVENT:**

Nurses assess patient's respirations.

**FOCUS QUESTION** for week #6:

How does the nurse assess a patient's blood pressure?THEORY:

PRACTICE:

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**PHILOSOPHY:**

Nurses are patient advocates.

**THEORY:**

Theory of physiology of cardiovascular system.

**PRINCIPLES:**

1. Pulses are vibrations of fluid waves as blood is pumped from heart to arteries.
- 2 a. Systolic pressure reflects maximum pressure exerted on arterial walls as left ventricle contracts [pumps to arteries]  
b. Diastolic pressure reflects pressure of elastic tone in arterial walls when heart is at rest.
3. In a normal cardiovascular system:
  - a. level of cardiac output is directly proportional to level of blood pressure
  - b. level of blood pressure is directly proportional to level of peripheral vascular resistance, vascular elasticity and vasoconstriction
  - c. level of peripheral vascular resistance is inversely proportional to lumen of arteries.
  - d. level of blood pressure is directly proportional to blood volume/viscosity
4. Vasomotor center in brainstem exerts control on level of blood pressure.

**CONCEPTS:**

systolic/diastolic pressure  
elastic tone, lumen (artery)  
vasoconstriction, cardiac output, vasomotor center, peripheral vascular resistance, blood viscosity, volume.

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**VALUE CLAIMS:**

Assessment of abnormalities is first step in problem solving.

**KNOWLEDGE CLAIMS:**

1. Palpate brachial pulse and apply cuff with indicator (arrow) one inch above pulsation.
2. Use cuff which is 20% wider than diameter of arm.
3. Palpate radial artery and inflate cuff 20-30 mm.Hg. above point of pulse disappearance.
4. Read manometer at eye level.
5. Place diaphragm of stethoscope over brachial artery and slowly/smoothly deflate cuff.
6. Note number where:
  - a. first consecutive tapping was heard.
  - b. abrupt muffling (damping) sound heard.
  - c. complete disappearance of sound occurred.
7. Deflate and remove cuff before documenting.
8. Use thigh with popliteal artery if needed (and expect systolic reading to be 10-40 mm.Hg. higher).

**TRANSFORMATION:**

Performance evaluation.

**RECORD OF EVENT:**

Observe nurse.

EVENT: Nurse checks patient's blood pressure.