Second National Doctors of Nursing Practice Conference: Defining Ourselves

The Confidence and Competence of Nurse Practitioners interpreting 12-lead ECGs and Identifying Acute Changes.

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Objectives

1. Identify significant findings on an electrocardiogram that indicate signs of Acute Coronary Syndrome
2. Describe the preliminary findings of a study examining the confidence of Nurse Practitioners in interpreting an electrocardiogram
3. Discuss the competence of Nurse Practitioners in interpreting an electrocardiogram and identifying acute changes present in Acute Coronary Syndrome

Introduction of the Problem

- Coronary artery disease is the leading cause of death in the United States (Anderson et al., 2007).
- It is estimated for the year 2009 that 785,000 Americans will have a new coronary attack and 470,000 will have recurrent attacks (Lloyd-Jones et al., 2008).
- The diagnosis of coronary artery disease is often made through the subtle changes in an electrocardiogram (12-lead ECG or EKG).

Introduction of the Problem

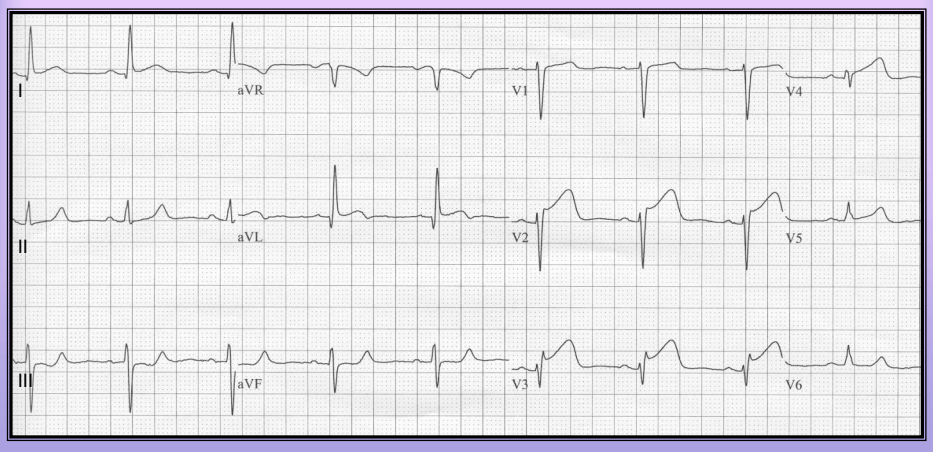
- Nurse Practitioners, as primary care providers need to:
  - Identify ECG changes
  - Interpret findings
  - Diagnose conditions
  - Develop treatment plans
  - Refer patients to specialists as appropriate.

Introduction of the Problem

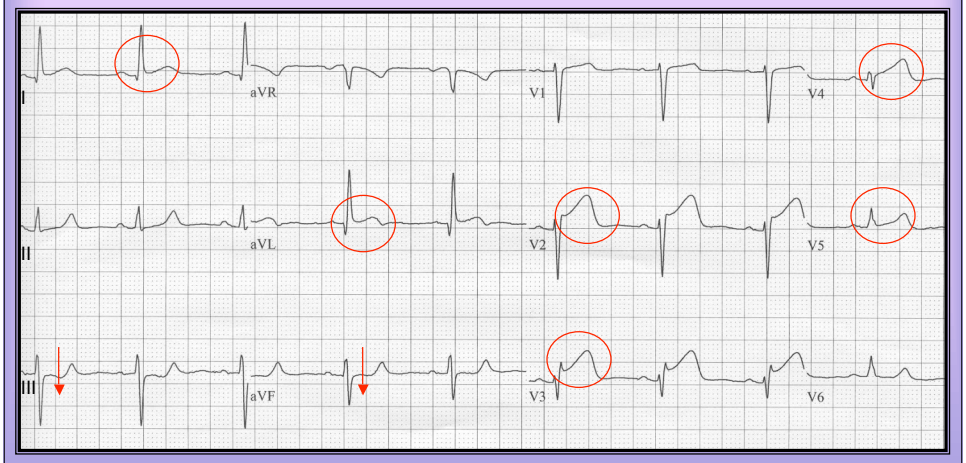
- Acute Coronary Syndrome (ACS)
- The term is a term used to describe:
  - Acute Myocardial Infarction (AMI also referred to as MI)
    - ST Elevation MI (STEMI)
    - Non ST Elevation MI (NSTEMI)
    - Q wave MI
  - Unstable Angina (UA)

(Lloyd-Jones et al., 2008)

Question: Does this ECG show changes found in Acute Coronary Syndrome?



Answer: Yes
Acute extensive anterior and high lateral MI

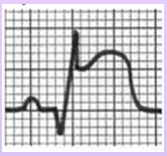


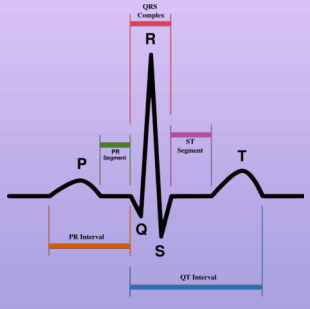
Rhythm: normal sinus rhythm
Waveform: ST↑ V2-5, I, aVL; slight ST ↓ III, aVF; poor R-progression V1-4

Interpretation: Acute extensive anterior and high lateral MI

Introduction of the Problem

- What Represents Acute Changes?
- Changes on a 12-lead ECG seen during Acute Coronary Syndrome events include
  - Changes in the ST segment
  - Q waves
  - T waves changes





Problem Statement

- The ECG results have considerable implications (including choice of treatment options – Emergency vs conservative).
- The accurate recording and precise interpretation of the ECG are critical (Kligfield et al., 2007).
- Patients presenting with chest pain, suspected ACS or cardiac risk factors should have an ECG performed and interpreted as soon as possible to determine the presence or absence of ST elevation which guides treatment options (Anderson et al., 2007; Antman et al., 2004; Lloyd-Jones et al., 2008).
- NP's must be able to identify changes that indicate myocardial injury or ischemia; and know when to observe, treat or refer, the patient based upon clinical presentation and the ECG findings.

Problem Statement

- To date there are no research studies that examine NP confidence or competence in interpreting ECGs.
- It is well documented that patients presenting with chest pain require rapid diagnosis through interpretation of the 12-lead ECG (Antman et al., 2004; Antman et al., 2008; Anderson et al., 2007).
- Rapid identification, treatment and transfer to the catheterization laboratory lead to reduction in myocardial infarction size, decreased hospital length of stay and reduce overall hospital cost (Khot et al., 2007).

Conceptual Framework

- Based on model by Evans and Donnelly (2006)
- Describes the relationship between knowledge, skill and judgment in nursing practice.
- The model is built on Benner's novice to expert framework (1984).
- A skill cannot stand alone; it is always supported by knowledge and judgment.
- Interrelationship is dynamic, as experience grows, placement along the novice to expert continuum increases, supported through evidence-based practice

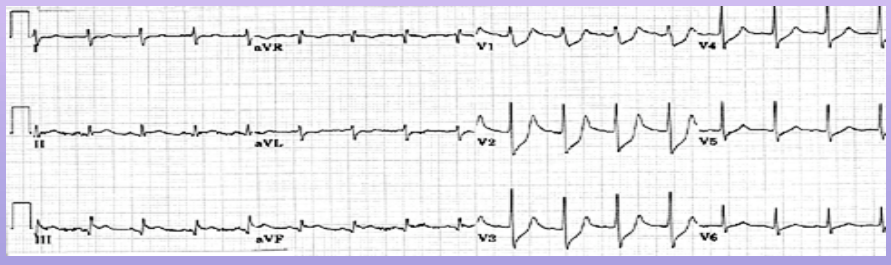
Confidence and Competence as it relates to Knowledge, Skill and Judgment

Nurse Practitioner Confidence and Competence of in Interpreting 12 Lead ECG and Identifying Acute Changes

Knowledge	Skill	Judgment
Knowledge of basic electrocardiography must exist to understand and interpret the ECG tracing **Confidence = VAS** Confidence in Knowledge **Competence Sample ECGs** Test for Knowledge **Correct interpretation of the ECG = Knowledge**	Skill is the application of the knowledge. The ability to perform the interpretation of the ECG **Confidence = VAS** Confidence in Skill **Competence Sample ECGs** Test for Skill **Correct interpretation of the ECG = Skill**	Judgment is the explanation of findings (interpretation) and the determination if acute changes exist. **Confidence = VAS** Confidence of Judgment **Competence Sample ECGs** Test for Judgment **Identification that acute changes exist = Judgment**

Purpose of the Study

- The purpose of the study was to explore the confidence and competence of nurse practitioners in identifying acute changes in a 12-lead ECG.



Research Questions

1. What is the level of NP self rated confidence in interpreting a 12-Lead ECG and identifying acute changes?
2. What is the competence of NPs in interpreting a 12-lead ECG and identifying acute changes when tested using a sample of five 12-lead ECG tracings?
3. Is there a relationship between NP confidence and competence in interpreting 12-lead ECGs and identifying acute changes?

Setting and Sampling

- Conducted during the American Academy of Nurse Practitioners 24th National Conference, Nashville Tennessee on June 17-21, 2009
- Convenience sample
  - Inclusion Criteria: NPs who currently practice in areas that care for the adult population.
    - E.g. family practice, adult, acute care, gerontology and women's health.
  - Exclusion Criteria: Pediatric and neonatal NPs

Instruments

Confidence
Measured with a Visual Analogue Scale (VAS)

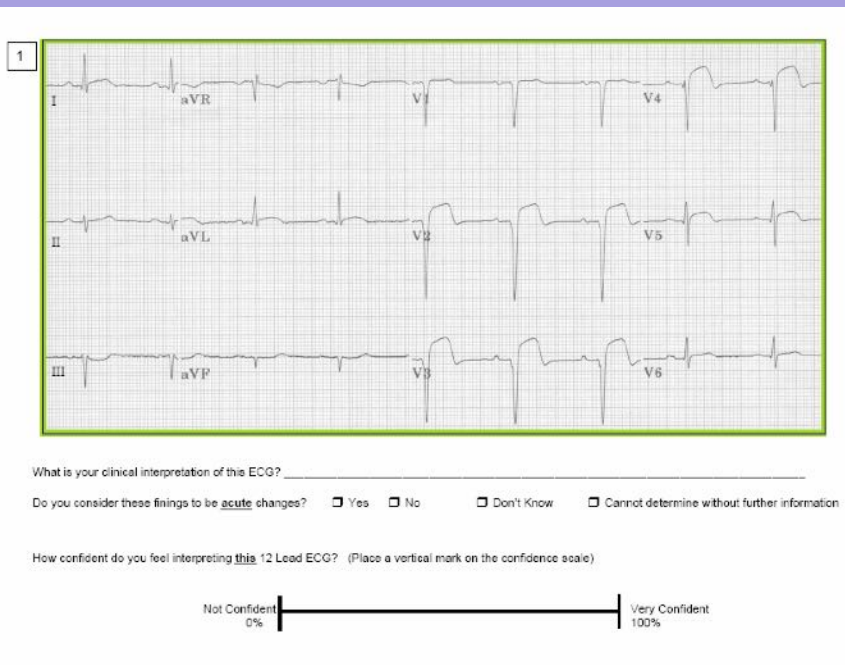
- NPs self-rated confidence in interpreting 12-lead ECGs and identifying acute changes.
  - How confident do you feel at interpreting 12-lead ECGs?
  - How confident do you feel at identifying acute changes?
  - Additionally, a confidence scale was attached to each of the five 12-lead ECG sample in the survey.
  - Score range 0-100 mm (also = 0-100%)

Instruments

Five tracings of 12-lead ECGs

- Demonstrated common abnormalities found in ACS and an imposter rhythm (left bundle branch block)
  - Abnormalities included ST elevation, ST depression and T-wave abnormalities.
- Each ECG had two questions
  - 1) What is your interpretation of this 12-Lead ECG?
  - 2) Do you identify acute changes?
- The ECG tracings were reviewed by a panel of clinical experts for accurate interpretation prior to the survey
- Each ECG interpretation was awarded one point for a correct interpretation and one point for correct identifications of acute changes.

Score for competency: 0-10 (maximum of 2 points/ECG tracing)



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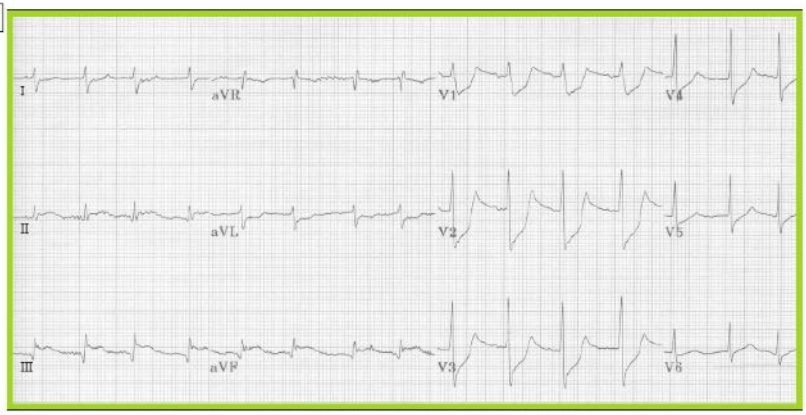


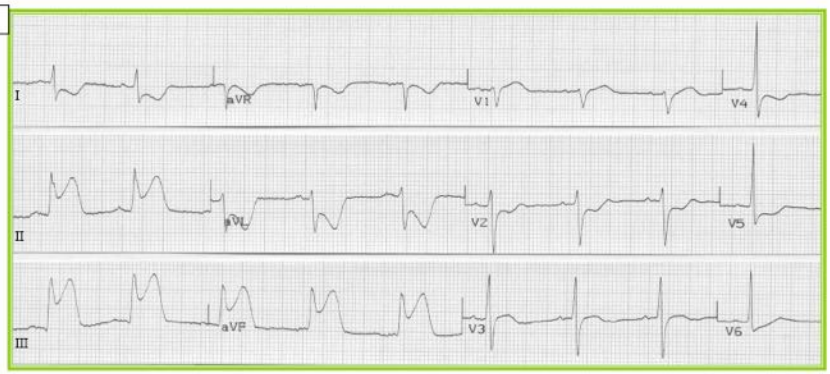
What is your clinical interpretation of this ECG? _____

Do you consider these finings to be acute changes? ❒ Yes ❒ No ❒ Don't Know ❒ Cannot determine without further information

How confident do you feel interpreting this 12 Lead ECG? (Place a vertical mark on the confidence scale)

Not Confident 0% — Very Confident 100%

3



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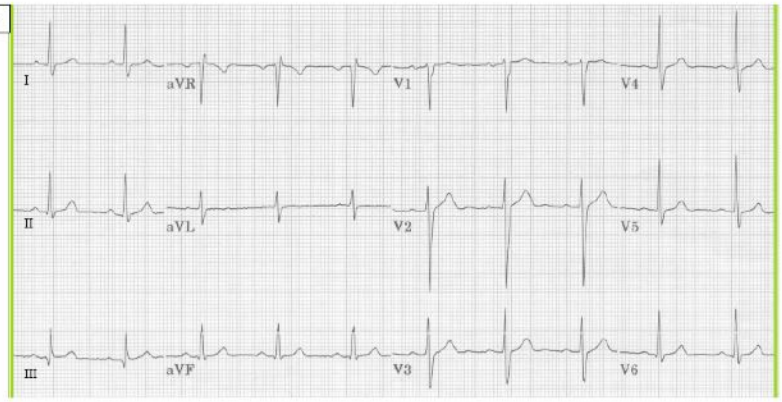

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5

What is your clinical interpretation of this ECG? _____

Do you consider these finings to be acute changes? ❒ Yes ❒ No ❒ Don't Know ❒ Cannot determine without further information

How confident do you feel interpreting this 12 Lead ECG? (Place a vertical mark on the confidence scale)

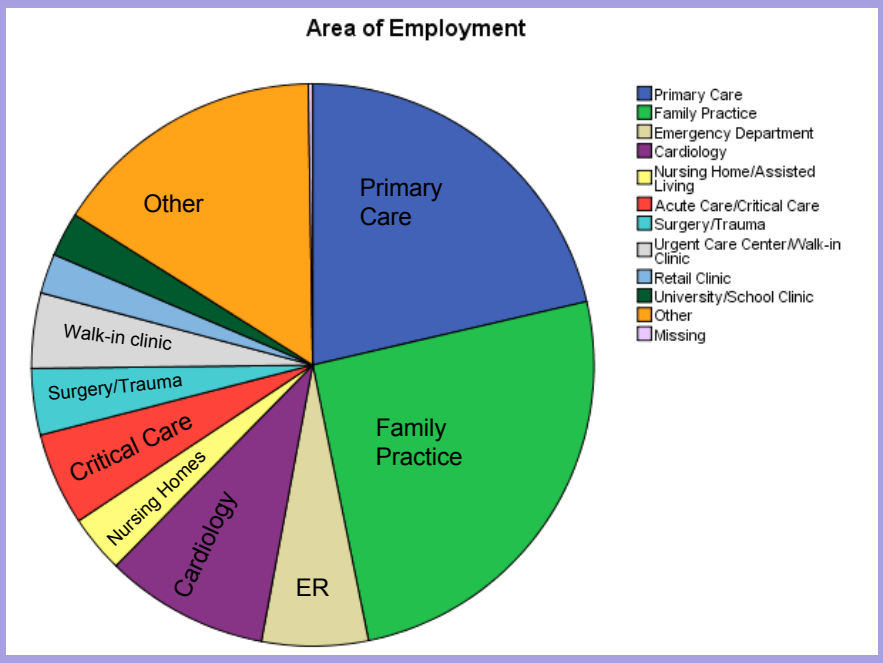
Not Confident 0% — Very Confident 100%

Data Management

- Participants completed survey at a table in one of the common areas of the conference. They were not guided in answering the survey and were asked not to discuss the survey with others
- All responses were evaluated using the pre-determined acceptable responses to ECG interpretation developed by the expert panel during tool validation
- Data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) software
- IRB, exempt approved. Protection of human participants was considered throughout

Preliminary Results

- 430 = Surveys collected at AANP national conference
  - 16 = missing data (>25%)
  - 11 = students (not currently practicing as NP)
  - 10 = NPs not currently practicing (excluded)
- **393 = Total surveys included in the study**
- Sample characteristics
  - Age - Range 25-67 (mean 47 years)
  - Gender - 92% Female and 8% Male
  - Years of experience as NP - Ranged 0-28 (mean 7 years)
  - NP Specialty - Majority were FNPs (72%)



Preliminary Results

- 64% of NPs report being responsible for interpreting ECGs in their practice
- How often do NPs order 12-lead ECGs?
  - 24% > Daily
  - 31% = 1-4 a week
  - 25% 1-4 times a month
  - 21% Rarely or never

- 64% of NPs have an ECG machine in their practice

Preliminary Results

Confidence Level

- Global confidence scores – Overall confidence that NPs self rated using the visual analogue scale (range 0-100%)
  - NPs report being **47%** confident (on a scale of 0-100) in interpreting 12-lead ECGs (SD 28.5)
  - NPs report being **57%** confident (on a scale of 0-100) at identifying acute changes on a 12-lead ECG (SD 30.3)

- These data were normally distributed based on skewness and kurtosis scores with fell acceptable parameters

Preliminary Results

- Overall Score of Competency (0-10)
  - Correct Interpretation = 35%
  - Correct Identification of Acute Changes = 61%

ECG and basic interpretation	Correct Interpretation	Correct Identification of Acute Changes
ECG #1 (Anterio-lateral MI)	34%	65%
ECG #2 (Inferio-posterior MI)	19%	68%
ECG #3 (Acute Inferior MI)	34%	75%
ECG #4 (Normal Sinus Rhythm)	67%	79%
ECG #5 (Left BBB with ST changes)	22%	18%

Problem ECGs

- ECG 2 Inferioposterior - Large anterior reciprocal depression distracted acute findings (19%)
- ECG 5 LBBB – problem identifying if it was an acute change (18% correct)

Questions still to Answer

- Is there any association between confidence and competence regarding ECG interpretation?
- Are responses correlated with NP characteristics of age, gender, or specialty practice?
- Does the NP specialty or the past experience as an RN dictate the ability of the NP in areas such as ECG interpretation?

Summary and Discussion

- The purpose of the study was to explore the confidence and competence of nurse practitioners in identifying acute changes in a 12 Lead ECG; data are still being analyzed.
  - What skills are necessary for NP practice?
    - Do you think that adult and family NPs should be competent in ECG interpretation?
    - How should competence be defined?
      - Recognition of abnormal or specific ability to interpret acute changes?
  - How are competence and confidence related in your practice?

The findings support the need for further research in this area!

Your suggestions welcome!

Thank you!

Please see References
(slides to follow)

Thank you to my committee at Case Western Reserve University, Frances Payne Bolton School of Nursing: Dr. Evelyn Duffy DNP, ANP, GNP, FAANP, Dr. Chris Winkleman PhD, RN and Dr. Theresa Campo DNP, NP-C.

A special thank you to Dr. Frank Yanowitz MD, cardiologist from the University of Utah, who provided the 12 lead ECGs used in this study.

Thank you to the expert panel: Dr. Frank Yanowitz MD, Dr. Querubin P. Mendoza MD, Carmen Lopez ARNP, Karen Santiago ARNP, and Tom Ahrens DNS CCNS FAAN

References

- Anderson, J. L., Adams, C. D., Antman, E. M., Bridges, C. R., Califf, R. M., Casey, D. E., et al. (2007). ACC/AHA 2007 guidelines for the management of patients with unstable angina/non ST-elevation myocardial infarction: A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines. *Circulation, 116*(7), e148-304.
- Antman, E. M., Anbe, D. T., Armstrong, P. W., Bates, E. R., Green, L. A., Hand, M., et al. (2004). ACC/AHA guidelines for the management of patients with ST-elevation myocardial infarction: A report of the American College of Cardiology/American Heart Association task force on practice guidelines. *Circulation. 110*(9), e82–292.
- Antman, E. M., Hand, M., Armstrong, P. W., Bates, E. R., Green, L. A., Halasyamani, L. K., et al. (2008). 2007 Focused Update of the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction. *Circulation, 117*(2), 296-329.
- Evans, R. J., & Donnelly, G. W. (2006). A model to describe the relationship between knowledge, skill, and judgment in nursing practice. *Nursing Forum, 41*(4), 150-157.

References

- Kligfield, P., Gettes, L., Bailey, J., Childers, R., Deal, B., Hancock, E., et al. (2007). Recommendations for the standardization and interpretation of the electrocardiogram: Part I: The electrocardiogram and its technology: A scientific statement from the American Heart Association Electrocardiography and Arrhythmias Committee, Council on Clinical Cardiology; the American College of Cardiology Foundation; and the Heart Rhythm Society endorsed by the International Society for Computerized Electrocardiology. *Circulation, 115*(10), 1306-1324.
- Khot, U., Johnson, M., Ramsey, C., Khot, M., Todd, R., Shaikh, S., et al. (2007). Emergency department physician activation of the catheterization laboratory and immediate transfer to an immediately available catheterization laboratory reduce door-to-balloon time in ST-elevation myocardial infarction. *Circulation, 116*(1), 67-76.
- Lloyd-Jones, D., Adams, R., Carnethon, M., De Simone, G., Ferguson, T. B., Flegal, K. et al. (2009). Heart disease and stroke statistics - 2009 update. A Report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. *Circulation.* Published on-line December 15, 2008. Retrieved on December 20, 208 from http://circ.ahajournals.org/cgi/content/abstract/CIRCULATIONAHA.108.191261v1

