# Measuring Sensitive Nursing Outcomes in Patient with Acute Myocardial Infarction: Tool Development and Validation

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**ABSTRACT**

***Context:*** The outcomes movement is a young science; improving care by determining the outcomes of nursing interventions will give scientific validity to strategies used by nursing in various venues. Cardiovascular nurses contribute significantly to health outcomes and frequently assume responsibility for the clinical and organizational processes to ensure positive outcomes for patients and families.

***Aims:*** This study aimed to identify nursing-sensitive outcomes in patients with acute myocardial infarction, to develop a tool to measure nursing-sensitive outcomes of caring patients with myocardial infarction, and to evaluate the content, face validity, reliability, and nursing sensitivity of 46 nursing-sensitive outcomes concerning bio-psycho-socio-educational aspects of care for patients with myocardial infarction from the Nursing Outcomes Classification (NOC).

***Methods:*** A survey research design was used in this study to assess the content and face validity of the designed instrument, and inter-rater reliability was utilized to assure its reliability. Thirty patients with acute myocardial infarction were subjected to measuring their nursing-sensitive outcomes during their stay in the CCUs or intermediate units. Fifty-nine experts were invited to participate in this study. Nursing-Sensitive Outcomes Measuring Scale was developed and subjected to testing reliability, validity, and sensitivity.

***Results:*** Most of the studied outcomes showed a high degree of consistency, as indicated by ICC above 0.900. 100% of the experts rated 14 out of 46 outcomes as very important; the remaining outcomes were assessed by more than 75% of the experts as important. Also, 18 out of 46 outcomes were rated by the 100% experts as very sensitive to the contribution of nursing intervention; no one outcome was rated as not important or not sensitive for nursing contribution.

***Conclusions:*** The study provided evidence of outcomes content validity, reliability, and nursing sensitivity of the studied outcomes. The study recommended the testing of NOC outcomes in various clinical settings with appropriate training for nurses and the inclusion of NOC into nursing curricula to be utilized in clinical education as a continuum for nursing diagnoses classification.

***Keywords:*** Nursing Sensitive Outcomes, acute myocardial infarction, tool development, validation

## 1. Introduction

The restructuring of the health care system to increase economic efficiency has resulted in an emphasis on measuring healthcare delivery systems' outcomes. Although these measures can improve care delivery and provide information about health practice and organizational outcomes, the interventions and outcomes of nursing care are not readily apparent in most evaluation systems. As the nursing profession struggles to retain its identity in a health care system restructured for greater efficiency, the need for nursing to define its interventions and outcomes has never been greater *(Johnson & Maas 1997).* For the nursing profession to become a full participant in clinical evaluation, it is essential that patient outcomes are influenced by nursing care identified and measured *(Lower & Burton 1989; Marek, 1989; Jennings, 1991).*

The systematic use of patient outcomes to evaluate health care began when Florence Nightingale recorded and analyzed health care conditions and patient outcomes during the Crimean War *(Lang & Marek, 1990; Salive, Mayfield, &Weissman, 1990).* Since that time, attempts to identify, measure, and use patient outcomes in the evaluation of health care delivery have been sporadic, often discipline-specific, and commonly focused on physician practice *(Johnson & Maas, 1997*). The use of patient outcomes to evaluate nursing care quality began in the mid-1960s when *Aydelotte (1962)* used changes in behavioral and physical characteristics of patients to evaluate the effectiveness of nursing care delivery systems. Since that time, additional patient outcome measures have been developed and tested for nursing *(Heater, Becker, & Olson 1988)*, and a variety of patient outcomes have been used to evaluate the quality of nursing care and the effects of nursing interventions *(Lang & Clinton, 1984; Sovie, 1989; Nylor, Munro & Brotoon, 1991).*

Nursing-sensitive patient outcomes represent a comprehensive standardized language used to describe the patient outcomes responsive to nursing interventions. Nursing outcomes with more specific indicators enable the nurse to assess the effects of interventions *(Johnson & Maas, 1997).* The nursing outcomes classification (NOC) is complementary to taxonomies of the North American Nursing Diagnosis Association (NANDA) *(North American Nursing Diagnosis Association, 1994; Rantz & LeMone, 1995),* and the Nursing Intervention Classification (NIC) *(Iowa Intervention Project, 1996).* The NOC completes the nursing process elements. The NOC taxonomy is a three-level coded organized struc-

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ture that currently includes 540 nursing-sensitive outcomes, categorized into 34 classes and seven domains. Each outcome includes a label name, a definition, a set of indicators that describe specific patient, caregiver, family, or community states related to the outcome, and a 5-point Likert-type measurement scale, which assist nurses in evaluating and quantifying patient status concerning a particular outcome *(Johnson, Maas, & Moorhead 2000; Johnson, Moorhead, Mass,& Reed 2003; Moorhead, Swanson, Johnson, and Mass, 2018).*

"Outcomes" has become a popular word in contemporary health care. This emphasis on identifying and measuring the results of interventions and practice is noteworthy, necessary, and has important implications for cardiovascular nursing practice *(Deaton, 1998).* As reported by *Whiteman et al. (2002),* with the cardiac patients constituting a large portion of hospitalized patients, improving the outcomes of patients with the cardiovascular disease requires the best efforts of nurses and other health care providers in multiple settings and roles and working collaboratively with families and patients. According to *Crane (1991)*, nursing has a foundation of outcomes management and research on which to build and the much-needed perspective of viewing patients as individuals and people and not merely as organs, diseases, conditions, and disabilities.

Myocardial infarction (MI) continues to be a significant health care issue because of its prevalence *(Robinson, 1999)* and high mortality, as about 45% of MI patients will die – half of them before reaching a hospital *(Beth, & Catherine, 2002).* The incidence of complications after myocardial infarction has been estimated to range from 14-95 percent, with overall one-month mortality of 30 percent *(Hubbard, 2003).*

Besides, symptoms are usually sudden and may not adhere to the classic chest pain scenario, which can cause treatment delays and tragic outcomes *(Beth & Catherine, 2002).* As the treatment options improve the survival rate, an increasing number of individuals have to learn how to adjust to this major life event and prevent a recurrence. Recovery can also be difficult, many patients experience emotional distress, fear of dying, and family turmoil, fail to return to work when physiologically capable of doing so, are unable to return to their previous levels of sexual activity, and are not capable of making the necessary diet and exercise changes *(Robinson, 1999).*

Cardiovascular nurses contribute significantly to health outcomes and frequently assume responsibility for the clinical and organizational processes to ensure positive outcomes for patients and families. Nurses have provided evidence for practices that influence outcomes and have studied patient outcomes related to mortality, morbidity, quality of life, psychological and physical functioning, symptoms, and family responses *(Dunbar, Funk, Wood, & Valderrama, 2004).*

Acute management strategies continue to limit the infarct size as “time is muscle." In contrast, holistic approaches to the patient and family adjustments must target seeking prompt treatment when symptoms present, psychological adjustment, stress reduction, and patient and family education for self-care and risk reduction. As hospital length of stay for acute MI patients decreases, health care professionals must provide an interdisciplinary, collaborative approach to ensure that the at-risk MI patient provided all of the information and support needed to lead a satisfying, productive, healthy life. An excellent way for nurses to address this challenge and lead the effort would be to develop a network of care for the at-risk MI patients *(Robinson, 1999).*

## 2. The significance of the study

There is a demand for more accountability and concurrent development of quality improvement programs, a need to examine outcomes beyond morbidity and mortality, and a challenge to provide higher quality care using more cost-effective approaches. Patient outcomes have been referred to as the "ultimate definition of effectiveness and efficiency.” Quality nursing care of the patient with myocardial infarction is realized following the evidence-based practice, and new evidence emerges. The framework for the patient's holistic care following myocardial infarction encompasses a comprehensive assessment, planning, intervention, and evaluation process. Accountability for patient outcomes is a fundamental responsibility of professional nurses. Defining clinically useful and measurable patient outcomes sensitive to nursing intervention is essential for efforts to determine the effectiveness and improve the quality of nursing care. A vital beginning for this effort is to estimate whether the outcomes have content validity and whether experts judge them as sensitive to nursing intervention.

## 3. The aim of the study

The present study aims at measuring nursing-sensitive patients’ outcomes in patients with acute myocardial infarction through:

-Identifying nursing-sensitive patient outcomes in patients with myocardial infarction
-Developing a tool to measure nursing-sensitive outcomes of a patient with myocardial infarction.
-Determining the validity, reliability, and nursing sensitivity of the developed instrument.

### 3.1. Operational definitions

*Nursing-Sensitive outcomes* are the outcomes that are influenced by nursing interventions,

*Nursing sensitivity* is defined in this study as the degree to which an outcome or indicator is subject to the influence of nursing interventions relative to interventions of other health professionals.

## 4. Subjects & Methods

### *4.1. Research design*

A survey research design was used in this study to assess the content and face validity of the designed instrument. Inter-rater reliability was utilized to assure the reliability of the designed tool.

### *4.2. Research setting*

The research was conducted at Coronary Care Units, intermediate care units in Ain Shams University Hospitals, Dar El-Shifa Hospital, and Cleopatra Hospital.

### *4.3. Subjects*

Thirty patients admitted to the settings mentioned above, diagnosed with acute myocardial infarction, were subjected to measuring their nursing-sensitive outcomes during their stay in the CCUs or intermediate units. Fifty-nine experts were invited to participate in this study, 20.3% of them were having a Masters's degree in medical-surgical nursing and working in CCUs for not less than five years, and 79.7% had a Ph.D. in nursing science. Among them, 11.1% were professors of medical-surgical nursing, (31.9%) were assistant professors in medical-surgical nursing, 26.1% were lecturers of medical-surgical nursing employed by faculties of nursing, 10.6% were lecturers of critical care, Vaxjo University, Sweden, they were visiting Egypt according to an agreement between Vaxjo, and October 6

University.

### *4.4. Tools of the study*

#### 4.4.1. Nursing-Sensitive Outcomes Measuring Scale

It has been developed (guided by the Nursing Outcome Classification System NOC developed by Iowa University Project published in 1997 and refined by 2000) to measure nursing-sensitive outcomes related to different aspects of caring for acute myocardial infarction patients. It includes 46 nursing-sensitive outcomes covering bio-psycho-socio-educational dimensions of patient care.

The outcomes are distributed under six main classifications: physiological health, functional health, psychosocial outcomes, health knowledge and behaviors, perceived health, and family health. Each of the six main classifications included main categories to be assessed to determine the patient's condition (e.g., physiologic health includes main categories such as cardiopulmonary, elimination, fluid and electrolyte, nutrition, and therapeutic response).

Each main category is then classified as outcomes (e.g., physiological health, with its main category; cardiopulmonary) includes six outcomes: cardiac pump effectiveness, circulation status, vital signs status, and tissue perfusion: cardiac, tissue perfusion: peripheral, and coagulation status). The outcomes are then indicated by some indicators to be assessed by the nurses to identify the results of their interventions. The classification and coding system kept the same as the NOC system designed by *(Iowa outcome Project, 2001)*.

#### 4.4.2. Expert Opinionnaire

It was designed by the researchers to explore the nurses' expert opinion regarding content, face validity, and sensitivity of the outcomes to nursing interventions. It was divided into three parts:

#### 4.4.2.1. First to measure content validity

The opinionnaire format presented each of the nursing-sensitive outcome concepts and definitions with indicators listed beneath. Experts rated each outcome on a three-point Likert- type scale for the importance of the outcome to measure the nursing contributions to acute myocardial infarction patient progress. The experts also rated the indicators of each outcome for the importance of the indicator for determining the outcome. The scale used to rate outcomes and indicators' importance was 1= not important; 2= important; 3= very important or critical.

#### 4.4.2.2. Second to measure sensitivity.

It was designed to measure the experts' opinions regarding the sensitivity of the outcomes to nursing interventions. Experts rated the sensitivity of each outcome and indicator to the contributions of nursing intervention. The scale used to rate the contribution of nursing to patient progress comparatively to the participation of other health care professionals was 1= no contribution (not sensitive), 2= some contribution (sensitive), and 3= contribution is mainly nursing (very sensitive).

#### 4.4.2.3. Third to measure face validity

It was designed to measure the face validity of the instrument. Experts were requested to either agree or disagree with the correctness, comprehensiveness, clarity, adequacy, the relevance of the Nursing Sensitive Outcome Measuring Scale (NOMS). The questionnaire included spaces for free comments and suggestions about the NOMS.

### *4.5. Procedures*

The nursing process was utilized as a theoretical framework for this study. An extensive review of the literature was done to explore all nursing diagnoses experienced by patients with acute myocardial infarction through their clinical pathway. A linkage was made between the collected nursing diagnoses and the related outcomes in the NOC *(Johnson, & Maas, 1997, Johnson, Mass, Moorhead, 2000)*.

Outcomes for this study selected from the NOC based upon their potential usefulness for evaluating the effect of nursing interventions in caring for a patient with myocardial infarction regarding different health aspects (physiological, functional, psychological, health knowledge and behaviors, perceived health, and family health).

The outcomes and their scales were selected and revised so that the repeated indicators were canceled to mentioned once, the outcomes then reduced to the most critical, clinically prevalent, and most linked to the scope of cardiovascular nursing provided to the AMI patient during acute, intermediate, and convalescent phases of illness based on the pilot work and prior experience of the research team, to ensure ample time for experts to perform rating, to limit the number of outcomes to a number nursing experts were willing to rate, and to assure the feasibility of the instrument in clinical use.

Only the very important and important outcomes appear in the instrument. Official permission was obtained from the heads of the CCUs. The study subjects were met individually to assess their outcomes by the same two researchers at every single session.

### *4.6. Limitations of the study*

A large portion of data measured in the study appeared in the results. However, they could not be presented in the study findings that related to the statistical

analysis of the validity, reliability, and sensitivity of the indicators as they constitute 365 indicators, each of which was rated by the experts for importance and sensitivity and were rated by the researchers for reliability, that need for about 46 tables, for importance, and a similar number for sensitivity. It could not be displayed in such a figure, but it appeared in only the instrument. The experts agreed that the indicators appear in the instrument as very important or important and very sensitive or sensitive to nursing interventions. Intra-rater reliability could not be used in this study because the time spacing between the two measurements of the same rater would be significantly affected by changes in patient condition.

### *4.7. Data analysis*

Data were analyzed to estimate the reliability, validity, and sensitivity of the designed instrument. Limit of agreement (LOA) between the two researchers' measurements utilized to assess the consistency between the two researchers measuring the same outcomes simultaneously. Limit of agreement measuring the size of the differences between the two raters to quantify the difference in measurement. The content validity measured through experts' opinionnaire displayed as pure numbers and percentages.

## 5. Results

The findings of this study classified into three parts: Table 1 shows that all the outcomes had a high degree of consistency between the two researchers, as indicated by the degree of intraclass correlation (ICC), which was above 0.800 in all the measured outcomes.

Table 1a reveals a high degree of consistency as indicated by ICC that was above 0.900 in all the measured outcomes, except for coagulation status 0.881 and nutritional status 0.803, which is still high.

Table 1b reveals a high degree of consistency as indicated by ICC that was above 0.900 in all the measured outcomes, except for energy conservation 0.891, psychomotor energy 0.898, and self-care: activity of daily living 0.801, which also indicated high reliability.

Table 1c reveals a high degree of consistency as indicated by ICC above 0.900 in all the measured outcomes, except health beliefs: perceived ability to perform 0.857.

Table 1d reveals a high degree of consistency as indicated by ICC above 0.900 in all the measured outcomes, except for caregiver adaptation to patient institutionalization 0.844.

Figure 1,2 illustrates the idea of the used statistical test of Limits of Agreement to clarify the consistency between the two researchers (inter-rater reliability).

Table 2 expresses experts' opinions regarding the importance of the outcomes in measuring nursing interventions in caring for patients with myocardial infarction. Table 2a reveals that 100% of the experts agreed that seven outcomes were very important, while 18 outcomes were agreed by more than 75% of the experts as very important. In contrast, acceptance: health status and role performance formed the least agreement in this table (74.58, 72.88 consecutively).

Table 2b reveals that 100% of the experts agreed that seven outcomes are very important, while the remaining 12 outcomes were agreed by more than 75% of the experts as very important.

**Table (1a): Inter-rater reliability regarding physiological outcomes.**

| Outcomes | Item Limits | Mean Difference | Difference Std. Dev. | LOA | | | | Intra Class Correlation ICC | Confidence Interval 95% C.I. of ICC | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower | Upper | Range | % | | | |
| **Cardiopulmonary** | | | | | | | | | | |
| Cardiac pump effectiveness | 17- 85 | -0.200 | 1.636 | -3.407 | 3.007 | 6.414 | 9.4 | 0.995 | 0.991 | 0.997 |
| Circulation status | 6 - 30 | 0.375 | 2.047 | -3.637 | 4.387 | 8.023 | 44.6 | 0.957 | 0.921 | 0.977 |
| Vital signs status | 5 - 25 | 0.000 | 0.392 | -0.769 | 0.769 | 1.538 | 7.7 | 0.977 | 0.957 | 0.988 |
| Tissue perfusion: cardiac | 5 - 25 | -0.125 | 0.911 | -1.911 | 1.661 | 3.572 | 17.9 | 0.975 | 0.953 | 0.987 |
| Tissue perfusion: peripheral | 9 - 45 | 0.150 | 0.533 | -0.896 | 1.196 | 2.091 | 5.8 | 0.955 | 0.918 | 0.976 |
| Coagulation status | 9 - 45 | -0.025 | 0.733 | -1.462 | 1.412 | 2.875 | 8.0 | 0.881 | 0.787 | 0.935 |
| **Elimination** | | | | | | | | | | |
| Bowel elimination | 10 - 50 | -0.100 | 0.955 | -1.973 | 1.773 | 3.745 | 9.4 | 0.960 | 0.927 | 0.979 |
| **Fluids & Electrolytes** | | | | | | | | | | |
| Fluid balance | 7 - 35 | -0.025 | 0.357 | -0.725 | 0.675 | 1.400 | 5.0 | 0.986 | 0.974 | 0.993 |
| Electrolyte & acid-base balance | 10 - 50 | -0.075 | 0.829 | -1.699 | 1.549 | 3.248 | 8.1 | 0.986 | 0.974 | 0.993 |
| **Nutrition** | | | | | | | | | | |
| Nutritional status | 3 - 15 | -0.050 | 1.176 | -2.354 | 2.254 | 4.608 | 38.4 | 0.803 | 0.659 | 0.891 |
| Nutritional status: nutrient intake | 10 - 50 | -0.550 | 1.339 | -3.174 | 2.074 | 5.248 | 13.1 | 0.981 | 0.965 | 0.990 |
| Nutritional status: biochemical measures | 4 - 20 | -0.075 | 0.694 | -1.435 | 1.285 | 2.720 | 17.0 | 0.984 | 0.969 | 0.991 |
| **Therapeutic response** | | | | | | | | | | |
| Medication response | 9 - 45 | 0.025 | 0.862 | -1.664 | 1.714 | 3.379 | 9.4 | 0.985 | 0.972 | 0.992 |

**Table (1b): Inter-rater reliability regarding functional and psychosocial outcomes.**

| Outcomes | Item Limits | Mean Difference | Difference Std. Dev. | LOA | | | | Intra Class Correlation ICC | Confidence Interval | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower | Upper | Range | % | | 95% C.I. of ICC | |
| **Energy maintenance** | | | | | | | | | | |
| Activity tolerance | 9 - 45 | 0.275 | 1.485 | -2.635 | 3.185 | 5.820 | 16.2 | 0.963 | 0.931 | 0.980 |
| Energy conservation | 6 - 30 | 0.025 | 1.609 | -3.129 | 3.179 | 6.308 | 26.3 | 0.891 | 0.804 | 0.941 |
| Rest | 6 - 30 | 0.050 | 0.904 | -1.723 | 1.823 | 3.545 | 14.8 | 0.973 | 0.949 | 0.986 |
| Sleep | 8 - 40 | 0.025 | 1.074 | -2.080 | 2.130 | 4.210 | 13.2 | 0.950 | 0.908 | 0.973 |
| Psychomotor energy | 7 - 35 | -0.325 | 1.730 | -3.717 | 3.067 | 6.783 | 24.2 | 0.898 | 0.816 | 0.944 |
| **Self-care** | | | | | | | | | | |
| Self-care: activity of daily living | 8 - 40 | 0.025 | 0.530 | -1.015 | 1.065 | 2.079 | 6.5 | 0.801 | 0.656 | 0.889 |
| Self-care: non-parenteral medication | 10 - 50 | -0.025 | 1.349 | -2.669 | 2.619 | 5.288 | 13.2 | 0.986 | 0.974 | 0.992 |
| **Psychosocial outcomes** | | | | | | | | | | |
| **Psychosocial wellbeing** | | | | | | | | | | |
| Body image | 7 - 35 | 0.200 | 0.687 | -1.146 | 1.546 | 2.693 | 9.6 | 0.980 | 0.962 | 0.989 |
| Identity | 5 - 25 | -0.225 | 0.733 | -1.662 | 1.212 | 2.875 | 14.4 | 0.971 | 0.945 | 0.984 |
| Self-esteem | 5 - 55 | -0.250 | 0.494 | -1.217 | 0.717 | 1.935 | 3.9 | 0.990 | 0.981 | 0.995 |
| **Psychosocial adaptation** | | | | | | | | | | |
| Acceptance: health status | 4 - 20 | -0.200 | 0.939 | -2.041 | 1.641 | 3.682 | 23.0 | 0.932 | 0.876 | 0.963 |
| Coping | 18 - 90 | 0.200 | 2.066 | -3.849 | 4.249 | 8.097 | 11.2 | 0.971 | 0.946 | 0.985 |
| **Self-control** | | | | | | | | | | |
| Anxiety control | 8 - 40 | 0.275 | 1.109 | -1.899 | 2.449 | 4.348 | 13.6 | 0.966 | 0.937 | 0.982 |
| **Social interaction** | | | | | | | | | | |
| Role performance | 4 - 20 | -0.025 | 0.577 | -1.156 | 1.106 | 2.261 | 14.1 | 0.968 | 0.941 | 0.983 |

**Table (1C): Inter-rater reliability regarding health knowledge and behaviors outcomes.**

| Outcomes | Item Limits | Mean Difference | Difference Std. Dev. | LOA | | | | Intra Class Correlation ICC | Confidence Interval | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower | Upper | Range | % | | 95% C.I. of ICC | |
| **Health behaviors** | | | | | | | | | | |
| Compliance behaviors | 11 - 55 | -0.425 | 0.813 | -2.018 | 1.168 | 3.187 | 7.2 | 0.980 | 0.962 | 0.989 |
| Adherence behaviors | 5 - 25 | -0.100 | 1.215 | -2.482 | 2.282 | 4.764 | 23.8 | 0.950 | 0.908 | 0.973 |
| Symptom control | 10 - 50 | 0.200 | 0.687 | -1.146 | 1.546 | 2.693 | 6.7 | 0.992 | 0.985 | 0.996 |
| Pain control | 9 - 45 | -0.250 | 0.899 | -2.011 | 1.511 | 3.523 | 9.8 | 0.966 | 0.937 | 0.982 |
| **Health beliefs** | | | | | | | | | | |
| Health beliefs: perceived threat | 6 - 30 | 0.275 | 0.987 | -1.659 | 2.209 | 3.868 | 16.1 | 0.974 | 0.952 | 0.986 |
| Health beliefs: perceived control | 5 - 25 | -0.275 | 0.816 | -1.875 | 1.325 | 3.199 | 16.0 | 0.977 | 0.958 | 0.988 |
| Health beliefs: perceived ability to perform | 3 - 15 | -0.150 | 1.099 | -2.304 | 2.004 | 4.308 | 35.9 | 0.857 | 0.747 | 0.922 |
| Health beliefs: perceived resources | 6 - 30 | -0.150 | 0.662 | -1.448 | 1.148 | 2.596 | 10.8 | 0.986 | 0.974 | 0.993 |
| **Health knowledge** | | | | | | | | | | |
| Knowledge: illness care | 8 - 40 | -0.300 | 1.159 | -2.572 | 1.972 | 4.544 | 14.2 | 0.983 | 0.968 | 0.991 |
| Knowledge: health behaviors | 9 - 45 | 0.025 | 0.920 | -1.777 | 1.827 | 3.605 | 10.0 | 0.957 | 0.921 | 0.977 |
| Knowledge: sexual functioning | 1 - 5 | 0.000 | 0.392 | -0.769 | 0.769 | 1.538 | 38.4 | 0.939 | 0.887 | 0.967 |
| **Risk control & safety** | | | | | | | | | | |
| Risk control: cardiovascular health | 12 - 60 | 0.125 | 0.463 | -0.783 | 1.033 | 1.817 | 3.8 | 0.998 | 0.997 | 0.999 |
| Risk control: tobacco use | 10 - 50 | 0.000 | 0.620 | -1.216 | 1.216 | 2.431 | 6.1 | 0.996 | 0.992 | 0.998 |

**Table (1d): Inter-rater reliability regarding perceived and family health.**

| Outcomes | Item Limits | Mean Difference | Difference Std. Dev. | LOA | | | | Intra Class Correlation ICC | Confidence Interval | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Lower | Upper | Range | % | | 95% C.I. of ICC | |
| **Perceived health** | | | | | | | | | | |
| **Health & life quality** | | | | | | | | | | |
| Quality of life | 9 - 45 | 0.050 | 0.749 | -1.41874 | 1.519 | 2.937 | 8.2 | 0.997 | 0.994 | 0.998 |
| Wellbeing | 5 - 25 | 0.000 | 0.847 | -1.66074 | 1.661 | 3.321 | 16.6 | 0.991 | 0.983 | 0.995 |
| Spiritual wellbeing | 10 -50 | 0.050 | 0.316 | -0.56981 | 0.670 | 1.240 | 3.1 | 1.000 | 0.999 | 1.000 |
| **Family health** | | | | | | | | | | |
| **Family caregiver status** | | | | | | | | | | |
| Caregiver adaptation to patient institutionalization | 8 - 40 | 0.025 | 1.000 | -1.93437 | 1.984 | 3.919 | 12.2 | 0.844 | 0.726 | 0.914 |
| Caregiver home care readiness | 14 -70 | -0.050 | 0.597 | -1.22012 | 1.120 | 2.340 | 4.2 | 0.999 | 0.998 | 0.999 |
| **Family wellbeing** | | | | | | | | | | |
| Family coping | 16 - 80 | -0.125 | 0.648 | -1.39503 | 1.145 | 2.540 | 3.4 | 0.999 | 0.999 | 1.000 |

**Figure (1): Example for the limit of agreement between the two researchers.**

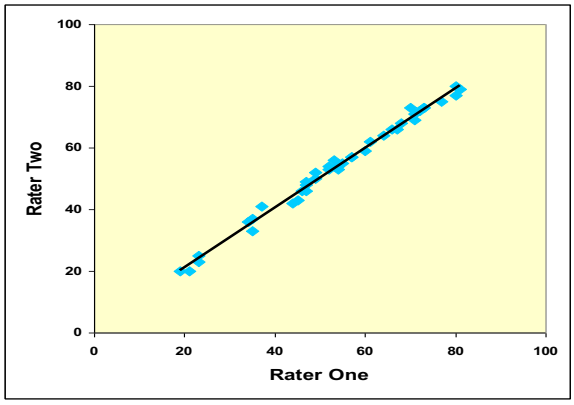


**Figure (2): Example for the limit of agreement between the two researchers.**

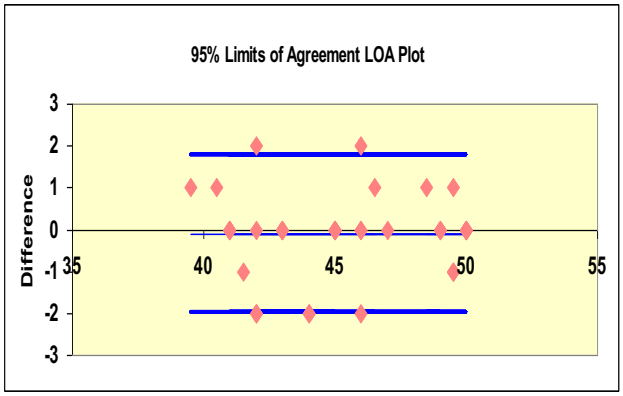


**Table (2): Experts' opinion regarding the importance of outcomes to nursing intervention**
**A. Physiological, functional, and psychological health. ***

| Outcomes | Very important outcomes | | Important outcomes | |
|---|---|---|---|---|
| | n= 59 | % | n= 59 | % |
| **Physiological health** | | | | |
| **Cardiopulmonary** | | | | |
| Cardiac pump effectiveness | 59 | 100 | - | - |
| Circulation status | 59 | 100 | - | - |
| Vital signs status | 59 | 100 | - | - |
| Tissue perfusion: cardiac | 59 | 100 | - | - |
| Tissue perfusion: peripheral | 59 | 100 | - | - |
| Coagulation status | 52 | 88.14 | 7 | 11.86 |
| **Elimination** Bowel elimination | 57 | 96.61 | 2 | 3.39 |
| **Fluids & electrolytes** | | | | |
| Fluid balance | 58 | 98.31 | 1 | 1.69 |
| Electrolyte & acid-base balance | 45 | 76.27 | 14 | 23.73 |
| **Nutrition** | | | | |
| Nutritional status | 51 | 86.44 | 8 | 13.65 |
| Nutritional status: nutrient intake | 49 | 83.05 | 10 | 16.95 |
| Nutritional status: biochemical measures | 58 | 98.31 | 1 | 1.69 |
| **Therapeutic response** Medication response | 59 | 100 | - | - |
| **Functional Health** | | | | |
| **Energy maintenance** | | | | |
| Activity tolerance | 58 | 98.31 | 1 | 1.69 |
| Energy conservation | 56 | 94.92 | 3 | 5.08 |
| Rest | 55 | 93.22 | 4 | 6.78 |
| Sleep | 55 | 93.22 | 4 | 6.78 |
| Psychomotor energy | 56 | 94.92 | 3 | 5.08 |
| **Self-care** | | | | |
| Self-care: activity of daily living | 56 | 94.92 | 3 | 5.08 |
| Self-care: non-parenteral medication | 58 | 98.31 | 1 | 1.69 |
| **Psychosocial Health** | | | | |
| **Psychosocial wellbeing** | | | | |
| Body image | 50 | 84.75 | 9 | 15.25 |
| Identity | 45 | 76.27 | 14 | 23.73 |
| Self-esteem | 53 | 89.83 | 6 | 10.17 |
| **Psychosocial adaptation** | | | | |
| Acceptance: health status | 44 | 74.58 | 15 | 25.42 |
| Coping | 50 | 84.75 | 9 | 15.25 |
| **Self-control** | | | | |
| Anxiety control | 59 | 100 | - | - |
| **Social interaction** | | | | |
| Role performance | 43 | 72.88 | 16 | 27.12 |

** No outcomes were rated as not important.*

**Table (2): Experts' opinion regarding the importance of the outcomes to nursing interventions B. Health knowledge and behaviors, perceived health, and family health. ***

| The outcomes | Very important outcomes | | Important outcomes | |
|---|---|---|---|---|
| | n= 59 | % | n= 59 | % |
| **Health knowledge and behaviors** | | | | |
| **Health behaviors** | | | | |
| Compliance behaviors | 55 | 93.22 | 4 | 6.78 |
| Adherence behaviors | 54 | 91.53 | 5 | 8.47 |
| Symptom control | 59 | 100 | - | - |
| Pain control | 59 | 100 | - | - |
| **Health beliefs** | | | | |
| Health beliefs: perceived threats | 50 | 84.75 | 9 | 15.25 |
| Health beliefs: perceived control | 53 | 89.83 | 6 | 10.17 |
| Health beliefs: perceived ability to perform | 55 | 93.22 | 4 | 6.78 |
| Health beliefs: perceived resources | 52 | 88.14 | 7 | 11.86 |
| **Health knowledge** | | | | |
| Knowledge: illness care | 59 | 100 | - | - |
| Knowledge: health behaviors | 59 | 100 | - | - |
| Knowledge: sexual function | 59 | 100 | - | - |
| **Risk control & safety** | | | | |
| Risk control: cardiovascular health | 59 | 100 | - | - |
| Risk control: tobacco control | 59 | 100 | - | - |
| **Perceived health** | | | | |
| **Health & life quality** | | | | |
| Quality of life | 45 | 76.27 | 14 | 23.73 |
| Wellbeing | 46 | 77.97 | 13 | 22.03 |
| Spiritual wellbeing | 46 | 77.97 | 13 | 22.03 |
| **Family health** | | | | |
| **Family caregiver status** | | | | |
| Caregiver adaptation to patient institutionalization | 47 | 79.66 | 12 | 20.34 |
| Caregiver homecare readiness | 48 | 81.36 | 11 | 18.64 |
| **Family wellbeing** | | | | |
| Family coping | 46 | 77.97 | 13 | 22.03 |

** No outcomes were rated as not important.*

Table 3 reveals experts' opinions regarding the sensitivity of the outcomes to the contribution of nursing interventions. Table 3a displays thirteen outcomes rated by 100% of the experts as very sensitive to nursing intervention, while tissue perfusion: cardiac was the least agreed by the experts regarding its sensitivity to nursing intervention (50.85).

Table 3b shows five outcomes rated by 100% of the experts as very sensitive to nursing intervention. On the other hand, health beliefs: perceived resources, spiritual wellbeing, and caregiver adaptation to patient institutionalization were the least rated by experts as very sensitive to nursing intervention (40.68, 61.02, 59.32 consecutively).

Table 4 represents the experts' opinion in the scale face validity. The appropriate appearance expressed by most of the experts, also, clarity of outcomes, indicators, and the used classification system, relevancy to a patient with myocardial infarction, comprehensiveness, and organization. Most of the experts counted the domain of physiological health as the primary outcome that has the highest degree of content validity regarding nursing influence on the caring patient with myocardial infarction.

## 6. Discussion

Evaluating the effectiveness of health care has become urgent and imperative. A necessary component of this evaluation is the measurement of patient outcomes associated with health care. Nursing has long demonstrated an active interest in evaluating the results of nursing treatments *(Simpson, 1995; Head, Maas, & Johnson, 2003).*

The study was subjected 46 outcomes with their 365 specific indicators to the experts' opinion regarding the content, face validity, and sensitivity. The findings of this study revealed varying degrees of importance and sensitivity regarding the various outcomes. However, most of the outcomes rated as either very important or important and very sensitive or sensitive, some of them were low estimated by the experts for importance such as identity, acceptance: Health status, role performance, health and life quality, and family health which the experts may consider as less commonly occurring in patients with acute myocardial infarction. Other outcomes were low estimated for sensitivity to the contribution of nursing, such as tissue perfusion: Cardiac, health beliefs: perceived resources, spiritual wellbeing, and caregiver adaptation to patient institutionalization. These findings can refer to that these outcomes may be considered beyond the scope of cardiovascular nursing. Surprisingly, none of the experts rated any of the outcomes as not important or not sensitive to nursing contribution.

Inter-rater reliability testing (for determining the consistency between the two researchers for each outcome) revealed a high degree of consistency between the two raters. These results were supported by earlier ones of a larger NOC study *Iowa Outcomes Project, (2001)* that reported similar findings of the content validity and nursing sensitivity of three study outcomes which are caregiver physical health, caregiver performance: direct care, and self-care: activities of daily living, as well as approximately 50 additional outcomes rated by ANA group members *(Iowa Outcomes Project, 2001). Mass et al. (2002*) reported another preliminary analysis of interrater reliability and constructor

**Table (3): Experts' opinion regarding the sensitivity of the outcomes to nursing interventions.**
**A. Physiological, functional, and psychological.**

| The outcomes | Very Sensitive | | Sensitive | |
|---|---|---|---|---|
| | No.= 59 | % | No.= 59 | % |
| **Physiological health** | | | | |
| **Cardiopulmonary** | | | | |
| Cardiac pump effectiveness | 47 | 79.66 | 12 | 20.34 |
| Circulation status | 59 | 100 | - | - |
| Vital signs status | 59 | 100 | - | - |
| Tissue perfusion: cardiac | 30 | 50.85 | 29 | 49.15 |
| Tissue perfusion: peripheral | 49 | 83.05 | 10 | 16.95 |
| Coagulation status | 45 | 76.27 | 14 | 23.73 |
| **Elimination** | | | | |
| Bowel elimination | 59 | 100 | - | - |
| **Fluids & electrolytes** | | | | |
| Fluid balance | 59 | 100 | - | - |
| Electrolyte & acid-base balance | 46 | 77.97 | 13 | 22.03 |
| **Nutrition** | | | | |
| Nutritional status | 58 | 98.31 | 1 | 1.69 |
| Nutritional status: nutrient intake | 53 | 89.83 | 6 | 10.17 |
| Nutritional status: biochemical measures | 51 | 86.44 | 8 | 13.65 |
| **Therapeutic response** | | | | |
| Medication response | 59 | 100 | - | - |
| **Functional Health** | | | | |
| **Energy maintenance** | | | | |
| Activity tolerance | 59 | 100 | - | - |
| Energy conservation | 58 | 98.31 | 1 | 1.69 |
| Rest | 57 | 96.61 | 2 | 3.39 |
| Sleep | 59 | 100 | - | - |
| Psychomotor energy | 59 | 100 | - | - |
| **Self-care** | | | | |
| Self-care: activity of daily living | 59 | 100 | - | - |
| Self-care: non-parenteral medication | 59 | 100 | - | - |
| **Psychosocial Health** | | | | |
| **Psychosocial wellbeing** | | | | |
| Body image | 52 | 88.14 | 7 | 11.86 |
| Identity | 53 | 89.83 | 6 | 10.17 |
| Self-esteem | 59 | 100 | - | - |
| **Psychosocial adaptation** | | | | |
| Acceptance: health status | 59 | 100 | - | - |
| Coping | 59 | 100 | - | - |
| **Self- control** | | | | |
| Anxiety control | 55 | 93.22 | 4 | 6.78 |
| **Social interaction** | | | | |
| Role performance | 51 | 86.44 | 8 | 13.65 |

**No outcomes were rated by the experts as not sensitive to nursing intervention*

criterion validity of 15 outcomes. The results indicated that NOC outcomes could be used to document the effectiveness of nursing interventions accurately. *Keenan et al. (2003)* conducting a study to provide evidence of the inter-rater reliability, validity, and sensitivity of a subset of NOC measures, including 26 outcomes found to be "most clinically useful" in a nurse practitioner setting (NPS). Results indicated that the measures are valid, reliable, and sensitive as clinical measures of nurse outcomes.

Similar findings were reported by *Alxander, and Kroposki (2001)*, who developed a Community Health Nursing Outcomes Inventory of 48 outcomes measures for client outcomes in community settings. Results concluded that the instrument is efficiently measuring outcomes sensitive to nursing care. A survey research design was used to assess the importance, sensitivity to nursing interventions, and content validity of six client outcomes from the NOC. Results strongly supported the content validity and nursing sensitivity of outcomes and their specific indicators. Experts judged all six outcomes as important and 90% of indicators as important in determining the outcomes. All outcomes and 78% of the indicators were decided to be responsive to community health nursing interventions *(Head, Mass, & Johnson, 2003).*

*Lee (2003)* carried out a study to assess the importance and sensitivity to nursing interventions of four nursing-sensitive outcomes selected from the Nursing Outcomes Classification. Outcomes for this study were "knowledge: diet, knowledge: disease process, knowledge: energy conservation, and knowledge: health behaviors." Results confirmed the importance and nursing sensitivity of outcomes and their indicators, which is congruent with the current study findings that all experts judged health knowledge outcomes "knowledge: illness care, knowledge: health behaviors, and knowledge: sexual function" as very important and very sensitive outcomes to nursing interventions.

Similar findings were reported by *(Maas et al., 2002; Keenan et al., 2003; Johnson et al., 2003).* One hundred sixty-nine of the NOC patient outcomes tested for inter-rater reliability, criterion validity, and sensitivity in 10 field sites, ranging from hospitals to home care, pairs of nurses rated the outcome measures for 5 to 130 patients. Inter-class correlations with criterion measures were greater than or equal to 0.70 for 63 outcomes, which is congruent with the current study findings that intra-class

**Table (3): Experts' opinion regarding the sensitivity of the outcomes to nursing interventions. B. Health knowledge and behaviors, perceived health, and family health.**

| The outcomes | Very sensitive | | Sensitive | |
|---|---|---|---|---|
| | No.= 59 | % | No.= 59 | % |
| **Health knowledge and behaviors** | | | | |
| **Health behaviors** | | | | |
| Compliance behaviors | 53 | 89.83 | 6 | 10.17 |
| Adherence behaviors | 53 | 89.83 | 6 | 10.17 |
| Symptom control | 59 | 100 | - | - |
| Pain control | 59 | 100 | - | - |
| **Health beliefs** | | | | |
| Health beliefs: perceived threats | 45 | 76.27 | 14 | 23.73 |
| Health beliefs: perceived control | 46 | 77.97 | 13 | 22.03 |
| Health beliefs: perceived ability to perform | 50 | 84.75 | 9 | 15.25 |
| Health beliefs: perceived resources | 24 | 40.68 | 35 | 59.32 |
| **Health knowledge** | | | | |
| Knowledge: illness care | 59 | 100 | - | - |
| Knowledge: health behaviors | 59 | 100 | - | - |
| Knowledge: sexual function | 59 | 100 | - | - |
| **Risk control & safety** | | | | |
| Risk control: cardiovascular health | 57 | 96.61 | 2 | 3.39 |
| Risk control: tobacco control | 55 | 93.22 | 4 | 6.78 |
| **Perceived health** | | | | |
| **Health & life quality** | | | | |
| Quality of life | 58 | 98.31 | 1 | 1.69 |
| Wellbeing | 56 | 94.92 | 3 | 5.08 |
| Spiritual wellbeing | 36 | 61.02 | 23 | 38.98 |
| **Family health** | | | | |
| **Family caregiver status** | | | | |
| Caregiver adaptation to patient institutionalization | 35 | 59.32 | 24 | 40.68 |
| Caregiver homecare readiness | 44 | 74.58 | 15 | 25.42 |
| **Family wellbeing** | | | | |
| Family coping | 49 | 83.05 | 10 | 16.95 |

**No outcomes were rated by the experts as not sensitive to nursing intervention.*

**Table (4): Experts' opinion regarding the face validity of the nursing-sensitive outcomes measuring instruments.**

| items | Agree | |
|---|---|---|
| | No.= 59 | % |
| The instrument looks like measurement scale for measuring nursing-sensitive outcomes for the patient with acute myocardial infarction | 59 | 100 |
| Scale title denotes the intended work to measure nursing-sensitive outcomes for the patient with acute myocardial infarction | 59 | 100 |
| The instrument covers the various dimensions of biopsychosocial aspects of care for the patient with acute myocardial infarction | 59 | 100 |
| The outcomes are relevant to the biopsychosocial aspects of the patient with myocardial infarction | 59 | 100 |
| The six classifications and their components are clearly defined | 59 | 100 |
| The classification system is clear, organized, and understandable | 57 | 96.61 |
| The instrument includes adequate coverage for each class | 59 | 100 |
| The outcomes selected balanced between different aspects of biopsychosocial dimensions of acute myocardial infarction care | 56 | 94.92 |
| The outcomes are measurable, observable | 55 | 93.22 |
| The outcomes look like the outcomes | 56 | 94.92 |
| The indicators' statement clear and easy to use | 56 | 94.92 |
| The instrument is concise | 10 | 16.95 |
| The outcomes have the highest degree of content validity regarding nursing influence on the caring patient with acute myocardial infarction. | | |
| Physiologic health | 50 | 84.75 |
| Functional health | 45 | 76.72 |
| Psychosocial health | 40 | 67.80 |
| Health knowledge and behaviors | 49 | 83.05 |
| Perceived health | 39 | 66.10 |
| Family health | 35 | 59.32 |

correlations were greater than or equal to 0.8 for the 46 outcomes. *Ralph et al. (2003)* reported similar results.

Qualitative analysis of the independent comments from the experts on the developed nursing outcomes measuring scale revealed that 90% of the experts offered comments in addition to ratings of the outcomes and indicators. Comments were analyzed using basic comment analysis techniques. Experts offered suggestions for outcome definitions, additional indicators, additional outcomes, and critiques of the wording and appropriateness of the indicator's statements.

Several comments raised substantive questions concerning the study outcomes. Because of the space limitations, only the most frequently repeated concerns are reported here. Some experts challenged the appropriateness of individual-level outcomes for cardiovascular nursing practice. Some experts viewed that some outcomes can merge under single outcomes such as (rest and sleep). Some criticized the scale of measurements, especially in discriminating between levels of non-numeric outcomes that depend mostly on the subjectivity of the assessor.

The experts also criticized the length of the instrument. The only rationale for this is the multiple health dimensions it measures. *Head, Mass, and Johnson (2003*) reported some of these comments, specifically regarding wording and appropriateness of the outcomes, while *Kol, Jacobson, Wieler, Weiss, and Sahed (2003)* reported the subjectivity of the scaled grading, in addition, some of the indicators are not identical to the clinical guidelines, and also question whether an evaluation scale of 5 grades is necessary for such numeric values as vital signs.

On testing the Nursing Sensitive Outcomes instrument reliability, the researchers in the present study faced some difficulties related to the appropriateness of the scale with measuring some outcomes indicators such as nausea not present, vomiting not present, orthostatic hypotension not present, the subjectivity of the scale, the translation necessary to convert indicators into interview Arabic questions, and selecting the appropriate wording to be understandable by low educated people. *Morrison, Broughs, Witt, Redden, and Leeper (2000)* also reported similar comments from the data collectors provided information about ease of using the instrument and raised questions about the questions that need to be addressed, such as some indicators that appeared to be more appropriate answered "Yes' or "No" rather than on a scale 1 to 5. A second issue was the necessary transformation of the indicators into interview questions, and the third issue was the redundancy of some of the indicators within the instrument.

## 7. Conclusion

Health care reforms have primarily focused on reducing costs, with little concern for evaluating the efficiency of health care providers' practices. Outcomes measures such as mortality and morbidity are often used as gross measures of medical practice, but nursing interventions tend to address more immediate outcomes such as improved tissue perfusion, greater activity tolerance, improved hydration, and reduced pain. Researchers developed the Nursing Outcomes Classification (NOC) tool to provide more comprehensive standardized information on patient, family, and community outcomes that result from nursing interventions. This study developed a modified version of this tool to measure holistic nursing interventions for patients with acute myocardial infarction. The study provided evidence of outcome content validity, reliability, and nursing sensitivity of the studied outcomes. These findings indicated that the NOC could measure the effectiveness of nursing interventions in caring for patients with acute myocardial infarction.

## 8. Recommendations

The following recommendations can deduce:

- The developed tool was validated, and its reliability was ascertained so, it is imperative to be disseminated to be used by the cardiovascular nurses caring for patients with acute myocardial infarction. It is not always sufficient to consider the outcomes that occur during hospitalization but extend the measurement across the continuum of care.
- The inclusion of NOC in nursing curricula to be utilized by nursing students in clinical education as a continuum for nursing diagnosis classification.
- Further validation applied to test the NOC outcomes in clinical practice on a considerably larger sample size would be needed to conduct factor analysis, eliminate redundant indicators, and develop more confidence in the generalizability and applicability with appropriate training for nurses using this instrument.
- Refinement of the NOC outcomes and indicators is strongly recommended to measure the quality of nursing intervention provided for various patients in different clinical settings; hence, this will help nursing retain its identity in a health care system restructured for greater efficiency.
- The enterprise of nurse clinicians and scientists working together is needed to clearly define and measure patient outcomes and highlight both nursing's unique contribution and the synergy of multidisciplinary collaboration in achieving optimal patient outcomes.

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