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# Using the Minimum Data Set (MDS) to Triage Long Term Care Facilities' Residents for a Systematic Evacuation in the Case of Mass Casualty Disaster Events

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## Recommended Citation

# USING THE MINIMUM DATA SET (MDS) TO TRIAGE LONG TERM CARE FACILITIES' RESIDENTS FOR A SYSTEMATIC EVACUATION IN THE CASE OF MASS CASUALTY DISASTER EVENTS

By

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# USING THE MINIMUM DATA SET (MDS) DATA TO TRIAGE RESIDENTS FOR SYSTEMATIC EVACUATION OF LONG TERM CARE FACILITIES

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University of Nebraska Medical Center, 2016

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Long Term Care facilities preparedness for disasters has been questioned, and evacuation before or during disasters is crucial for life saving. This thesis attempted to develop a systematic triage methodology based on the use of the Minimum Data Set (MDS), which is a powerful resource for gathering residents' vital information including physical ability, cognitive functioning, and other health related conditions. Our assumption was that 90% of caregivers' triage categorization will match with the categorization generated from the MDS dataset. To achieve our objectives and aims, we compared the triage categorization carried out by residents' caregivers versus the MDS generated triage categories. Overall we did not found a strong agreement between caregivers and MDS triage categorization. However, the triage categorization of both homemakers and cooks versus CNAs yield a substantial correlation. Also we found that the work experience was closely related to the agreement between RN and CNAs versus MDS. In conclusion we think that MDS can be used to generate triage categories for long term care residents to facilitate the systematic evacuation of buildings in the case of mass casualty event. But before that, it will be important to conduct further studies with a large sample size of caregivers and the accessibility to the MDS dataset. The validation of the use of MDS dataset to generate triage categories will hugely help long term care facilities to be prepared for evacuation, because it can be the start point for the development of triage application which can be use on both portable and mobile electronic devices.

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# LIST OF ABBREVIATIONS

**ADL:** Activities of Daily Living

**BIMS:** Brief Interview for Mental Status

**HHR:** Hillcrest Health & Rehab

**HCE:** Hillcrest Country Estates

**IBM:** International Business Machines Corp

**ICC:** Intraclass Correlation Coefficients

**ICUs:** intensive care units

**IRB:** Institutional Review Board

**CMS:** Centers for Medicare & Medicaid Services

**CDC:** Center for Disease Control and Prevention

**CNA:** Certified Nursing Assistants

**ESF:** Emergency Support Function

**LPN:** Licensed Practical Nurses

**LTCF:** Long Term Care Facilities

**MDS:** Minimum Data Set

**NDMS:** National Disaster Medical System

**NIH:** National Institute of Health

**RN:** Registered Nurse

**RDH:** Royal Darwin Hospital

**SAVE:** Secondary Assessment of Victim Endpoint

**SPSS**: Statistical analysis software package

**START**: Simple Triage and Rapid Treatment

**SWiFT**: Seniors without Families Team

**UNMC:** University of Nebraska Medical Center

# CHAPTER-I: INTRODUCTION

## I. Background

### a. Introduction

Long-term care facilities (LTCFs), also known as nursing homes or skilled nursing facilities or assisted living facilities, deliver a diverse type of service (both medical and personal care) to individuals who are incapable of living autonomously in the community (Center for Disease Control and Prevention, 2015). The number of people in need of diverse long-term care in the United States was around 10 million in 2000 (CohnReznick Wealth Management, 2013). According to the Centers for Disease Control and Prevention (CDC), about nine million people in the US were served by 67,000 paid, regulated long-term care services providers; namely adult day services centers (4,800), home health agencies (12,400), hospices (4,000), nursing homes (15,600), and assisted living and similar residential care communities (30,200) (Harris-Kojetin, & al, 2016). The National Institute of Health (NIH) reported that around 70% of people over the age 65 may need long-term care facilities' services at some point in their life, and over 40% may need to stay in long-term care facilities for some period (National Institute of Health, n. d.).

The majority of long-term care facilities' residents are older adults, and their pre-existing physical and health conditions, cognitive deficiency, and functional needs make them vulnerable to disasters (Medcalf & Fisher, 2015). It is projected that in 2016, federal regulations will require long-term care facilities certified by Medicare and Medicaid to have plans and procedures that meet all potential disasters, as well as providing emergency procedures training to their staff (Levinson, General, 2006). However, large disasters have tragically impacted long-term care facilities and yielded deficiencies in emergency preparedness planning. Although considered an underestimation, 1170 persons died from Hurricane Katrina, with 132 deaths occurring in nursing homes, some due to drowning (Markwell & Ratard, n. d.). These fatalities may have been

avoided if proper preparedness plans were in place. Among other planning, a good disaster evacuation plan is paramount to LTCFs' residents' safety during disasters.

Evacuation is considered to be the last resort in the case of a disaster, and remains a major lifesaving strategy in disaster settings. LTCFS were hugely impacted by past emergencies resulting in the evacuation of numerous facilities. At least 120 of over 300 nursing homes were affected by Hurricane Katrina in Louisiana and required the evacuation to other non-affected zones (Cefalu, 2006). Contrasting findings were reported by Blanchard and Dosa (2009), who find that Katrina was responsible for the evacuation of 84 of the 115 nursing homes in Louisiana. Florida sustained eight major hurricanes in 2004 and 2005. In 2004 alone, long term care residents accounted for 10,000 evacuees (Hyer et al., 2006). Because of the lack of proper evacuation planning, many problems were recorded among nursing home residents. Among the 132 nursing home casualties of Hurricane Katrina, 35 were due to drowning (Markwell & Ratard, n. d.). Additionally, long-term care facilities' (LTCF) residents who were evacuated during recent hurricanes were temporarily lost because of the lack of proper identification, hindered by their ability to communicate, and their weakened cognition (Hyer, et al., 2006). However, many factors make long-term care facilities vulnerable compared to healthcare facilities.

Long term care facilities are disproportionately affected by several threats as compared to hospitals. The Emergency Support Function (ESF) #8 (Health and Medical Services), deals with "public health and medical services during disasters." All states ESF#8 lead agencies identify hospitals as essential medical facilities, but the same status is not given to LTCFs (Hyer et al., 2006; United States Government Accountability Office, 2006). Nursing home administrators reported the lack of sufficient emergency support from local, state and federal agencies; also, nursing homes were excluded from the community preparedness planning (Laditka et al., 2008). Despite the upcoming Federal law, which will requires skilled nursing homes to develop and implement their preparedness plans (Christensen et al., 2012), these facilities may still be vulnerable for many reasons. Funding for preparedness activities of long-term care facilities is

affected by the fact that they are not recognized as healthcare facilities in many states; consequently, these facilities are not eligible for some state and federal services and funding. Medicare reimbursement is subject to certification, and only nursing homes certified by the Center for Medicare and Medicaid can claim reimbursement for health issues (Laditka et al., 2008). The federal evacuation resources under the National Disaster Medical System (NDMS) and the disasters assistance plan were not open to the nursing home because of their non-healthcare facilities status (Hyer et al., 2006), (Saliba, et al., 2004). These considerations can hugely impact the decision of LTCF's administrators to evacuate or to shelter in place, as well as the effectiveness of the evacuation process.

### b. Statement of the Problem/Context

Natural and man-made disasters can both lead nursing homes to evacuate or to shelter in place to avoid losses or injuries. The previous number of disasters requiring evacuation in the coastal area is indicative of prospective catastrophic events that may require systematic evacuation of long-term care facilities. Therefore, it's important to explore innovative ways to improve preparedness plans. Because of the pre-existing health conditions and cognitive deficiencies of long-term care facilities residents, triage could be a viable option for prioritizing residents for efficient emergency evacuation.

An overall 50% of all nursing home disbursements are covered by State Medicaid programs but 70% of all bed-day are consumed by Medicaid beneficiaries (Castle, 2008). Medicare and Medicaid Center is working hard to assist long-term care facilities by providing financial assistance for residents' health conditions but not for emergency planning. The Minimum Dataset (MDS) was developed by the Centers for Medicare and Medicaid Services to serve as a primary screening and comprehensive health status assessment tool for Medicare and Medicaid-certified long-term care facilities residents (Medicare & Medicaid Services, 2012). The MDS dataset is structured into 16 components with a different type of data, which can be both

quantitative and qualitative. The components are Demographics; Daily activities and function; communication, hearing, and vision; Mood and behavior; Psychosocial well-being; Physical functioning and structural problems; Continence; Disease diagnoses and health conditions; Oral, nutritional, and dental status; Skin condition; Activity patterns; Special treatments and procedures; Discharge potential and overall status; Therapies (e.g., physical therapy); Discharge information; and Medications (Society of General Internal Medicine, n. d). This database can help long-term care facilities' staff in the monitoring and detection of health problems through a multidimensional output of their functional abilities (Centers for Medicare & Medicaid Services, 2012). The MDS dataset has been used for research purposes, and can be a valuable resource for disaster planning in long-term care facilities. Preparedness plans of most of the long-term care facilities lack a proper triage plan to systematically evacuate their residents in case of mass casualty disasters.

Fortunately, disaster triage is well-documented in other emergency healthcare settings and is considered as a means of prioritizing patients for treatment. The "reverse triage" was developed by Gabor Kelen and colleagues at Johns Hopkins University to increase hospitals' surge capacity during a disaster by safely discharging patients whose acuity is not high, to make the bed available for patients who may need it more (McD Taylor, 2006). This model mainly deals with mass-casualty events, and has been used in diverse disasters scenarios, but unfortunately, only a few articles described its application in the real-time mass-casualty emergency situation. Moreover, there is no scholarly evidence of its use in long-term care facilities' planning for disasters. We, therefore, propose that "reverse triage" can be useful in the triage categorization of long-term care facilities' residents for systematic evacuation during disasters. We believe that the use of MDS data to generate evacuation triage categories will be an innovative way to fill the gap in the Medicare and Medicaid-certified long-term care facilities' evacuation planning. Therefore, we want to conduct a study to investigate to what extent the

caregiver's assignment of triage categorization will match with the categorizations generated from the MDS dataset. Our assumption is that 90% of nurses' triage categorization will match with the categorization generated from the MDS Dataset.

### c. Significance of study/project

Long-term care facilities were hugely impacted by disasters such as Katrina and Gustav. Initiatives are being developed to improve the preparedness of long-term care facilities in the United States. For instance, in the near future laws will require these facilities to have an all-inclusive disaster preparedness plan and to provide training to staff on the use of the plan. Financial issues that faced these facilities are getting attention from donors; for instance, the development of evacuation decision models for long-term care facilities is supported by the Hartford Foundation (Hyer, et al, 2006). We think that developing a triage methodology (using the MDS dataset) that can be used for the systematic evacuation of any long-term care facility within the U.S could fill this gap under the utilitarian perspective by "doing the greatest good for the greatest number of patients." This model can have a potential of evacuating long-term care facilities promptly, thus saving lives.

## II. Purpose of the study

### a. Research question

The purpose of this study was to demonstrate that triage categories can be assigned to long term care residents using the MDS dataset. These triage categories can be used for systematic evacuation of long-term care facilities residents. Therefore, our research question was: Are triage categories generated by MDS data the same as those assigned by caregivers, at least 90% of the time?

### b. Specific Aims

- ✓ Using a focus group of subject matter experts, determine which data sets within a resident's MDS best represent the criteria to determine a triage category

- ✓ Generate a report of the MDS and determine the triage categories of a study population of long term care residents

- ✓ Provide just in time training to caregivers on how to assign triage categories to their residents, and ask then to determine those categories for the residents in the study population

- ✓ Compare the triage categories assigned through both methods above for the same residents.

- ✓ Determine if the number of years of experience makes Caregivers (Certified Nursing Assistants) triage categorization more likely to match the triage categorization generated from the MDS dataset.

### c. Definitions of terms

**All-Hazards: All Hazards:** "All-Hazards refer to preparedness for domestic terrorist attacks, major natural or man-made disasters, and other emergencies." (**NCR**, *National Capital Region Homeland Security Strategic Plan 2007-2009 – Overview*, August 2006, p. 4)

**Disaster:** also known as emergency, catastrophe is referred to us as "A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources." (https://www.unisdr.org/we/inform/terminology)

**Emergency evacuation:** is the immediate and urgent movement of people away from the threat or actual occurrence of a hazard.

**Long-Term Care Facilities:** refers to nursing homes, skilled nursing facilities, and assisted living facilities, and provide diverse services, both medical and personal care, to people who are unable to manage independently in the community (http://www.cdc.gov/longtermcare/).

**The Long-Term Care Minimum Data Set (MDS)**: " The Minimum Data Set (MDS) is a standardized uniform comprehensive assessment of all residents in Medicare or Medicaid certified facilities mandated by federal law (P.L.100-203) to be completed and electronically

transmitted to the state. The MDS identifies potential resident problems, strengths and preferences." ( http://www.odh.ohio.gov/odhPrograms/io/mds/mds1.aspx)

**Triage:** occurs when clinicians sort, screen, and prioritize victims in a resource-constrained environment (Burkle, 2006).

**Medical Surge** is the capability to rapidly expand the capacity of the existing healthcare system (long- term care facilities, community health agencies, acute care facilities, alternate care facilities and public health departments) in order to provide triage and subsequent medical care. (http://www.ema.ohio.gov/documents/pdfs/Target_Capabilities/TCL_Medical_Surge_May_2008.pdf)

**Mass casualty incident**: "is any incident in which emergency medical services resources, such as personnel and equipment, are overwhelmed by the number and severity of casualties." (http://www.safetyalliance.emory.edu/injury_surveillance/injury_definitions/other_injury.html)

 d. **Assumptions**
 - ✓ The experts who comprise the focus groups have enough expertise to determine the MDS data that best represents the definitions of the triage categories produced by Morris, et al. (1999).
 - ✓ Caregivers in long term care facilities have enough baseline knowledge of the residents in their care, to be able to assign triage categories after just in time training.

III. **Literature Review**

The word triage has its origin in the French language, "trier meaning to sort", and the concept of using the word triage was firstly used by the military medicine practices in war to prioritize battlefield victims in resource-limited setting (Burkle, 2006). The initiator of the concept of triage is controversial; however, a well-documented source points to Baron Dominique Jean Larrey (Surgeon in Chief to Napoleon's Imperial Guard)  as the father of modern triage because of his

work during the Napoleonic War in 1792 (Kennedy, et al., 1996) (Robertson-Steel, 2006). For instance, he developed a system in which the most wounded soldiers were given priority and minor injured soldiers were treated and sent back to the battlefield (Kennedy, et al., 1996).

The original concepts of triage, which remain valid in mass casualty and warfare situations, were to sort wounded into three main categories (immediate, urgent, and non-urgent) (Robertson-Steel, 2006). After this initial work, the concept of triage has been used in diverse forms and in different settings. Burkle (2006) described two primary triage processes. The first process he described was the simple triage in which mass casualty disaster patients are sorted based on the gravity of their condition, thus patients with immediate needs are transported first to the healthcare facility as compared to a patient whose life is not jeopardized. An example of this system is the Simple Triage and Rapid Treatment (START). According to Burkle (2006) this process is "readily performed by pre-hospital and inexperienced volunteer personnel in the field in trauma related disasters such as earthquakes and accidents." This approach uses four groups; namely DECEASED (victims who are dead), IMMEDIATE (victims who need immediate transportation to hospital), DELAYED (people whose condition is not in danger by delaying the transport), and MINOR ("walking wounded" with negligible injuries). Another method coupled with START is the SAVE (Secondary Assessment of Victim Endpoint), which gives care to a patient who has at least a 50% chance of survival using available resources. The SAVE process evaluates the likelihood of survival based on number of injuries and according to trauma statistics. It then uses this knowledge to portray the correlation between disbursed resources and the expected benefit (Benson et al., 1996). According to Benson et al. (1996) because of the unavailability of early transport to a sound medical facility, the knowledge gathered about patients survivability guide the triaging in the field that was different from the START approach. The second process he described is the advanced triage, which is used by experienced staff and defined as a method that allocates resources to people who are likely to survive as compared to harshly wounded people whose life is threatened or have little chance of survival. This strategy

uses a color tag to identify the triage cluster. For instance; the first triage group is the BLACK (EXPECTANT) which refers to people who will not survive from their injuries or illnesses, or have already died. Second is the RED (IMMEDIATE) which refers to people in need of immediately advanced care or surgery. Third is the YELLOW (OBSERVATION) which refers to people with stable health condition at that point in time, who may at some point be assigned (re-triage) into the red group, if no eventual treatment is provided. Fourth is the GREEN (WAIT) which refers to people whose care can be delayed for hours or days because of minor superficial injuries. This group (green) may require minor follow-up measures. Finally, the Fifth group is triaged into the WHITE (DISMISS) which refers to people whose condition can be managed at home or first aid with a prompt follow-up. Seniors without Families Team (SWiFT) triage is another methodology developed mainly for the evacuation of frail and elderly people from community disaster. According to the Baylor College of Medicine (2006), this triage approach has three levels where level 1 refers to older adults who are incapable of performing, at least, a basic to activities of daily living (ADL) such as walking, eating, bathing, dressing, toileting, continence without support. This group should be immediately relocated to an assisted living facility or nursing home or hospital for expert or personal care. Level two refers to older adults who are not able to achieve instrumental activities of daily living such as resources assessment, benefits management, finances, etc. this group should be linked with a local aging services case manager. Level three refers to older adults who require negligible support with the activities of daily living and instrumental activities of daily living. This group should be connected with Red Cross or other rescue organization service. Unfortunately, this triage methodology seems incomplete regarding the assessment of elderly. The cognitive function is not addressed in the SWiFT triage methodology, which is an important parameter to be considered when evacuating residents from a long-term care facility. Moreover, this triage strategy is more suitable for elderly living with families not those living in nursing home. One of the triage strategies that have been

successfully used in a mass-casualty scenario within the US hospital evacuation remains the "reverse triage".

The "reverse triage methodology was developed by Professor Gabor D. Kelen at John Hopkins University and has shown to be an innovative approach in the management of hospital surge capacity during mass-casualty disasters (Kelen, et al., 2006). Reverse triage is a state of art approach used by a hospital to manage surge capacity by discharging low-risk patients to make resources available for high risk or acute patients. Kelen, et al. (2009) further described a retrospective scenario to pinpoint the advantage of the "reverse triage" in the early discharging for up to 96 hours the hospitalized patients at low risk of adverse events in three hospitals. In their study; pediatric unit, nurseries, and ICUs (intensive care units) were not included; also, patients who were not in need of any critical intervention within the past four days were classified as for early discharge. They were able to release 44% of 3491 patient, and most of the discharge occurred within 24 to 48 hours timeframe. The "reverse triage" concept has proven to be successful by increasing hospital surge capacity and lessening the threat of adverse effects during a tabletop exercise (Davis, et al., 2013). Fuzak et al. (2010) retrospectively described the use of reverse triage in drills and simulations by unit team leaders and subspecialty physicians for a mass transfer of pediatric tertiary care hospital inpatients to a new location in under 12 hours. According to the authors, the team was able to evacuate 111 patients in 11.6 hours with no adverse events. This strategy was also used successfully in a real disaster scenario in Sydney, Australia in 2012 to create surge capacity at the Royal Darwin Hospital (RDH) for 30 victims of boat explosion-related injuries while trying to get access to the country as immigrants. The reverse triage was able to create surge capacity for the victims (Satterthwaite, & Atkinson, 2012).

The MDS Dataset has been widely used to examine diverse aspects of long-term care facilities. Brown, et al. (2012) used the MDS data set to investigate the effects of evacuation on nursing home residents with dementia. In their methodology, they merged the resident assessment files of MDS Dataset with the enrollment file of the Centers for Medicare to determine the date of

death of identified nursing homes' residents during Hurricane Gustav. Another study conducted by Dosa, et al. (2010) in the post-Katrina era, assessed nursing homes' resident's mortality rates at 30 and 90 days post-admission and mortality rates in the hurricane affected zones in Louisiana and Mississippi to examine the significant ADLs declines rate. They merged MDS and the Medicare claims to conduct a secondary data analysis and compared the hospitalization and mortality rates of long-stay residents (> 90 days) housed in 141 at risk nursing homes versus residents at the same facilities during the pre-hurricane period (2003-2004). These studies confirm that MDS data set can be used for research purposes and can play a crucial role in improving preparedness related activities in long-term care facilities.

# CHAPTER 2: METHODS

## I. Study Sites and population

The study was conducted at Hillcrest Health Services, comprising two long-term care facilities in Bellevue, namely the Hillcrest Health & Rehab (HHR), and the Hillcrest Country Estates (HCE) The Cottages. The Hillcrest Health & Rehab (HHR) is dedicated to post-acute rehabilitation for patients recovering from surgery, illness, or injury. The Hillcrest Country Estates (HCE) The Cottages offers an innovative household-model *skilled nursing* care. Each of these two facilities has an estimate of hundred residents. Our study population consisted of caregivers including CNAs, RNs, Cooks, Homemakers and LPN; who used their knowledge about residents physical, mental, and health condition to give a triage code (green, yellow, red) to the residents they care for.

## II. Data collection methods

Data of our study was collected in two different days. We collected data first from caregivers at HHR, and one week later we collected data from HCE. At each of our study site, we first gathered consent from caregiver before providing the just in time training, and then ask them to triage their residents. For the MDS a subject matter expert at Hillcrest health services was responsible for pulling out resident data and assigning the triage colors. The methodology used for data collection is described as follow.

➢ **Training on reverse triage**

Caregivers were provided just in time training on the reverse triage concepts before they can categorize residents they care for. This training meant to update or give basic knowledge to caregivers about the reverse triage categorization using the three colors (Red-Yellow-Green). We were expecting that this knowledge can help them assign triage colors to the residents in their care based on the resident's physical and health condition, cognitive functioning and

functional needs. The following table describes the triage categorization using the three colors strategy.

| COLOR | DESCRIPTION |
|---|---|
| RED | These residents require maximum assistance to move and may require 2-3 staff members to transport out of the building or to a staging area. these residents move **LAST** from the Unit |
| YELLOW | These residents require some assistance and may require wheelchairs or stretchers and 1-2 staff members to transport out of the building or to a staging area. these residents move **SECOND** from the Unit |
| GREEN | These patients require minimal assistance and are ambulatory. 1 staff member can safely lead several patients who fall into this category out of the building or to the staging area. these residents move **FIRST** from the Unit |

**TABLE-1**: **Directives for the just in time training on reverse triage** (Updated from *New York Center for Bioterrorism Preparedness and Planning, 2006)*

➢ **Caregivers Triage categorization:** The information about general demographic data and the experiences of nurses was collected using the caregivers' triage categorization form (Annexes). Those data helped us to determine the relationship between nurses' experience or education level and their ability to match the MDS triage categorization. After filling out the demography section of the caregivers' triage categorization form, caregiver evaluated and assigned the triage colors (Green, Yellow, and Red) to the residents under their care, and was based on the above triage categorization approach. This evaluation was based on their knowledge about the residents' health, physical and mental status.

➢ **MDS data and focus group of subject matter experts**: The MDS data were based on the focus group of subject matter experts' determination for the best data to be

used for categorization. Based on their recommendation, the Brief Interview for Mental Status (BIMS) was selected for the evaluation of residents' cognitive functioning; and the Activities of Daily Living (ADLs) was selected to evaluate the physical ability of nursing home residents. Every resident received a score using these two parameters. The BIMS evaluates reminiscence and coordination through 15-point, it also includes free and cued recall items (Chodosh, et al.; 2008). Also the BIMS total score was found to be highly correlated with Mini-Mental State Exam (Folstein, & al, 1975). Thus, the score ranges of 0-7, 8-12, and 13-15 were categorized as red, yellow, and green respectively. The ADL was categorized based on the residents' ability to perform the different activities of daily living such as Personal hygiene, Toilet use, Locomotion, Eating. Residents who can perform all the ADLs was classified as independent if they don't need any assistance or supervision, and as "under supervision" if they need supervision or assistance in at least one of the ADLs. Residents in the "under Supervision" category were then classified into 4 sub-categories (Supervision, limited assistance, extensive assistance, and total dependence). The "Green" was allocated to independent residents who did not required any assistance, help or oversight from staff member; the residents who required the limited assistance from one staff member in completing their ADLs were classified as "Yellow"; and residents who were totally dependent and required extensive assistance from at least two staff members were classified into the "Red" category (Morris, et al.; 1999). In some extent, when a resident was classified as red using the BIMS or ADLs, they have to be red definitely. For residents classified as Yellow using one of the parameter, we further evaluate to see if using the other parameter they can be red. We did the same with residents classified as green to see if there is potential for moving them to other categories. (Annex II- RAI MANUAL DEFINITIONS (MDS MANUAL)).

➤ **Matching Categorization data**

After the categorization using the MDS dataset and the categorization provided by caregivers using the reverse triage methodology, Data were entered into the same spread sheet using unique identifiers given to each resident, as well as the identifiers of caregivers. The entire dataset was then sent to the UNMC study team for statistical analysis. Researchers compared caregiver triage colors with those generated from the respective resident's MDS. The following Hierarchy graph summarizes the data collection strategy.



**Figure-1: DATA COLLECTION METHODS.** This hierarchy graph summarizes the strategy used for the data collection.
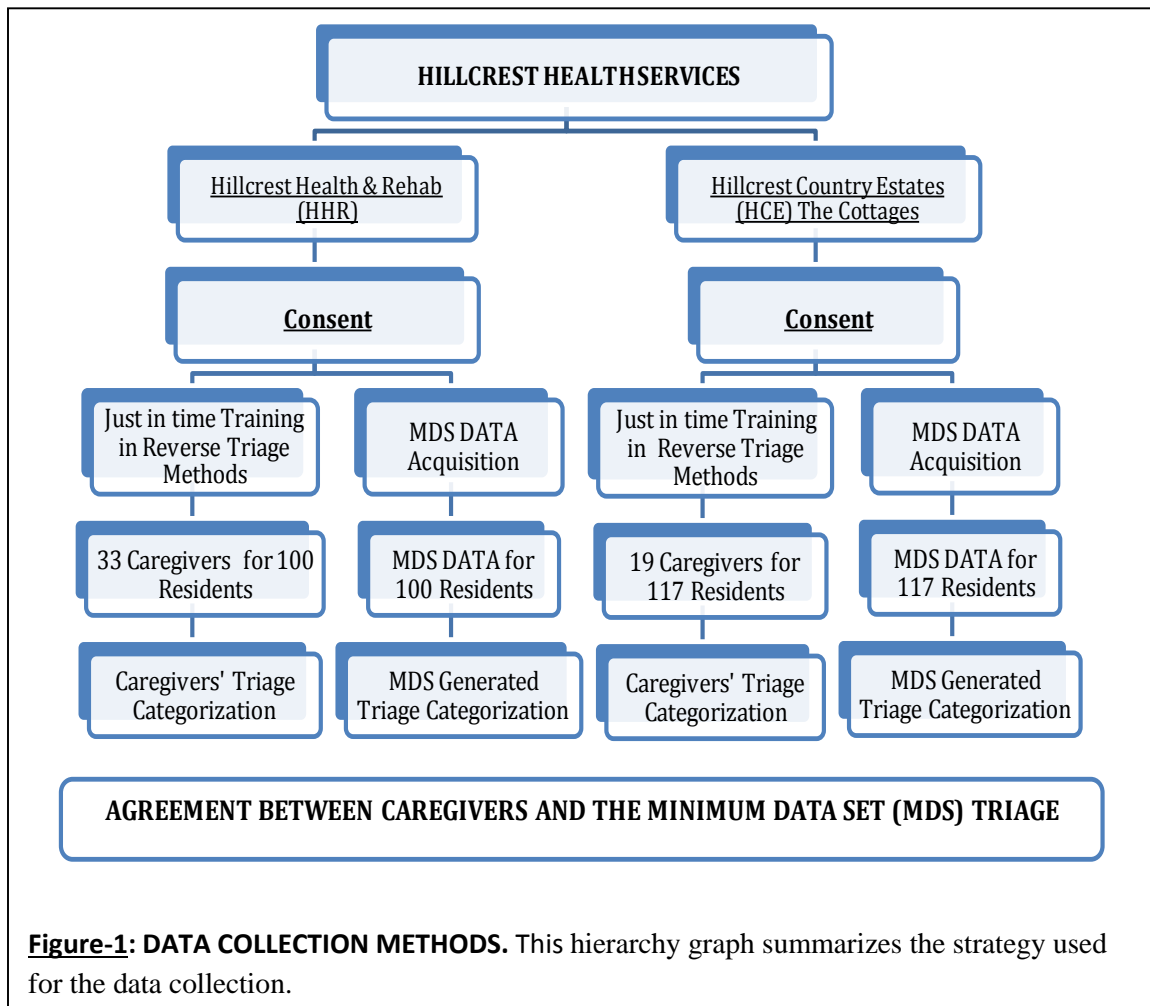
## III. Ethical considerations and Confidentiality

This research has been reviewed and approved by the University Of Nebraska Medical Center (UNMC) IRB and assigned IRB # 105-16-EX. The concept of the study was explained to

caregivers, and only those who accepted to participate to this study by providing their consent was included in our study. This study was conducted in the way that preserves the confidentiality of residents and the caregivers. Only authorized staff at Hillcrest, who had access to the MDS dataset performed all the matching activities and then sent the dataset with only residents' unique identifiers. Data collected were secured in a secure location at the Hillcrest Health Systems and transferred to UNMC after all residents' personal identifying information was removed

## IV. Data analysis methods

We used version 22.0 of IBM SPSS Statistics to analyze our Data. Descriptive statistics was used to summarize caregiver demographic information. We performed a cross tabulation with CNAs in the column and other type of caregivers (Registered Nurses, Licensed Practical Nurses, Homemakers, and Cooks) in the rows to investigate at what extend the other type of caregivers triage categorization match with the categorization of CNAs. The Kappa value was computed with the p-value to understand the level of agreement and how the categorization differs between CNAs and other type of caregivers. The same statistical methodology was used to compare the triage categorization of CNAs and RNs with the categorization generated from the MDS based on their work experience. Finally we use the intraclass correlation coefficient (ICC) to test the assumption of our study (At least 90% agreement between caregivers and MDS triage categorization) instead of the Pearson correlation coefficient. The Pearson correlation coefficient just tests the strength of the relationship between two variables, not the agreement. The ICC uses a pooled mean and standard deviation from centered and scaled variables; whereas Pearson correlation uses mean and standard deviation from individual-centered and scaled variable (McAlinden, et al., 2011). We sought think that ICC will give us the most accurate agreement testing compared to the Pearson correlation coefficient. Kappa value and the ICC were interpreted using the following table

| KAPPA (K-VALUE) | INTRACLASS CORRELATION COEFFICIENTS | STRENGTH OF AGREEMENT |
|---|---|---|
| < 0.00 | 0-0.2 | Poor |
| 0.00- 0.20 | | Slight |
| 0.21– 0.40 | 0.3-0.4 | Fair |
| 0.41–0.60 | 0.5-0.6 | Moderate |
| 0.61–0.80 | 0.7-0.8 | Strong or Substantial |
| 0.81–1 | >0.8 | Almost Perfect |

**Table-2:** Interpretation of Kappa and Intraclass correlation coefficients (ICC) (updated from

Altman, 1991, Viera, & Garrett, 2005, Portney & Watkins, 2000, and Landis, & Koch, 1977).

# CHAPTER III: RESULTS

## I. DEMOGRAPHY OF CAREGIVERS

| | | HCE N (%) | HHR N (%) | P- VALUE |
|---|---|---|---|---|
| **GENDER** | Female (%) | 28 (54.9) | 14 (27.5) | **<0.0001** |
| | Male (%) | 05 (9.8) | 04 (7.8) | |
| **AGE** | N | 47 | | **<0.0001** |
| | Mean | 32.28 | | |
| | Median | 28.00 | | |
| | Std. Deviation | 13.041 | | |
| | Minimum: | 19 | | |
| | Maximum | 63 | | |
| **EDUCATION LEVEL** | High School | 6 (11.8) | 4 (7.8) | **> 0.05** |
| | Associate | 5 (9.8) | 6 (11.8) | |
| | Some College | 16 (31.4) | 6 (11.8) | |
| | LPN Diploma | 1 (2.0) | 0 (0.0) | |
| | BS Degree | 5 (9.8) | 2 (3.9) | |
| **PROFESSION** | CNA | 19 (38) | 12 (24) | **> 0.05** |
| | Cooks | 5 (10) | 0 (0.0) | |
| | Homemaker | 2 (4.0) | 0 (0.0) | |
| | LPN | 3 (6.0) | 0 (0.0) | |
| | RN | 3 (6.0) | 6 (12.0) | |
| **YEAR OF EXPERIENCE** | < 1 Year | 7 (14.3) | 1 (2.0) | **> 0.05** |
| | 1 - 5 Years | 15 (30.6) | 8 (16.3) | |
| | 6 - 10 Years | 7 (14.3) | 5 (10.2) | |
| | 11 - 15 Years | 1 (2.0) | 0 (0.0) | |
| | > 15 Years | 2 (4.1) | 3 (6.1) | |
| **EXPERIENCE IN TRIAGING** | No | 20 (40.0) | 14 (28.0) | **> 0.05** |
| | Yes | 12 (24.0) | 4 (8.0) | |

**Table-3: Demography of Caregivers**

The demography analysis results for caregivers are displayed in the table-3. An overall of 52 caregivers participated our study, which includes 31 (62%) Certified Nursing Assistants, 5 (10%)

Cooks, 2 (4%) Home Makers, 3 (6%) Licensed Practical Nurses, and 9 (18%) Registered Nurses. The majority of our study subjects were female (82.4%), the minimum age was 19 and the maximum was 63 years old, with a 28 and 32.28 years respectively as the median age and the mean ages of caregivers. The standard deviation was 13.041. The age difference between our study participants was statistically significant with a p-value <0.0001. Caregivers who just took some college classes after the high school represented 43.2%. Associated degree holders were ranked second with 21.6%, followed by High School Diploma holders (19.6%), Bachelor Holders (13.7%), and Licensed Practical Nurse Diploma (2%). Most of the caregivers (46.9%) had a work experience between 1 to 5 years, followed by 24.5%, 16%, 10%, and 2% respectively for caregivers who had a work experience between 6-10 years, less than 1 year, more than 15 years, and between 11-15 years. Finally, sixty eight percent (68%) of caregivers did not have any experience in triaging patients or residents for disaster evacuation before participating in our study.

II. **TRIAGE CATEGORIZATION OF CERTIFIED NURSING ASSISTANTS VERSUS OTHER TYPE OF CAREGIVERS**

| OTHER CAREGIVERS' TRIAGE | | CNAs TRIAGE | | | | - Kappa (p-value) |
|---|---|---|---|---|---|---|
| | | GREEN N (%) | YELLOW N (%) | RED N (%) | TOTAL | - ICC (90% CI) |
| Homemakers TRIAGE | GREEN N (%) | **4 (18.2)** | 3 (13.6) | 0 (0.0) | 7 (31.8) | |
| | YELLOW N (%) | 2 (9.1) | **8 (36.4)** | 1 (4.5) | 11 (50.0) | **K= 0.56 (< 0.0001)** |
| | RED N (%) | 0 (0.0) | 0 (0.0) | **4 (18.2)** | 4 (18.2) | **ICC= 0.73 ( 0.517-0.86)** |
| | TOTAL N (%) | 6 (27.3) | 11 (50.0) | 5 (22.7) | **22 (100)** | |
| Cooks TRIAGE | GREEN N (%) | **8 (20.5)** | 3 (7.7) | 1 (2.6) | 12 (30.8) | |
| | YELLOW N (%) | 1 (2.6) | **9 (23.1)** | 4 (10.3) | 14 (35.9) | **K= 0.575 (<0.0001)** |
| | RED N (%) | 0 (0.0) | 2 (5.1) | **11 (28.2)** | 13 (33.3) | **ICC= 0.723 (0.57-0.83)** |
| | TOTAL N (%) | 9 (23.1) | 14 (35.9) | 16 (41.0) | **39 (100)** | |
| Licensed Practical Nurses TRIAGE | GREEN N (%) | **4 (9.1)** | 7 (15.9) | 1 (2.3) | 12 (27.3) | |
| | YELLOW N (%) | 2 (4.5) | **13 (29.5)** | 9 (20.5) | 24 (54.5) | **K= 0.281 (P=0.006)** |
| | RED N (%) | 0 (0.0) | 1 (2.3) | **7 (15.9)** | 8 (18.2) | **ICC= 0.495 (0.25-0.67)** |
| | TOTAL N (%) | 6 (13.6) | 21 (47.7) | 17 (38.6) | **44 (100)** | |
| Registered Nurses TRIAGE | GREEN N (%) | **21 (14.4)** | 7 (4.8) | 7 (4.8) | 35 (24.0) | |
| | YELLOW N (%) | 13 (8.9) | **44 (30.1)** | 23 (15.8) | 80 (54.8) | **K= 0.311 (P<0.001)** |
| | RED N (%) | 2 (1.4) | 12 (8.2) | **17 (11.6)** | 31 (21.2) | **ICC= 0.393 (0.27-0.5)** |
| | TOTAL N (%) | 36 (24.7) | 63 (43.2) | 47 (32.2) | **146 (100)** | |

**Table-4:** **Measure of Agreement in resident triage assignment between Certified Nursing Assistant versus Homemaker, Cooks, Licensed Practical Nurses, and Registered Nurses Triage categorization**

The results of the comparison between CNAs and other caregivers are displayed in the table-4. First, twenty two (22) Residents were triaged by both CNAs and homemakers, and the

agreements were 18.2%; 36.4%; and 18.2% respectively for the green, yellow, and red categories. The Kappa was .561, which is suggestive of a moderate agreement. The agreement difference between homemakers and CNAs was statistically significant (P< 0.001). The ICC (0.733) suggested a strong agreement with 90% of Homemakers being able to triage between moderate and almost perfect agreement level as shown by the 90% CI (0.517-0.862). Second, Thirty nine (39) residents were triaged by both the CNAs and Cooks, and the agreements were 20.5%, 23.1%, and 28.2% respectively for the green, yellow, and red categories. The Kappa was .575, which is suggestive of a moderate agreement. The Difference between the triage categorization of homemakers versus CNAs was statistically significant (P< 0.001). The ICC (0.723) suggested a strong agreement with 90% of cooks being able to triage between moderate and almost perfect agreement level as shown by the 90% CI (569-829). Third, forty four (44) Residents were triaged by both the CNAs and LPNs, and the agreements were 9.1%, 29.5%, and 15.9% respectively for the green, yellow, and red categories. The Kappa was 0.281, which is suggestive of a fair agreement. The probability for the LPNs to match with the CNAs was statistically significant (P= 0.006). We observed a fair agreement (ICC= 0.495) with 90% of LPNs being able to triage with an agreement between poor and strong or substantial levels as shown by the 90% CI (0.251-0.671). Finally, an overall of a hundred forty six (146) residents were triaged by both CNAs and RNs, and the agreements were 14.4%, 30.1%, and 11.6% respectively for the green, yellow, and red categories. The Kappa was 0.311, which is suggestive of a fair agreement between the triage categorization of the two groups. The difference for homemakers' triage categorization to match with the CNAs' triage categorization was statistically significant (P< 0.001). The ICC (0.393) suggested a fair agreement with 90% of RNs being able to triage between poor and moderate agreement levels as shown by the 90% CI (0.273-0.502).

**III.** **TRIAGE CATEGORIZATION OF CERTIFIED NURSING ASSISTANTS VERSUS MDS TRIAGE CATEGORIZATION AND THE IMPACT OF WORK EXPERIENCE.**

| CNAs TRIAGE PER EXPERIENCE | | MDS TRIAGE CATEGORIZATION | | | | KAPPA (P-Value) AND/OR ICC (90%CI) |
|---|---|---|---|---|---|---|
| | | GREEN N (%) | YELLOW N (%) | RED N (%) | TOTAL N (%) | |
| Less than 1 Year | GREEN N (%) | **0 (0.0)** | 1 (3.7) | 1 (3.7) | 2 (7.4) | **K= 0.047 (P= 0.644)** |
| | YELLOW N (%) | 5 18.5) | **3 (11.1)** | 10 (37.0) | 18 (66.7) | |
| | RED N (%) | 0 (0.0) | 1 (3.7) | **6 (22.2)** | 7 (25.9) | |
| | TOTAL N (%) | 5 (18.5) | 5 (18.5) | 17 (63) | **27 (100)** | |
| 1 to 5 Years | GREEN N (%) | **8 (11.8)** | 4 (5.9) | 8 (11.8) | 20 (29.4) | **K= 0.152 (P= 0.28)** |
| | YELLOW N (%) | 5 (7.4) | **6 (8.8)** | 21 (30.9) | 32 (47.1) | |
| | RED N (%) | 1 (1.5) | 2 (2.9) | **13 (19.1)** | 16 (23.5) | |
| | TOTAL N (%) | 14 (20.6) | 12 (17.6) | 42 (61.8) | **68 (100)** | |
| 6 to 10 Years | GREEN N (%) | **5 (14.7)** | 6 (17.6) | 1 (2.9) | 12 (35.3) | **K= 0.301 (P= 0.01)** |
| | YELLOW N (%) | 3 (8.8) | **5 (14.7)** | 5 (14.7) | 13 (38.2) | |
| | RED N (%) | 0 (0.0) | 1 (2.9) | **8 (23.5)** | 9 (26.5) | |
| | TOTAL N (%) | 8 (23.5) | 12 (35.3) | 14 (41.2) | **34 (100)** | |
| 11 to 15 Years | GREEN N (%) | **0 (0.0)** | 0 (0.0) | 1 (11.1) | 1 (11.1) | **K= 0.224 (P= 0.215)** |
| | YELLOW N (%) | 3 (33.3) | **2 (22.2)** | 1 (11.1) | 6 (66.7) | |
| | RED N (%) | 0 (0.0) | 0 (0.0) | **2 (22.2)** | 2 (22.2) | |
| | TOTAL N (%) | 3 (33.3) | 2 (22.2) | 4 (44.4) | **9 (100)** | |
| More than 15 Years | GREEN N (%) | **3 (23.1)** | 0 (0.0) | 0 (0.0) | 3 (23.1) | **K= 0.430 (P= 0.012)** |
| | YELLOW N (%) | 1 (7.7) | **1 (7.7)** | 3 (23.1) | 5 (38.5) | |
| | RED N (%) | 1 (7.7) | 0 (0.0) | **4 (30.8)** | 5 (38.5) | |
| | TOTAL N (%) | 5 (38.5) | 1 (7.7) | 7 (53.8) | **13 (100)** | |
| Total | GREEN N (%) | **16 (10.6)** | 11 (7.3) | 11 (7.3) | 38 (25.2) | **K= 1.89 (P< 0.0001)** **ICC=0.380 (0.256-0.489)** |
| | YELLOW N (%) | 17 (11.3) | **17 (11.3)** | 40 (26.5) | 74 (49.0) | |
| | RED N (%) | 2 (1.3) | 4 (2.6) | **33 (21.9)** | 39 (25.8) | |
| | TOTAL N (%) | 35 (23.2) | 32 (21.2) | 84 (55.6) | **151 (100)** | |

**Table 4: MDS Triage Categorization versus Certified Nursing Assistants Triage Categorization and the Impact of Work Experience**

The triage categorization using the MDS dataset versus CNAs triage categorization by work experience is presented in table 4. Overall, 151 residents were triaged by both MDS reporting data and CNA's triage categorization based on their knowledge of the residents, with a total agreement of 16 (10.6%, 17 (11.3%), and 33 (21.9%) respectively for green, yellow, and read. The overall agreement between the two methods was poor (K=1.89). The Difference between the two triage categorization methodology was significant (p<0.0001). We observed a fair agreement (ICC= 0.380), with 90% of CNAs being able to triage with an agreement between the fair and moderate agreement levels with MDS triage categorization as shown by the 90% CI (0.256-0.489). Twenty seven (27) Residents were triaged through the MDS dataset and by the Less than 1 year of work experience groups of CNAs, the agreements were 0.0%, 11.1%, and 22.2% respectively for the green, yellow, and red categories. The Kappa measure of agreement (k=0.047) was suggestive of a poor agreement between the two triage methods. Sixty eight (68) residents were triaged both by using MDS dataset and by the 1 to 5 year of experience groups of CNAs, the agreements were 11.8%, 8.8%, and 19.1% respectively for the green, yellow and red categories. The kappa measure of agreement (k= 0.152) was suggestive of a poor agreement between the two triage methods. Thirty four (34) residents were triaged by both using the MDS dataset and by the 6 to 10 year of experience groups of CNAs, the agreements were 14.7%, 14.7%, and 23.5% respectively for the green, yellow and red categories. The kappa measure of agreement (k= 0.301) was suggestive of a fair agreement between the two triage methods. Nine (9) residents were triaged by both using the MDS dataset and by the 11 to 15 year of experience groups of CNAs, the agreements were 0.0%, 22.2%, and 22.2% respectively for the green, yellow and red categories. The kappa measure of agreement (k= 0.224) was suggestive of a fair agreement between the two triage methods. Thirteen (13) residents were triaged both by using the MDS dataset and by the 11 to 15 year of experience groups of CNAs, the agreements were 23.1%, 7.7%, and 30.8% respectively for the green, yellow and red categories. The kappa measure of agreement (k= 0.430) was suggestive of a moderate agreement between the two triage

methods. The differences in triage categorization between the two methods were statistically significant for 6 to 10 and more than 15 years of work experience groups with a respective p-value of 0.01, and 0.012. Whereas the certified nursing assistant who had less than a year of experience, and those with an experience between 1 and 5 years were more likely to match the MDS triage categorization.

**IV. COMPARISON BETWEEN THE TRIAGE CATEGORIZATION OF THE MDS VERSUS REGISTERED NURSES AND THE IMPACT OF WORK EXPERIENCES IN THEIR TRIAGE DECISION**

| REGISTERED NURSES TRIAGE | | MDS TRI | | | | KAPPA (P-Value) AND/OR ICC (90%) |
|---|---|---|---|---|---|---|
| | | GREEN | YELLOW | RED | Total | |
| **LESS THAN 1 YEAR** | GREEN N (%) | **2 (9.5)** | 1 (4.8) | 3 (14.3) | 6 (28.6) | **K=0.039 (P= 0.768)** |
| | YELLOW N (%) | 3 (14.3) | **1 (4.8)** | 5 (23.8) | 9 (42.9) | |
| | RED N (%) | 1 (4.8) | 1 (4.8) | **4 (19.0)** | 6 (28.6) | |
| | TOTAL N (%) | 6 (28.6) | 3 (14.3) | 12 (57.1) | **21 (100)** | |
| **1 TO 5 YEARS** | GREEN N (%) | **5 (15.6)** | 3 (9.4) | 0 (0.0) | 8 (25.0) | **K= 0.291 (P= 0.005)** |
| | YELLOW N (%) | 2 (6.3) | **5 (15.6)** | 11 (34.4) | 18 (56.3) | |
| | RED N (%) | 0 (0.0) | 0 (0.0) | **6 (18.8)** | 6 (18.8) | |
| | TOTAL N (%) | 7 (21.9) | 8 (25.0) | 17 (53.1) | **32 (100)** | |
| **6 TO 10 YEARS** | GREEN N (%) | **10 (14.9)** | 3 (4.5) | 4 (6.0) | 17 (25.4) | **K= 0.260 (P<0.0001)** |
| | YELLOW N (%) | 5 (7.5) | **8 (11.9)** | 23 (34.3) | 36 (53.7) | |
| | RED N (%) | 1 (1.5) | 0 (0.0) | **13 (19.4)** | 14 (20.9) | |
| | TOTAL N (%) | 16 (23.9) | 11 (16.4) | 40 (59.7) | 67 (100) | |
| **TOTAL** | GREEN N (%) | **17 (14.2)** | 7 (5.8) | 7 (5.8) | 31 (25.8) | **K=0.230 (P<0.0001)** **ICC= 0.415 (0.248-0.549)** |
| | YELLOW N (%) | 10 (8.3) | **14 (11.7)** | 39 (32.5) | 63 (52.5) | |
| | RED N (%) | 2 (1.7) | 1 (0.8) | **23 (19.2)** | 26 (21.7) | |
| | TOTAL N (%) | 29 (24.2) | 22 (18.3) | **69 (57.5)** | 120 (100) | |

**Table 5: Comparison between the triage categorization generated from the MDS and the Registered Nurses triage categorization and the impact of work experience in their triage decision.**

The results for the triage categorization of registered nurses versus the one generated from the MDS dataset are presented in table 5. An overall of one hundred and twenty (120) residents were triaged by both MDS and Registered Nurses, with an agreement of 14.2 %, 11.7% and 19.2% respectively for the green, yellow, and red categories. We observed a fair agreement between the two triage methods (K= 0.233), with a statistically significant difference (p<0.0001). We observed a fair agreement (ICC= 0.415), with 90% of RNs being able to triage with an agreement between the poor and moderate agreement levels with the MDS categorization as shown by the 90% CI (0.248-0.549). Twenty one (21) residents were triaged both by using the MDS dataset and by the of CNAs who have less than 1 year of work experience, with an agreements of 9.5%, 4.8%, and 19% respectively for the green, yellow, and red categories. The observed agreement was poor between the two triage categorization methods (k= 0.039). The difference between the two categorization methods for the Less than 1 years of experience group was not significant (p=0.768). Thirty two (32) residents were triaged both by using the MDS dataset and by the CNAs who had 1 to 5 years of experience groups, and we observed an agreement of 15.6%, 15.6%, and 18.8% respectively for the green, yellow, and red categories. The agreement between the two triage categorization methods was fair (k= 0.039). The difference between the two categorization methods for the Less than 1 years of work experience group was significant (p=0.005). Sixty Seven (67) residents were triaged both by using the MDS dataset and by the CNAs who had 6 to 10 years of experience groups, and we observed an agreement of 14.2% , 11.7%, and 19.2% respectively for the green, yellow, and red categories. The agreement between the two triage categorization methods was fair (k= 0.260). The difference between the two categorization methods for the 6 to 10 years of experience group was significant (p<0.0001)

# CHAPTER 3: DISCUSSIONS

We conducted this study to demonstrate the possibility of using a subset of data from a resident's Minimum Data Set (MDS) to assign triage colors to long term care facilities' residents for systematic evacuation of buildings during mass casualty event. The goal was to verify the agreement between the triage categorization based on the subset of MDS data and the categorization performed by the caregivers of said residents. The hope is that facilities in need of evacuation, can generate an MDS report that will quickly and effectively assign a triage categorization and expedite the evacuation process. Demographic information was collected on the caregivers and analyzed using a cross-tabulation for agreement testing between caregivers triage categorization and the triage categorization generated by MDS. Because of the lack of published scholarly papers regarding the triage categorization in long term care facilities, the discussion of our results may be limited.

### a- Demography of Caregivers

The overall number of participant of this study was 51 people, which include 31 (62%) CNAs, 5 (10%) Cooks, 2 (4%) Homemakers, 3 (6%) LPN, and 9 (18%) RNs. Several studies find that the majority of residents in long term care facilities were female, which was also representative in our study. For instance, a study carried out by Schulz, et al. (2004) to evaluate the effect of caring for relative with dementia on caregivers' health and well-being in a long-term care facility found that 81.4% of caregivers were female. Another study carried out by Yu, et al (2009) to study the determining factors of health IT applications acceptance by caregivers in long-term care facilities also found that 95% of caregivers who responded to their survey was female. The sample size of our study was lower compared to all these cited studies, thus the difference in female percentages. The variance in the job level, with certified nursing assistant in the top of the list was also documented by other scholars. The majority of caregivers who responded to Yu, et al (2009) survey were personal caregiver or assistant in nursing (41.8%)

followed by registered nurse (31%). Long term care facilities typically operate with the majority of care provided by certified nursing assistants. Despite the lack of federal regulation about the best staffing level of nursing homes, laws require the presence of at least one registered nurse (RN) for a minimum of eight hours per day, and during the whole week (7 days). Federal laws also requires either an LPN/LVN or an RN to be on duty the whole day (24 hours) (Medicare, n. d). Thus, in most nursing homes the number of CAN is very high compared to RN or LPN. The median age of the caregivers, who participated in our study was 28 (range, 19-63). The average age was 32.28 years. The age caregivers ranged from 19 to 63 years, with statistically significant difference between caregivers' ages (p-value <0.0001). These findings were close to those found by Cocco, and al. (2003), who reported a mean age of 35.33 and a standard deviation of 8.09 for nursing homes caregivers, but different from the results found by Schulz, et al. (2004), that reported a median age of 66.1 with an interquartile range of 63.4-75.2. These differences can also be explained the difference in sample size but also the characteristics of caregivers, which may differs from one place to another.

We find that the majority of caregivers at Hillcrest health services have completed some college classes after the high school. Our results were similar to those find by Schulz, et al. (2004), who reported that 60.6%, 25%, and 14.4% of caregiver had respectively an education above high school, high school, and bellow the high school. In our study there was no caregiver bellow the high school diploma, which can be explained by the difference in countries education and work system or requirements. Also, as the majority of our caregiver were CNAs, it's not surprising to see the high majority of them with less than the BS degree or LPN diploma.

The work experience level of caregivers was mainly between 1 and 5 years (46.9%), which was slightly higher compared to those find by Yu, et al (2009), who reported that 60.5% of caregivers has experiences less than 10 years. We also found that the majority (68%) of our caregivers did not possess any experience in triaging patients or LTC residents for disaster

evacuation. This finding is interesting by the fact that it highlighted the necessity of training LTCF caregivers in disaster preparedness before even the CMS regulation is enforced. The impact of Hurricane Katrina could have been alleviated if more preparedness training was provided to caregivers serving long term care facilities' residents. It is expected that CMS will soon require LTCF to have a preparedness plan, and training for caregivers, thus our study already benefited Hillcrest Health Services, by providing at least a basic training in triage categorization.

### b- Comparisons of Triage Categorizations

Although the main goal of our study was not the comparison between caregivers triage categorization. The triage categorization between CNAs and homemakers, and cooks were in strong or substantial agreement. This can be explained by the duties of these caregivers and to their relationship with residents. Moreover, these caregivers spend more time with residents compared to RN and LPN. Also, and despite the fact that the triage categorization of CNAs and RNs did not achieved the expected agreement, this study also finds that the agreement between triage categorization of RN achieved a better agreement with the triage categorization using the MDS compared to the triage categorization of CNAs. The triage categorization of both the CNAs and RNs versus MDS is somehow related to the work experience, with an exception for the CNAs whose work experience was between 11 and 15 years. This exception can be explained by the number of residents triaged by both this groups and using the MDS. Only nine residents were triaged by CNAs in this work experience group, which was low compared to the other groups. We can speculate that the triage categorization of both the CNAs and RNs who have more years of work experience may have more chance of agreeing with the one generated using the MDS.

### c- Study Limitations

The sample size of our study may limit its generalizability. The just in time training may not have been comprehensive enough because we did not wanted to disrupt the daily activities of

caregivers. Even though we used a simple table with simple wording to explain how to triage residents into the different categories, we suspected there may be an issue in understanding the concept. In the worst scenario case, we may need to review the information used to carry out the triage categorization using the MDS dataset. To maintain resident confidentiality, the researchers did not have access to the MDS dataset. A staff person from Hillcrest extracted all the data from the MDS and provided it to the research team after redacting the resident's names. It became therefore important for the focus group to carefully look back into the BIMS and ADLs contained in the MDS dataset and to try to understand what can explain the discordance between the triage categorization of caregivers versus the one done using MDS.

Upon validation of our results, the study can generalized to other Medicare and Medicaid-certified long-term care facilities, where the MDS is enforced and updated as required by CMS. Unfortunately, we cannot guarantee the generalizability outside the US because we don't know what kind of standard dataset are used in other countries. Also, we cannot be sure at 100% that the results generated from this study will be representative to all nursing homes in the US, mostly due to the varying nature of caregivers across the country.

### d- Conclusion

In conclusion, we were not able to achieve the expected agreement (at least 90%) between caregivers' and MDS generated triage categorizations. However, this study was worth to be conducted, because the concept of using the MDS data of LTC residents to generate their triage code took us closer to the development of an innovative way of categorizing LTCFs residents for the systematic evacuation of buildings before or during mass casualty disaster. Also, it yields the urgent necessity of giving preparedness education to LTCF caregivers before even the CMS upcoming regulation is implemented. It also gives us more information about the variation in the results of triage categorization carried out by caregivers. In the light of our results, we recommend that the focus groups reconvene and re-examine the BIMS and ADLs datasets and

explore other subsets to establish a triage categorization that is in better agreement with that provided by the caregivers; and then make a new comparison with the already available caregiver triage designations. Another recommendation would be to redesign the study by reviewing the sample, and by giving more time for the just in time training so that caregivers have a better understanding of the triage categories. Upon validation of the future results, this study will be an important milestone toward the automation of triage methodology within LTCF, which will facilitate the systematic evacuation of long term care facilities' residents during disasters.

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# I- CAREGIVERS' TRIAGE CATEGORIZATION FORM

### 1- Demographic

Work Place (Please check one)

___Hillcrest Health & Rehab (HHR)          ___Hillcrest Country Estates (HCE)

Caregiver Full Name (Please write your full name): _____

Date of Birth (MM/DD/YYYY): _____/_____/_____

Gender (Please Check One): ___ Male          ____Female

Residency (Please write): _____

Level of education (Please check one)

___ Less than high school                          ___ High School

___Some College (no degree)                      ___Associate Degree

___ Bachelor Degree (BS)                          ___Master Degree (MS)

___Other (please Specify): _____

Profession (Please check one)

___ Caregivers                                   ___Certified Nursing Assistant (CNA)

___Registered Nurse (RN)                         ___Other (Please specify): _____

How many year of experience do you have working as caregiver? _____ (Years)

Do you have any experiences in triaging from your current or previous position? (Please Check

One)   ___YES                          ___NO

**2- Triage Categorization** (Based on the training your received please fill out the following table)

| Patient Number | Patients Full name (Please clearly write the full name of the patient) | Triage Category (Please Check one for each patients) |
|---|---|---|
| 1 | | __Green<br>__Yellow<br>__Red |
| 2 | | __Green<br>__Yellow<br>__Red |
| 3 | | __Green<br>__Yellow<br>__Red |
| 4 | | __Green<br>__Yellow<br>__Red |
| 5 | | __Green<br>__Yellow<br>__Red |
| 6 | | __Green<br>__Yellow<br>__Red |
| 7 | | __Green<br>__Yellow<br>__Red |
| 8 | | __Green<br>__Yellow |

|   |   |   |
|---|---|---|
|   |   | __Red |
| 9 |   | __Green<br><br>__Yellow<br><br>__Red |
| 10 |   | __Green<br><br>__Yellow<br><br>__Red |
| 11 |   | __Green<br><br>__Yellow<br><br>__Red |
| 12 |   | __Green<br><br>__Yellow<br><br>__Red |
| 13 |   | __Green<br><br>__Yellow<br><br>__Red |
| 14 |   | __Green<br><br>__Yellow<br><br>__Red |
| 15 |   | __Green<br><br>__Yellow<br><br>__Red |

# II-   RAI MANUAL DEFINITIONS (MDS MANUAL)

| ACTIVITIES OF DAILY LIVING (ADLs) | | BIMS |
|---|---|---|
| ADL assistance -  See below for the columns<br>**Green:** If column 1 was coded a 0, 1,2 and column 2 was coded a 0 or 1<br>**Yellow:** If column 1 was coded a 2 and column 2 was coded a 0, 1, or 2<br>**Red:** If column 1 was coded a 3, 4, 7, 8 and column 2 was coded a 2,3,8 | | **Green:** 13-15 **Yellow:** 8-12<br>**Red:** 0-7 |
| **COLUMN 1**<br>**ADL Assistance Needed** | **COLUMN 2**<br>**Number Of Team Members (Staff) To Assist** | |

| | | |
|---|---|---|
| **Code 0, independent:** if resident completed activity with no help or oversight **every time** during the 7-day look-back period and the activity occurred at least three times.<br>**Code 1, supervision:** if oversight, encouragement, or cueing was provided **three or more times** during the last 7 days.<br>**Code 2, limited assistance:** if resident was highly involved in activity and received physical help in guided maneuvering of limb(s) or other non-weight-bearing assistance on **three or more times** during the last 7 days.<br> **Code 3, extensive assistance:** if resident performed part of the activity over the last 7 days and help of the following type(s) was provided **three or more times**:<br>— Weight-bearing support provided **three or more times, OR**<br>— Full staff performance of activity **three or more times** during part but not all of the last 7 days.<br>**Code 4, total dependence:** if there was **full staff performance** of an activity with no participation by resident for any aspect of the ADL activity and the activity occurred three or more times. The resident must be unwilling or unable to perform any part of the activity over the entire 7-day look-back period.<br>**Code 7, activity occurred only once or twice:** if the activity occurred **fewer than three times**.<br>**Code 8, activity did not occur:** if the activity did not occur or family and/or non-facility staff | **Code 0, no setup or physical help from staff:** if resident completed activity with no help or oversight.<br>**Code 1, setup help only:** if resident is provided with materials or devices necessary to perform the ADL independently. This can include giving or holding out an item that the resident takes from the caregiver.<br>**Code 2, one person physical assist:** if the resident was assisted by one staff person.<br>**Code 3, two+ person physical assist:** if the resident was assisted by two or more staff persons.<br>**Code 8, ADL activity itself did not occur during the entire period:** if the activity did not occur or family and/or non-facility staff provided care 100% of the time for that activity over the entire 7-day period. | The BIMS total score is highly correlated with Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975) scores. Scores from a carefully conducted BIMS assessment where residents can hear all questions and the resident is not delirious suggest the following distributions:<br><br>**13-15:** cognitively intact<br>**8-12:** moderately impaired<br>**0-7:** severe impairment |

## III- CONSENT FORM

**TITLE OF STUDY: Using MDS (Minimum Data Set) Data to Triage Residents for Systematic Evacuation of Long Term Care Facilities.**

**PRINCIPAL INVESTIGATOR:** Zoumana Isaac TRAORE

Department of Health Promotion, Social and Behavioral Health

College of Public Health, University of Nebraska Medical Center

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Zoumana.traore@unmc.edu, smedcalf@unmc.edu

**PURPOSE OF STUDY**

You are being asked to take part in a research study. Before you decide to participate in this study, it is important that you understand why the research is being done and what it will involve. Please listen carefully and feel free to ask the researcher if there is anything that is not clear or if you need more information.

The purpose of this study is to demonstrate that triage categories can be assigned to long term care residents using the MDS dataset. These triage categories can be used for systematic evacuation of long-term care facilities residents in the case of mass casualty disaster.

We think that developing a triage methodology (using the MDS dataset) that can be used for the systematic evacuation of any long-term care facility within the U.S could fill this gap under the utilitarian perspective by "doing the greatest good for the greatest number

of patients." This model can have a potential of evacuating long-term care facilities promptly, thus saving lives.

**STUDY PROCEDURES**

Your participation in this study will involve a short just-in-time training on assigning triage categories to your residents. After the training you will be asked to assign triage color categories (Green or Yellow or Red) to residents you are caring for at Hillcrest Health & Rehab (HHR) or the Hillcrest Country Estates (HCE). You will use your best knowledge on your residents' health, physical, and mental status to assign a category. This will be done using a Caregivers' Triage Categorization Form, which you will then return to the study investigator. In addition to your residents triage category, you will be asked a few questions about yourself, but please know that none of your personal identification information will be collected and your form is completely anonymous. The training and the forms will be completed the same day, and you will be given enough time to do both.

On the same day, we are going to generate a report from your resident's MDS and assign a triage category based on BIMS and ADL scores. Eventually we will compare your triage categories with the ones from the MDS

**RISKS**

There are no risks related to your participation to this study. Your forms will not contain any personal identifiable information. You may decline to answer any or all questions and you may terminate your involvement at any time if you choose. Your participation is completely voluntary

**BENEFITS**

There will be no direct benefit to you for your participation in this study. However, we hope that the information obtained from this study may contribute to the development of a sound triage methodology for systematic evacuation of long term care facilities' residents during disasters. You will however benefit from the knowledge you'll gain in assigning triage categories for evacuation of healthcare facilities

**CONTACT INFORMATION**

- If you have questions at any time about this study, or you experience adverse effects as the result of participating in this study, you may contact the researcher whose contact information is provided on the first page. If you have questions regarding your rights as a research participant, or if problems arise which you do not feel you can discuss with the Primary Investigators at

 **Zoumana Isaac TRAORE at phone: 678-613-5073, or email: zoumana.traore@unmc.edu**

 **Sharon Medcalf by phone: 402-552-2529, or by email: smedcalf@unmc.edu**

**CONSENT**

If you are willing to participate in this study the researchers will provide a short training and give you a form to complete. Remember that your participation is voluntary and that you are free to withdraw at any time, without giving a reason and without cost. You voluntarily agree to take part in this study by verbally confirming your willingness to participate.

**University of Nebraska Medical Center**

NEBRASKA'S HEALTH SCIENCE CENTER                    Office of Regulatory Affairs (ORA)
                                                    Institutional Review Board (IRB)

March 16, 2016

Zoumana Traore, BS

COPH Hlth Pr, Soc & Behv Health

UNMC - 4365

**IRB #** 105-16-EX

**TITLE OF PROPOSAL:** USING MDS (Minimum Data Set) DATA TO TRIAGE RESIDENTS FOR SYSTEMATIC EVACUATION OF LONG TERM CARE FACILITIES.

The Office of Regulatory Affairs (ORA) has conditionally approved your exempt proposal pending modifications to the following:

**IRB APPLICATION**
1. Our records show that CITI training is current. Be advised that any investigators and/or participating personnel added in the future will need to be CITI trained before they are added to assist with the study.
The CITI website can be accessed at http://citiprogram.org to update certifications.
2. Upon review, it was noted that the data being used by the patients in the long term care facilities is all de-identified, so they are not considered human subjects. The subjects would be the 24 CNA_s.
Therefore, please modify sections II.3, II.5 and II.7
3. Please change II.12 to NO as there are no direct benefits to the subjects.
4. Your study qualifies for exemption under category 2. Please modify section II.17 by checking category 2, not 5 as you currently submitted.

**DOCUMENTS**
1. The Caregiver Triage categorization form is noted and appropriate.
2. The Verbal Consent form has been simplified and moved to the consent form file in the documents section. Please review and confirm by email that you agree with the modifications made. If you feel further changes are required, you may make them to the form.
Please make your revisions to the IRB on-line application and appropriate forms and resubmit for further review. If you have questions, please do not hesitate to contact me.

Sincerely,

Signed on: 2016-03-16 10:23:00.000

Gail Kotulak, BS, CIP
IRB Administrator III
Office of Regulatory Affairs

NEBRASKA'S HEALTH SCIENCE CENTER                    Office of Regulatory Affairs (ORA)
                                                    Institutional Review Board (IRB)


March 22, 2016


Zoumana Traore, BS
COPH Hlth Pr, Soc & Behv Health
UNMC – 4365

IRB # 105-16-EX


TITLE OF PROPOSAL: USING MDS (Minimum Data Set) DATA TO TRIAGE
RESIDENTS FOR SYSTEMATIC EVACUATION OF LONG TERM CARE FACILITIES.

The Office of Regulatory Affairs (ORA) has reviewed your application for
Exempt Educational, Behavioral, and Social Science Research on the above-titled research
project. According to the information provided, this project is exempt under 45 CFR 46:101b,
category 2. You are therefore authorized to begin the research.

It is understood this project will be conducted in full accordance with all applicable HRPP
Policies. It is also understood that the ORA will be immediately notified of any proposed
changes for your research project.

Please be advised that this research has a maximum approval period of 5 years from the
original date of approval and release. If this study continues beyond the five year approval
period, the project must be resubmitted in order to maintain an active approval status.

Sincerely,

Signed on: 2016-03-22 10:36:00.000

Gail Kotulak, BS, CIP
IRB Administrator III
Office of Regulatory Affairs