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## Rationale and study protocol for the Nursing Home Compare Plus (NHCPlus) randomized controlled trial: A personalized decision aid for patients transitioning from the hospital to a skilled-nursing facility

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### Abstract

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**Background**—Annually more than 3 million people are admitted to one of the 15,965 skilled nursing facilities (SNFs) in the United States with 90% of admissions occurring from a hospital. Although the Centers for Medicare and Medicaid Services (CMS) publishes several web-based report cards, including one for nursing homes (Nursing Home Compare, NHC), they are not widely used. This is due, in part, to the complexity of the information available and the fact that the choice of nursing homes is typically made while in the hospital without access to the web-based NHC. We developed Nursing Home Compare Plus (NHCPlus) to address these limitations and to improve the decision-making process.

**Methods/Design**—This paper describes the design and rationale of a two-arm randomized controlled trial designed to test the effectiveness of NHCPlus compared to usual care only, in a sample of patients being discharged from the hospital to an SNF (N=229). Assessments were conducted within 24-hours prior to patient discharge and 30-days post discharge. Primary outcomes to be examined included use of NHC, increased choice of nursing homes with better reported outcomes, and increased distance between patient/family residence and nursing home. Secondary outcomes included satisfaction with the decision to go to a nursing home, confidence in the choice of nursing home, and reduced hospital length of stay.

**Discussion**—NHCPlus is an innovative mobile application designed to allow patients to personalize their choice of nursing homes to meet their medical needs and preferences. The application to other quality report cards is discussed.

## Background

In any given year, more than 3 million persons enter a nursing home in the United States, either as long-term care (LTC) residents or as post-acute (PAC) patients.<sup>1</sup> LTC residents typically enter with the expectation that they will spend long periods of time in the facility, possibly a year or two, and perhaps the rest of their lives. PAC patients are expected to have short stays of a few weeks and to return to the community after their rehabilitation care goals have been achieved.

Nursing homes vary in the quality of care they provide to their residents, an issue of concern for decades.<sup>2,3</sup> To address this concern, the Centers for Medicare and Medicaid Services (CMS) have been publishing the web-based Nursing Home Compare (NHC) quality report-card since 2002 (see <https://www.medicare.gov/nursinghomecompare/About/What-Is-NHC.html>).<sup>4</sup>

The NHC report card provides information on all Medicare and Medicaid certified facilities, which comprise more than 90% of all nursing homes in the country. As with other report cards, the expectation was that making this information available on the web would improve consumer use; yet despite these expectations, the empirical evidence to-date about the success of NHC is mixed.<sup>5–11, 12</sup> The reasons for the mixed results are complex and multifaceted. However, two potential factors may explain why consumer use of NHC is limited: 1) the circumstances under which nursing home choices are typically made, and 2) the complexity of the information provided in NHC.

Nursing home choice is typically made under both time constraints and emotionally stressful conditions. More than 90% of patients enter the nursing home directly from the hospital, and

only have a few hours to several days to make a decision. Most people do not have nursing home experience, do not know what to look for in nursing home care, and do not have the opportunity to visit the facility before choosing. Therefore, they rely on the hospital discharge planners to make the choice for them, in concert with family.<sup>13</sup>

Even if they are aware of and can gain access to NHC, the complexity of the information presented on NHC creates a barrier. For each SNF, NHC includes information on staffing, health inspections, and 19 clinical quality measures. These measures are only minimally correlated, making it impossible for consumers to identify a nursing home that excels in all dimensions —i.e. there is no “best” nursing home. While NHC also offers composite measures of quality the —5 Star rankings —these are “one size fits all”, which does not allow for the large heterogeneity in patients’ own medical needs and preferences.

To address these limitations, we developed Nursing Home Compare Plus (NHCPlus). NHCPlus is an innovative mobile application designed to improve the decision making process for patients and families by 1) educating the user about the quality measures (QMs) reported in NHC; 2) eliciting the user’s preferences; and 3) providing the user with a sorted list of nursing homes based on the users preferences and the NHC reported QMs. Furthermore, NHCPlus is made available to patients and their families at the hospital bedside for as long as they need to make the decision.

We hypothesized that NHCPlus would increase patients’ use of the federal report card (NHC), increase the selection of higher quality nursing homes, and increase the distance patients and families would be travelling between their residence and the nursing home, as they tradeoff proximity for better quality. We also hypothesized that users would feel more satisfied with their decision, more confident in their choice of nursing home, and have a shorter hospital length of stay.

In this article, we explain the protocol for a randomized controlled trial to assess the feasibility and effectiveness of the NHCPlus mobile application. We also describe the three different components of NHCPlus. Finally, we provide baseline data describing the sociodemographic and health characteristics of the study sample.

## Methods/Design

### Study design

The NHCPlus intervention was evaluated using a two-arm randomized controlled trial (RCT; Figure 1). All study comparisons were between patients randomly assigned to the NHCPlus group plus usual care versus those assigned to usual care only. The design, conduct, and reporting of this RCT adhered to the Consolidated Standards of Reporting Trials (CONSORT) guidelines for trials. Human subjects approval for this study was obtained from the Institutional Review Board of the University of California, Irvine. Patients or their surrogates provided informed written consent.

## Study setting

Patients were recruited from a 411-bed acute care hospital (University of California, Irvine Medical Center; UCIMC) providing tertiary and quaternary care, ambulatory and specialty medical clinics, behavioral health and rehabilitation. UCIMC is located in Orange County, California. The study recruitment period was February 12, 2013 through August 20, 2015.

## Eligibility screening and recruitment

Study eligibility criteria for patients were age 50+, a discharge plan that included being sent to a skilled nursing facility (SNF), English-speaking or having a surrogate who is English-speaking, and being an inpatient in the Departments of Medicine or Surgery. Family members, if they were involved in the patient's choice of selecting a nursing home, were also recruited for the project as joint decision-makers with the patients, provided they were 18 years or older and English-speaking. Patients who came to the hospital from a long-term care facility were not eligible to participate in the study because they were "experienced" and, therefore, would be a very different population.

The recruitment process was initiated by UCIMC Hospital Discharge Planners (e.g. Nurse Case Managers) who identified inpatients at UCIMC being discharged to a nursing home who met our inclusion criteria. As part of usual care, once an attending physician recommended a discharge to a skilled nursing facility, the Nurse Case Manager associated with the patient's medical team became responsible for working with the patient, the family or the surrogate to identify the nursing home the patient would be discharged to, and to arrange admission to that facility. When the Nurse Case Manager identified a potentially eligible patient, she or he contacted the study Research Coordinator who then approached the patient, described the study to the patient, and obtained consent from the patient. Patients were approached in their patient rooms, and all attempts were made to protect patient privacy. If the patient had a formal surrogate documented in his or her Medical/Health record, the Research Coordinator, in coordination with the Nurse Case Manager, attempted to approach this surrogate directly. All attempts were made to contact the surrogate in-person. Telephone calls were also made to set-up a time in which to meet in-person at the hospital.

If a patient was unable to provide consent due to diminished capacity (discussed in greater detail below), the Research Coordinator, in coordination with the Nurse Case Manager, attempted to contact, either by telephone or by in-person contact, the patient's family member (or designated contact if noted in the patient Medical/Health record) to recruit the potential participant. Contacting family or surrogates by telephone is also part of the usual routine care for Nurse Case Managers.

Whenever possible, the Research Coordinator attempted to obtain informed consent directly from the patient. If the potential research participant was disoriented, unconscious or otherwise obviously lacking in decision-making capacity, the Research Coordinator documented this observation in the research record and in the patient's medical record, and then proceeded with the steps required by state law for *Identifying Persons to Provide*

*Surrogate Consent.* Written consent was obtained from either the patient or from the patient's surrogate prior to enrollment in the study.

## Randomization

Recruitment was conducted prior to randomization. Patients were randomly allocated into either the intervention group or the usual care alone group using a computer-generated random number producing algorithm. To ensure a balanced group design, a block randomization schedule was used in which patients were stratified by type (long-term care (LTC) residents or as post-acute care (PAC) patients) to ensure balanced group assignment. Nurse Case Managers determined prior to randomization if a patient was being discharged as LTC or PAC.

## Study population and enrollment

Three hundred and twenty-three patients or surrogates were approached to participate in the study (see Figure 1). Thirty people (approximately 9.3%) refused to participate. Of the 153 patients assigned to the intervention, 105 completed the exit survey and were discharged to a skilled nursing facility, 15 did not complete the exit survey, but were discharged to a skilled nursing facility, and one died. Of the 140 patients assigned to the control arm, 95 completed the exit survey, 14 did not complete the exit survey but were discharged to a skilled nursing facility, and five died. Fifty-eight patients were removed from the sample because ultimately they were not discharged to a skilled nursing facility (i.e., the plan of care changed while in the hospital after the patient had already been consented and randomized into the study). Their data will not be included in any study analyses. The final analytic sample included 229 patients/surrogates for all analyses that used data gathered from patients' medical records, and 200 patients/surrogates for analyses that used data gathered from the exit survey.

Characteristics of the study sample are presented in Table 2. The majority of patients were categorized as being PAC (n=224, 98.8%), whereas only five patients were categorized as being discharged to a SNF as LTC. The patient sample was predominately female (58.3%) with an average age of 75.1 (SD=10.2). The sample mirrored the ethnic/racial composition of the county. The majority of the study sample had a high school education or less (51%), and more than half of the sample had an income of \$40,000 per year or less (54%). Most of the sample was married/living with a partner (40.8%), widowed (24.1%), or divorced/separated (18.4%). Patients' health before entering the hospital was generally fair or poor (Mean= 3.5 [SD=1.2] on scale of 1=Excellent and 5=Poor). On a 1–10 scale pain, on average, was rated as a 4.9 (SD=2.8), with '10' being severe pain. The average length of stay in the hospital was 8.8 days (SD=7.6).

The 120 participants who were discharged to an SNF and received NHCPlus were discharged to nursing homes in 67 different zip codes, reflecting the wide geographic catchment area for UCIMC. The top five zip codes included the following: 92868, 92806, 92708, 92841, and 92870, with approximately 26% of users selecting nursing homes in these zip codes. UCIMC is located in 92868, which according to the NHC website has approximately 140 nursing homes within 25 miles from its center. Similarly, 92806 has approximately 187 nursing homes and 92708 has 131 nursing homes within 25 miles from

the centers, reflecting the wide choice of nursing homes available for users willing to travel this distance.

## Intervention

Patients randomized to the intervention group were given access to the NHCPlus mobile application via an iPad that was secured to the patient bed. Each patient was given a unique password that ‘unlocked’ the program. Participants had access to this iPad throughout their remaining hospital stay. Family members were also encouraged to use the iPad with the patient. Patients and families access to NHCPlus ranged from a few hours to several days depending on how late in their stay the decision on a nursing home discharge was made.

The NHCPlus mobile application consists of three components/modules: (1) an Educational Module to convey information about the nature and importance of the staffing, deficiencies, and quality measures available as part of the federal nursing home report card (<https://www.medicare.gov/nursinghomecompare/search.html>); (2) a Preference Elicitation Module to guide patients in identifying and prioritizing the most important indicators to them when selecting a skilled nursing facility; and (3) an Outcomes Module to provide an ordered list of nursing homes in the patient’s pre-specified geographic area (e.g., patient can select zip code and radius in which to conduct the search). Each of these is described in more detail below:

**Educational Module**—The NHCPlus mobile application first takes users through a series of screens educating them on the various measures of nursing home quality that are available in the Federal Report Card, NHC, and describing to users why this information might be important and useful to their decision (see Figure 2 and Figure 3). Through the government site (<https://www.medicare.gov/nursinghomecompare/search.html>), the information that is available to consumers includes data about staffing levels (e.g., RN hours per resident day), state inspection statistics, and clinical quality measures (e.g., the percent of residents in pain, in physical restraints, or with pressure sores). For ease of exposition we refer to all, including staffing and deficiency measures, as quality measures, or QMs. The NHC data come from two different sources: a) the CMS’s health inspections database, which includes the nursing home characteristics, health deficiencies issued during the three most recent state inspections and recent complaint investigations, issued penalties, as well as data about staffing; and b) the Minimum Data Set (MDS), which includes assessments performed by the nursing home at regular intervals on every resident (<https://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/IdentifiableDataFiles/LongTermCareMinimumDataSetMDS.html> accessed 10/19/15).

In 2008, CMS further improved NHC by introducing the “5 Star” system that offers, in addition to the individual measures, an overall composite measure and three composite measures for the three main domains: health inspections, staffing, and 10 of the 18 of the clinical quality measures.<sup>14, 15</sup> Nursing homes are rated in each of these 4 categories and can receive between 1 and 5 stars, with 5 being the best.

The education module was designed to provide the user with an understanding of the kinds of data available on the NHC website, but in a format that was easy to understand and user friendly. Users of the app had the option of reading a brief overview of the meaning of each



QM (see Figure 4 for an example), a detailed explanation of the meaning of each QM, and an example using patient vignettes in the form of short stories describing why this QM might be important to patients or families in their selection of a skilled nursing facility. We attempted to gear all text to a 5<sup>th</sup> grade reading level or less. The PAC version of NHCPlus (which includes both PAC QMs and LTC QMs) explained that while the LTC QMs are calculated on a different population, namely the LTC population, it may be relevant to the PAC patient as well.

**Preference Elicitation Module**—This module was also developed with two versions – one for the PAC patients and one for the LTC patients. Data about staffing levels (e.g., RN hours per resident day), state inspection statistics, and number of physical therapists was included in both versions. The LTC version also included all the LTC QMs, except for the two vaccination measures, which exhibit a strong ceiling effect and only minimal variation across nursing homes. The PAC version included staff and deficiencies and the three short-stay measures: pain, pressure ulcers, and use of antipsychotic medications. This version also included an option for the user to consider the LTC measures, if the user felt they were relevant, despite the fact that these QMs were measured on a different population. A short explanation for the user about these measures was included.

Post-acute patients were first asked to consider the six short-stay QMs. They were prompted to rank these QMs on a scale from 1 (not at all important) to 10 (very important). Users were told that they were not required to use all the QMs, and that they were allowed to rank priorities at the same level (i.e. ties were allowed). After being presented with a list of nursing homes (described in the outcomes module below), post-acute patients were then asked if they wanted to include QMs that were calculated on the long-term patient population. Users who indicated they were interested were then allowed to repeat the preference elicitation exercise, this time with the additional 9 clinical quality measures added to the screen. The screen saved their previous ranking of the short stay QMs, but allowed users to re-rank all they measures if that was their preference.

Patients designated as long-term care were presented with the 12 clinical QMs plus staffing and state inspection measures, for a total of 14 QMs. They were asked to rank these indicators on a scale of 1 (not at all important) to 10 (very important). Similarly, users were instructed that they were not required to use all of the 14 QMs, and that they were allowed to rank priorities at the same level (i.e., ties were allowed).

**Outcomes Module**—After ranking the measures, patients were provided with a list of nursing homes with a composite rating based on their own preferences combined with NHC QMs, ranked from highest quality score to lowest (see Figure 5 for an example). Users had the option to go back and re-re-rank their QMs, add price, or sort manually. When users felt their list reflected their preferences, they directly sent their ranked and sorted list electronically through the app to the Nurse Case Manager who was responsible for the discharge planning of patients as part of usual care procedures. The information was sent from NHCPlus using a secure direct task link set up by UCI Informatics to ECIN, the program used by the UCIMC hospital to manage patient discharge as part of its regular care procedures.



## Control group

Patients assigned to the control group continued to receive usual care only. This involved having a case manager present a minimum of three nursing homes to the patient or surrogate, and allowing the selection of placement based on the choices made from this list.

## Sources of Data

### **Short survey assessing the usability and acceptability of NHCPlus—**

Participants assigned to the NHCPlus arm were asked to respond to a short survey on the iPad about the usability, understandability, and friendliness of the application once they had completed their use of NHCPlus. Specifically, they were asked ten short questions about their experiences and preferences using the NHCPlus program. These questions were adapted from the web site usability questionnaire.<sup>16</sup> Sample questions included “I would use NHCPlus again”, “I would recommend NHCPlus to a friend”, “In general, I found it difficult to locate the information I needed within NHCPlus”, “The information was very helpful”, and “I became frustrated using NHCPlus to search for information.”

**Functionality of NHCPlus—**Logging functionality was programmed into the NHCPlus application. For example, the following usage statistics were recorded for each user: the number and length of time (in minutes and seconds) of the NHCPlus sessions in which the patient or family engaged, how much time they spent with specific functions of the app, which functions they returned to and how often, as well as other usage characteristics.

**Exit survey—**All patients, intervention and control, were administered an ‘exit’ questionnaire by the Research Coordinator just prior to discharge from the hospital. Either the patient or the family member/surrogate was asked to complete the survey. Surveys were read to participants by our Research Coordinator. The following areas were assessed in the patient survey: level of decision certainty, satisfaction with decision, level of and satisfaction with the involvement of others in the decision, prior nursing home experience, use of information from external sources (e.g. CalQualityCare.org, NHC, friends and/or family), general technology, computer and internet experience, satisfaction with care at UCIMC, patient (and family member) general health and mental health status, patient socio-demographics, quality of the patient/decision maker (e.g., surrogate) relationship, and future time perspective. The family/surrogate survey collected the same information, in addition to asking about the socio-demographic and health status of the surrogate.

**30-day follow-up survey—**All patients, intervention and control, were administered a follow-up survey 30-days post-hospital discharge. Either the patient or the family member/surrogate was asked to complete the telephone survey. The survey assessed the following areas: satisfaction with decision, and importance of, and satisfaction with, care at the skilled nursing home to which the patient was discharged with respect to a number of dimensions, including the following: quality of food, cleanliness, physical environment, social environment, recreational activities, attentiveness to residents, quality of routine and emergency medical care, personal security, and quality of communication with residents and family members. The family/surrogate questionnaire collected the same information.

**Medical record abstraction**—The following information was abstracted from all patients' medical records: patient race/ethnicity, age, gender, address of patient residency, name of nursing home to which the patient was discharged, patient diagnoses, admission and discharge date (to calculate length of stay), HIV, mental health, and MRSA status, as well as patient insurance type.

### Outcomes assessments

The primary objective of the study was to assess the effectiveness of NHCPlus in enhancing consumers' use of the NHC report card and the potential it has for future improvement on a large scale.

In future work, we will test the following hypotheses to determine the effectiveness of NHCPlus:

H1: The availability of NHCPlus at the bedside increases the use of NHC information in the choice of nursing homes by hospital discharged patients. H1 will be assessed through the exit survey administered to all patients after the selection of a nursing home.

H2: The availability of NHCPlus increases the choice of nursing homes with better reported outcomes. H2 will be assessed through data obtained from the NHC web based report card.

H3: The availability of NHCPlus increases the distance between patient/family residence and the chosen nursing homes. H3 will be assessed through a comparison between patient's current residence obtained from address information noted in the patient's medical report and the distance to the nursing home using Googlemaps.

Secondary outcomes included satisfaction with the decision to go to a nursing home, confidence in the choice of nursing home, and reduced hospital length of stay. Data assessing satisfaction and confidence ratings will be assessed through the exit survey, and hospital length of stay will be obtained from the patient medical record. We chose these secondary outcomes because we hypothesized that if patients were involved in the decision they would not only come to a decision faster, but also feel more satisfied with decision, thereby expediting the communication of their choice to the case manager and facilitating the discharge process.

Additional analyses will be conducted to assess the usability and acceptability of NHCPlus, and to identify a) sub-groups of consumers that may have benefited more or less from using NHCPlus; b) sub-components of NHCPlus that were more or less useful; and c) the interaction between the two. This information will be useful in guiding future improvements to NHCPlus.

### Sample size calculation

We calculated the sample size required to detect an effect size of 25% when comparing means of two samples (the intervention and control groups) with equal variances and equal size, with an  $\alpha$  of 0.05 and a  $\beta$  of 0.80 for several important quality measures. Table 1 shows the minimum size for each group that is required to detect this effect size. The data used for

these calculations were based on means and standard deviations calculated from data reported for the 76 nursing homes in Orange County, CA in NHC (accessed on 2/15/2012). We chose an effect size of 25% because our prior experience with the QMs indicated that this was a feasible and meaningful difference.

## Discussion

Quality report cards have become an important component of the American health care system. CMS publishes several web-based report cards, including Nursing Home Compare. For every skilled nursing home that receives federal support, detailed information about staffing, deficiencies, and 19 different clinical quality measures is available for consumers. The data come from two different sources: a) the CMS's health inspection database, which includes both the nursing home characteristics and health deficiencies issued during the three most recent state inspections and recent complaint investigations, as well as data about staffing and penalties issued to the nursing homes; and b) the Minimum Data Set (MDS), which includes assessments performed by the nursing home at regular intervals on every resident (<https://www.cms.gov/Research-Statistics-Data-and-Systems/Files-for-Order/IdentifiableDataFiles/LongTermCareMinimumDataSetMDS.html> accessed 10/19/15).

Research suggests, however, that these federal report cards are not being used to their greatest potential, perhaps because of the complexity of the information being presented. The '5 Star' system was designed by CMS to help patients and their families interpret the large amount of data available on the Nursing Home Compare website. This system, however, is a composite measure based on experts' opinion, and does not take into account the personal preferences and unique health characteristics of patients and/or their families.

The NHCPlus study is the first randomized controlled trial comparing the effectiveness of the personalized version of NHC to usual care. The innovation of NHCPlus is that it improves accessibility for patients and their families by enhancing the ability of users to incorporate information about quality in NHC and ranking their own personal care needs and priorities, with the ability to trade off different dimensions of quality with other important attributes (e.g. distance and price), all while making this information accessible to patients at the bedside in the hospital. It is designed in the spirit of patient centered care.

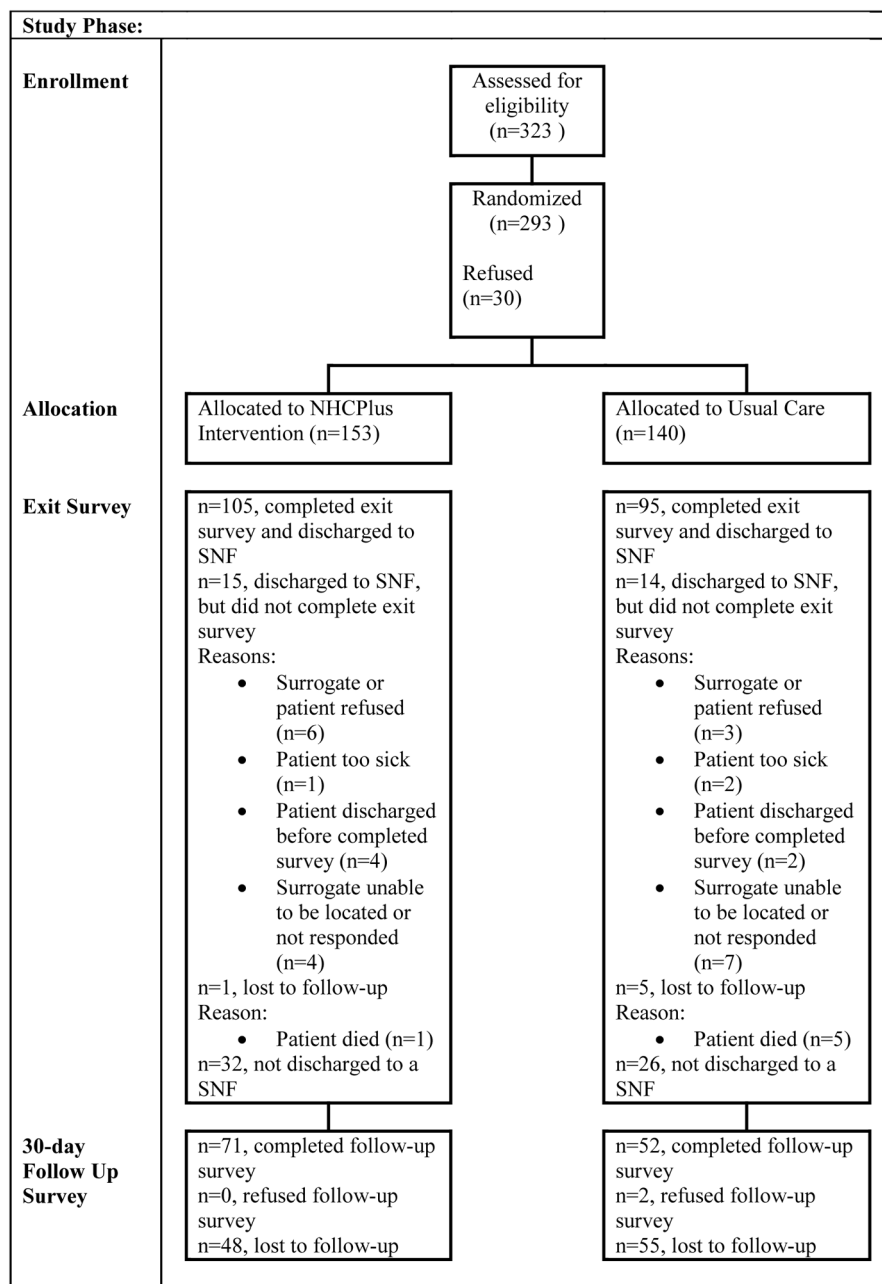
The current study does have some limitations. First, the study was limited to one hospital, which is an academic medical center. However, because of UCIMCs central location and historical referral patterns, its patient population reflects the ethnic and racial diversity of the county. Second, we did not include patients who did not speak-English, unless they had a family member or surrogate who did speak English. If NHCPlus proves to be effective, then it could easily be adapted to include other languages. We also excluded patients younger than 50. While individuals younger than age 50 are not the majority of nursing home admissions, future studies should consider including any patient who is being discharged to a skilled nursing facility, irrespective of their age. The lessons learned from this study, however, will have direct application to improving the use of Nursing Home Compare for consumers. The findings may also have implications for other report cards in the 'Compare' series, such as Home Health Compare or Health Plan Compare.

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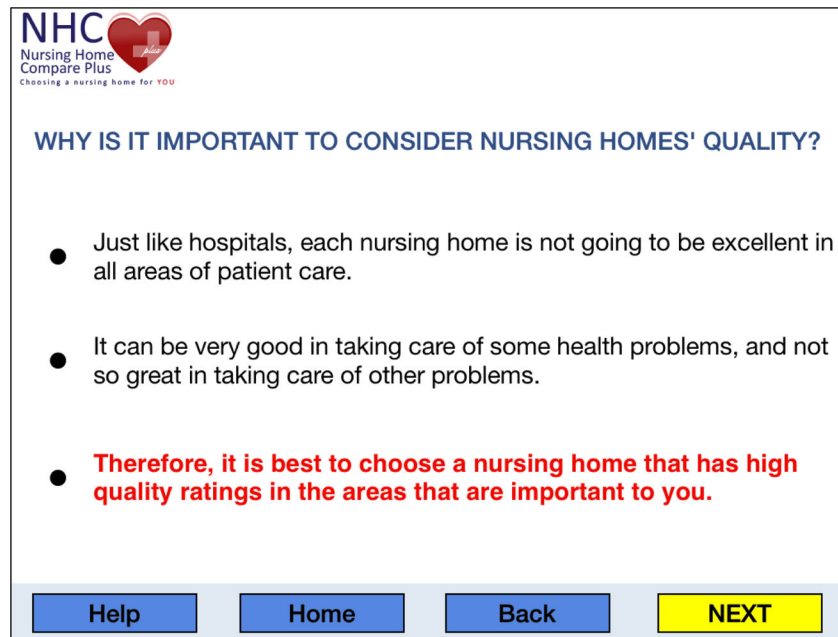
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**Figure 1.**  
Consort Diagram



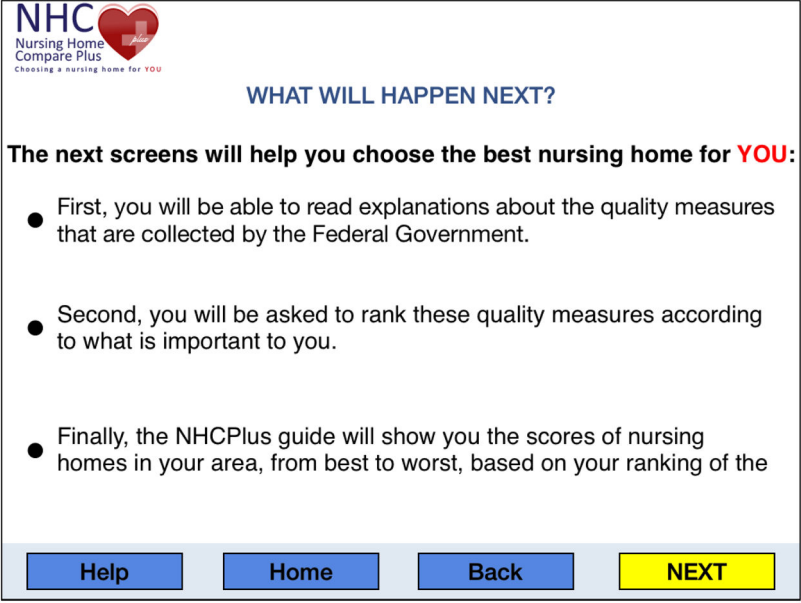
**NHC**  
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Choosing a nursing home for YOU

### WHY IS IT IMPORTANT TO CONSIDER NURSING HOMES' QUALITY?

- Just like hospitals, each nursing home is not going to be excellent in all areas of patient care.
- It can be very good in taking care of some health problems, and not so great in taking care of other problems.
- **Therefore, it is best to choose a nursing home that has high quality ratings in the areas that are important to you.**

Help Home Back **NEXT**

**Figure 2.**  
Rationale for NHC Plus



**NHC**  
Nursing Home  
Compare Plus  
Choosing a nursing home for YOU

**WHAT WILL HAPPEN NEXT?**

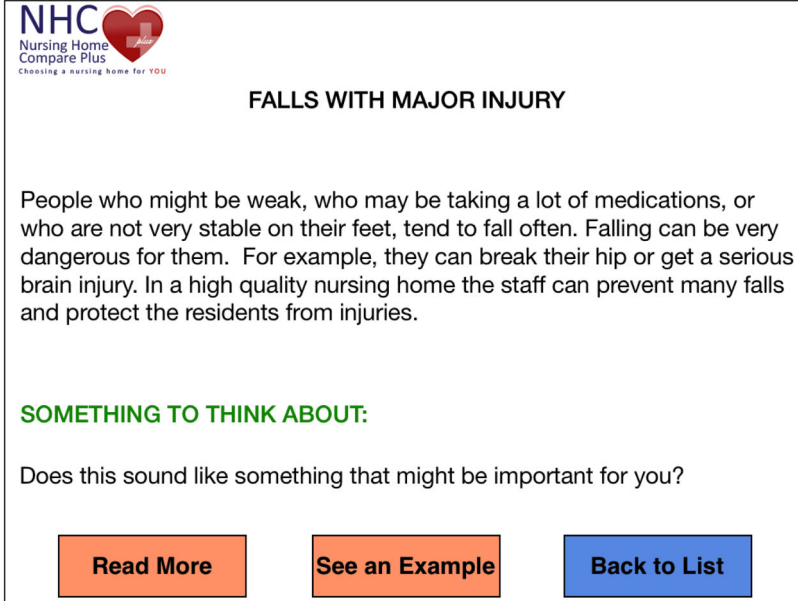
**The next screens will help you choose the best nursing home for YOU:**

- First, you will be able to read explanations about the quality measures that are collected by the Federal Government.
- Second, you will be asked to rank these quality measures according to what is important to you.
- Finally, the NHCPlus guide will show you the scores of nursing homes in your area, from best to worst, based on your ranking of the

Help Home Back **NEXT**

**Figure 3.**  
Description of Modules





**NHC**  
Nursing Home  
Compare Plus  
Choosing a nursing home for YOU

### FALLS WITH MAJOR INJURY

People who might be weak, who may be taking a lot of medications, or who are not very stable on their feet, tend to fall often. Falling can be very dangerous for them. For example, they can break their hip or get a serious brain injury. In a high quality nursing home the staff can prevent many falls and protect the residents from injuries.

**SOMETHING TO THINK ABOUT:**

Does this sound like something that might be important for you?

[Read More](#) [See an Example](#) [Back to List](#)

**Figure 4.**  
Example from Education Module

YOUR LIST OF 3 NURSING HOMES RANKED FROM HIGHEST TO LOWEST QUALITY			
Quality Score	Distance (miles)	Nursing Home Name	Address & Phone Number
22.7	0.0	REGENTS POINT - WINDCREST	19191 HARVARD AVENUE, IRVINE, CA, 92612 (949)509-2274
8.6	4.4	COUNTRY VILLA PLAZA CONVALESCENT CENTER	1209 HEMLOCK WAY, SANTA ANA, CA, 92707 (714)546-1966
0.0	4.4	ROYALE HEALTH CARE CENTER	1030 W WARNER AVE, SANTA ANA, CA, 92707
<p>To select nursing homes to compare, touch up to 3 names at a time and then touch the <b>COMPARE</b> button</p>			<input type="button" value="Compare"/>
<input type="button" value="Help"/>		<input type="button" value="Home"/>	<input type="button" value="Back"/>
			<input type="button" value="NEXT"/>

**Figure 5.**  
Sample Rankings of Nursing Homes

**Table 1**

Sample Size Required to Detect an Effect Size of 25% by Quality Measure

Quality Measure	Group Size	Total Sample
<i>All Patients</i>		
Total staffing (Hours per resident day)	81	162
Health deficiencies	56	112
<i>Long-term Care (LTC) Patients</i>		
High risk pressure ulcers	97	194
Urinary tract infections	196	392
Catheter	145	290
Weight loss	148	296
Restraints	351	702
Depression	100	200
Pain	168	336
Activities of daily living	110	220
<i>Post-Acute Care (PAC) Patients</i>		
Pain	124	244
Pressure sores	108	216

Note the table does not include the influenza and pneumococcal vaccine QMs as those have very high rates and show very little variation across nursing homes. We will, thus, have no difficulty detecting a 25% effect size for all outcomes, except LTC urinary tract infections, catheter, weight-loss, restraints, and pain. In most cases we have sufficient sample and power to detect a smaller effect.

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**Table 2**

Baseline socio-demographics and health characteristics of the patient

Variable	Mean (SD) or Frequency, n (%)
<b>Age, Mean (SD)</b>	75.14 (10.2)
<b>Gender, n (%)</b>	
Female	133 (58.3%)
Male	95 (41.7%)
<b>Ethnicity/Race, n (%)</b>	
Non-Hispanic white	107 (46.9%)
Hispanic	45 (19.7%)
African American/Black	10 (4.4%)
Asian	27 (11.8%)
Mixed	6 (2.6%)
Missing	33 (14.5%)
<b>Education, n (%)</b>	
No formal education	16 (7.0%)
Grade school (1–8)	24 (10.5%)
High school or equivalent (9–12)	76 (33.3%)
Junior/community college or vocational, trade school	18 (7.9%)
College (4 year) or university	37 (16.2%)
Graduate or professional school	20 (8.8%)
Missing	37 (16.2%)
<b>Marital Status, n (%)</b>	
Married or living with partner	93 (40.8%)
Widowed	55 (24.1%)
Divorced or separated	42 (18.4%)
Never married	8 (3.5%)
Missing	30 (13.2%)
<b>Income, n (%)</b>	
\$10,000 or less	36 (15.8%)
\$10,001–\$20,000	49 (21.5%)
\$20,001–\$40,000	38 (16.7%)
\$40,001–\$60,000	25 (11.0%)
\$60,001–\$80,000	9 (3.9%)
\$80,001–\$100,000	7 (3.1%)
\$100,001 or greater	10 (4.4%)
Missing	54 (23.7%)
<b>Insurance To Cover SNF Stay, n (%)</b>	
Medicare	104 (45.4%)
Medicaid	9 (3.9%)
Both Medicare and Medicaid	47 (20.5%)
Other	69 (30.2%)

Variable	Mean (SD) or Frequency, n (%)
Self-reported health <sup>1</sup> , Mean (SD)	3.5 (1.2)
Pain intensity in past 24 hours <sup>2</sup> , Mean (SD)	4.9 (2.8)
Average length of stay in days, Mean (SD)	8.8 (7.6)

Note.

<sup>1</sup>Self-reported health was assessed using a single item that asked respondents to rate their health just prior to their hospitalization. Ratings were made on a 5-point scale, 1=Excellent, 5=Poor. Ratings were made as part of the exit survey.

<sup>2</sup>Pain intensity was assessed using a single item that asked patients to think about the last 24 hours and to rank their level of pain (n=49) on a scale of 1–10, with 1=no pain and 10=severe pain, their pain level. Ratings were made a part of the exit survey.

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