

*Do-not-Resuscitate (DNR) and Do-not-Hospitalize (DNH) Orders in Nursing Homes:
Who gets them and do they make a difference?*

Original Study

MeSH Keywords: nursing homes; long-term care; advance directives; do-not-resuscitate; do-no-hospitalize; mortality; hospitalization;

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ABSTRACT

Objectives: To describe the rate of do-not-resuscitate (DNR) and do-not-hospitalize (DNH) orders among residents newly admitted into long-term care homes. We also assessed the association between DNR and DNH orders with hospital admissions, deaths in hospital, and survival.

Design: A retrospective cohort study.

Setting and Participants: Admissions in all 640 publicly funded long-term care homes in Ontario, Canada, between January 1, 2010 and March 1, 2012 (n=49,390).

Measures: We examined if a DNR and/or DNH was recorded on resident's admission assessment. All residents were followed until death, discharge, or end of study to ascertain rates of several outcomes, including death and hospitalization, controlling for resident characteristics.

Results: Upon admission, 60.7% of residents were recorded to have a DNR and 14.8% a DNH order. Those who were older, female, widowed, lived in rural facilities, lived in higher income neighborhoods prior to entry, had higher health instability or cognitive impairment, and spoke English or French were more likely to receive a DNR or DNH. Survival time was only slightly shorter for those with a DNR and DNH with a mean of 145 and 133 days, respectively, versus 160 and 153 days for those without a DNR and DNH. After controlling for age, sex, rurality, neighborhood income, marital status, health instability, cognitive performance score, and multi-morbidity, DNR and DNH were associated with an odds ratio of 0.57 (95% CI: 0.53-0.62) and 0.41 (95% CI: 0.37-0.46) for dying in hospital, respectively. Those with a DNR and DNH, after adjustment, had an incidence rate ratio of 0.87 (95% CI: 0.83-0.90) and 0.70 (95% CI: 0.67-0.73), respectively, for hospital admissions.

Conclusions and implications: This study outlines identifiable factors influencing whether residents have a DNR and/or DNH order upon admission. Both orders led to lower rates - but not absolute avoidance - of hospitalizations near and at death.

1 **INTRODUCTION**

2 Long-term care (LTC) facilities (i.e., nursing homes) provide residential care to frail elderly
3 persons no longer able to live independently or care for themselves. Increasingly, residents
4 admitted to LTC will have a diagnosis of dementia and/or multiple comorbidities, and many are
5 near the end of life.^{1,2} As such, LTC is an important setting for palliative and end-of-life care.³
6 Decision making about treatment plans should be grounded in a shared understand of
7 prognosis and the resident’s goals, fears and wishes. Decisions about interventions such as
8 cardiopulmonary resuscitation (CPR) and transfer to hospital are critical to provide medically
9 appropriate care that is not contrary to people’s wishes.

10
11 The process of advanced care planning (ACP) and goals of care discussions – which includes
12 learning about wishes, values and beliefs and informing substitute decision makers about
13 preferences for medical treatments and preferences for location of care – becomes a critical
14 component of resident-centered care⁴. The process of ACP not only improves patients’ and
15 families’ experiences at the end of life^{4,5} but is also associated with overall less hospital
16 transfers and hospital deaths.⁶ “Do not resuscitate” (DNR) and “do not hospitalize” (DNH)
17 orders are particularly relevant to the care provided in LTC considering the frequency of
18 burdensome and potentially avoidable interventions and transfers of residents to hospital near
19 the end of life.^{6,7}

20
21 Recent studies have highlighted the importance of establishing DNR and DNH orders early in
22 the LTC admission process,^{8,9} and that DNR orders in particular should not limit other care,
23 including care that may require a transfer to hospital.^{10,11} The purpose of a DNH order is to

24 indicate that in the event of a clinical decline, the resident or their substitute decision makers
25 forego hospitalization in preference for continued care in their current LTC setting, even if
26 death is a likely outcome. It may be reasonable to think that those with a DNH would
27 experience few hospital transfers and stays.¹² For LTC residents whose goals of care are
28 focused on comfort, studies suggest that without a DNH order residents will have a
29 significantly higher odds of being transferred to hospital following a clinical decline.^{8,12}
30 However, there are studies that support that even with a DNH order, many LTC residents are
31 still hospitalized.^{13,14}

32
33 DNR orders have become progressively more common,^{15,16} and appear to be respected by LTC
34 staff.¹⁷ However, there appears to be considerable variability with DNH orders among LTC
35 facilities¹⁸⁻²⁰ with generally few residents having such an order.^{9,12,18,21}

36
37 Barriers to having and subsequently following DNH orders continue to be poorly
38 understood.^{8,22} Two studies have shown that younger age, independent function, and stable
39 health are associated with transfers to acute care hospital for residents with a DNH order.^{17,23}
40 One study found DNR orders written before illness episodes were associated with a decreased
41 rate of hospitalization.²⁴ No population-level study has been published, to our knowledge, has
42 examined the relationship between DNR and DNH orders on LTC admission and resident
43 characteristics. Further, there are no published studies on the survival time (following
44 admission), transfers to both acute and sub-acute care facilities (e.g., rehabilitation and
45 complex continuing care facilities), and location of death for those with/without DNR/DNH.

46

47 We thus examined the relationship between a resident's characteristics on admission to LTC
48 with DNR and DNH orders in Ontario, Canada, a population with over 13 million residents. In
49 Ontario, LTC admissions are largely subsidized by the provincial government, with co-payments
50 commensurate to income. Approximately 24% of Ontarians will enter a LTC home in the last
51 year of life.²⁵ Furthermore, we examine how DNR and DNH, controlling for resident
52 characteristics, are associated with end-of-life outcomes such as hospital transfer rates (for
53 both acute and sub-acute facilities), survival time and location of death. This study will improve
54 understanding of whether residents wishes regarding DNR and DNH are being elicited and
55 respected.

56
57 **METHODS:**

58 We conducted a retrospective cohort study of new admissions to LTC facilities in Ontario,
59 Canada, between January 1, 2010, and March 31, 2012 – the latest data in which DNR/DNH is
60 available. As a recommended part of clinical practice in Ontario LTC homes, the Resident
61 Assessment Instrument – Minimum Dataset version 2.0 (RAI-MDS 2.0) is used to routinely
62 gather resident characteristics, including sociodemographic variables (e.g., age, sex, marital
63 status, primary language), the Changes in Health, End-stage disease, and signs and symptoms
64 (CHESS) scale score (a measure of medical instability and risk of death) and Cognitive
65 Performance Scale (CPS). These data are held at ICES, where RAI-MDS assessments are linked at
66 an individual level to other health administrative databases to derive additional characteristics
67 such as urban/rural location, income quintile of residents prior to entry, and multiple validated
68 chronic disease comorbidities. To capture incident admissions, we used previously developed

69 methods, removing admissions that were transfers from another LTC facility and individuals
70 who had a previous admission to an LTC facility.²⁶

71

72 **Data sources and definitions**

73 Incident admissions to LTC facilities were identified using data from the Continuing Care
74 Reporting System (CCRS). The CCRS in Ontario collects information on all LTC residents who had
75 received a RAI-MDS 2.0 assessment.^{4,5} Assessments are done at entry, quarterly, and on any
76 significant health status changes. We examined if a DNR and/or DNH was recorded on each
77 resident's admission RAI-MDS assessment – our main exposure of study – typically conducted
78 by a clinician with input from the care team. As sensitivity analyses, we examined whether
79 DNR/DNH status changed over time. We then followed all individuals forward in time until
80 death, discharge, or end of study (March 31, 2014) to ascertain rates of several quality
81 indicators.

82

83 *Characteristics of residents with a DNR/DNH*

84 Information from the initial assessment was used to describe the sociodemographic
85 characteristics of residents with and without a DNR and DNH at time of entry. This includes
86 their age, sex, marital status, primary language, and where they were admitted from. We used
87 the postal code of each resident's residence prior to entry and linked it to census data to
88 determine whether they lived in an urban or rural setting and their neighborhood income
89 quintile. We also examined each resident's clinical features, including their level of cognitive
90 impairment through the CPS²⁷ their level of health stability (i.e., CHESS scale score),²⁸ and their
91 Resource Utility Group version three (RUG-III).²⁹ Finally, we examined the presence of 17

92 chronic conditions through linkage of the CCRS to various administrative databases held at ICES.
93 This linkage allowed us to identify the presence of these chronic conditions prior to entry,
94 captured using previously developed – and in some cases, validated – chronic disease databases
95 at ICES.³⁰

96 *Outcomes*

97 We examined three main end-of-life outcomes: 1) location of death; 2) rate of hospitalization;
98 3) survival time. Deaths were captured from the Registered Persons Database (RPDB). Location
99 of death in acute care hospitals, emergency room departments, complex continuing care (or
100 designated sub-acute care) facilities, and rehabilitation facilities were identified through the
101 Canadian Institute for Health Information’s Discharge Abstract Database (DAD), the National
102 Ambulatory Care Reporting System (NACRS), the CCRS, and the National Rehabilitation
103 Reporting System, respectively. These same databases were used to look at rates of
104 hospitalization across settings. Deaths in LTC homes were also captured in the CCRS. For both
105 location of death and hospitalization rates, acute care hospitals and emergency rooms were
106 combined together as “acute care”, and complex continuing care and rehabilitation facilities as
107 “sub-acute care”. Any deaths not captured in one of these databases, including deaths in the
108 patient’s own dwelling or in hospices, were collectively coded as death outside of a hospital.

109
110 Among those admitted into an acute care hospital, we examined the most responsible
111 diagnosis, determined as the cause that contributed to the longest length of stay or greatest
112 use of resources. We then applied a previously published set of ICD codes for diagnoses that
113 are considered ambulatory care sensitive in the Canadian context, signifying potentially
114 avoidable transfers.^{31–34}

115

116 **Analyses**

117 We dichotomized location of death as acute care hospital (including emergency rooms), and
118 elsewhere. We also examined whether a resident was ever hospitalized for a care-sensitive
119 cause during the follow-up period. For these two outcomes, we ran logistic regressions to
120 examine the impact of a DNR and DNH status, controlling for age, sex, rurality, neighborhood
121 income quintile, marital status, language group, CHESS score, CPS score, and a count of number
122 of chronic diseases. For rate of acute care hospitalization, to account for the large number of
123 residents without a single hospitalization, we ran a negative binomial regression. Those with
124 missing data were excluded prior to analysis (n=482).

125

126 **RESULTS**

127 A population-based cohort of 48,909 incident admissions into LTC facilities between January 1,
128 2010 and March 1, 2012 was captured. Approximately 3 in 5 (60.7%) had a DNR on admission,
129 and only 1 in 7 (14.7%) had a DNH. Throughout each resident's admission, DNR status changed
130 from no to yes for 14%, and from yes to no for 3% (data not shown). Similarly, DNH status
131 changed from no to yes for 8% and from yes to no for 3%. Almost everyone (95.9%) who had a
132 DNH also had a DNR. Within our follow-up period, 23.7% of residents died.

133

134 **Characteristics of residents with a DNR/DNH**

135 Table 1 shows the socio-demographic characteristics of residents upon entry. The proportion of
136 residents with a DNR or DNH rose with age. Those over 90 years of age had about a three-fold
137 higher prevalence of DNR and DNH compared to those under 50 years (75.3% vs. 22.6% for

138 DNR, and 20.0% vs. 6.4% for DNH). Female residents, widowed residents, and rural residents
139 were also more likely to have a DNR and DNH. Primary language was strongly associated with
140 DNR and DNH, with those speaking English or French (the two native, official languages of
141 Canada) having higher rates than those speaking other languages (e.g., East Asian, and South,
142 Central and Western Asian). There was a small trend of increasing DNR and DNH among
143 residents who lived in higher income neighborhoods prior to entry. Residents who prior to
144 entry lived in residential board and care facilities and in inpatient complex continuing care
145 facilities had the highest rates of DNR and DNH, while those entering from rehabilitation
146 facilities had the lowest rates (data not shown).

147
148 Table 1 also describes the functional and clinical characteristics of residents by DNR and DNH
149 status. Higher cognitive impairment and higher health instability were both associated with
150 higher rates of DNR and DNH. The DNR and DNH rates peaked at 72.7% and 23.3%,
151 respectively, for those with very severe cognitive impairment, and at 91.7% and 50.9%,
152 respectively, for those with very high health instability. We also looked at each resident's RUG-
153 III classification, which is used in Ontario to determine funding provided by the government.³⁵
154 Residents who were classified as needing medical extensive care on entry had the highest rates
155 of DNR/DNH, while those in the rehabilitation group had the lowest rates. Higher number of
156 chronic conditions was associated with both higher rates of DNR and DNH; individual chronic
157 conditions were somewhat associated with DNR, and less so for DNH.

158
159 **Outcomes**

160 Among LTC residents who died, 69% did so in a LTC facility. DNR or DNH were associated with a
161 lower rate of death in an acute care setting (crude RR of 0.63 and 0.48, respectively), although
162 this means that about 1 in 2 of those with a DNH actually die in a hospital (Table 2). Those with
163 a DNR and DNH similarly died less often in a sub-acute care facility or in the community.

164 Survival time among those who died was shorter for those with a DNR and DNH with a mean of
165 145 and 133 days, respectively, versus 160 and 153 days for those without a DNR and DNH
166 (Table 2).

167 Rates of hospitalization in an acute care and sub-acute care setting were similarly lower for
168 those with a DNR and DNH (RR of 0.72 and 0.45 for DNR and RR of 0.66 and 0.57 for DNH,
169 respectively) (Table 2). After controlling for sociodemographic and clinical variables, DNR was
170 associated with an odds ratio of 0.57 (95% CI: 0.53-0.62) for dying in hospital (Figure 1). A
171 separate model for DNH controlling for the same covariates yielded an odds ratio of 0.41 (95%
172 CI: 0.37-0.46) for dying in a hospital for those with a DNH. Examining the other variables in the
173 model, middle age (50-70 years), certain languages spoken, high CHES score, and higher
174 number of chronic diseases were most associated with a hospital death (Supplementary Tables
175 1-2).
176

177 After controlling for covariates, DNR and DNH had an incidence rate ratio of 0.87 (95% CI: 0.83-
178 0.90) and 0.70 (95% CI: 0.67-0.73), respectively, for hospital admissions. The logistic regression
179 for any hospitalization for an ambulatory care sensitive hospitalization yielded an odds ratio of
180 0.88 (95% CI: 0.82-0.94) for those with a DNR and an odds ratio of 0.70 (95% CI: 0.63-0.78) for
181

182 those with a DNH. Higher CHES scores were associated with higher hospitalization rate, and a
183 higher chronic disease count for ambulatory care sensitive hospitalizations (data not shown).

184

185 **DISCUSSION**

186 We evaluated the factors associated with rates of DNR and DNH orders among a population
187 level cohort of residents newly admitted to LTC. We also examined the association between
188 such orders and outcomes of survival, location of death, and hospitalization. In Ontario, we
189 show a higher rate of DNH and DNR than previously recorded in LTC facilities across Canada,
190 highlighting partly the concerted efforts of staff to ascertain such status post-admission in the
191 province.¹⁷ However, given that most residents in LTC are nearing the end-of-life, the lack of
192 DNH or DNR in some may be a result of the *lack* of informed discussions about the
193 appropriateness of such orders. In Ontario, like many jurisdictions, an assessment of the
194 appropriateness of DNR and DNH orders is not a mandated requirement. Apart from being at
195 an advanced age and health instability, DNR/DNH orders were associated with being female,
196 residing in a rural facility, entering from a high-income neighborhood, and not
197 recently/currently receiving rehabilitation. Residents speaking languages other than the official
198 languages of English or French also had lower rates of DNR/DNH, with Asians particularly having
199 lower rates of DNH. Interestingly, the number of chronic conditions were also associated with
200 DNR, but not DNH, perhaps a reflection of the poor prognosis of patients (i.e., hence DNR
201 status) that is influenced by conditions (e.g., diabetes) that led to states that are viewed as
202 potentially reversible (e.g., hyperglycemia) in hospital.

203

204 We showed that among those who die, having a DNR or DNH was associated with only a slightly
205 shorter survival with a difference of 9% and 13%, respectively. Similarly, the difference was
206 small for hospitalizations in acute care, with an adjusted reduction of 13% and 30% for all
207 causes. The adjusted reductions were similar for admissions for ambulatory care sensitive
208 conditions (12% for DNH and 30% for DNH), which is concerning given the potentially avoidable
209 nature of these admissions. Overall, DNH orders (along with DNR orders) were only slightly
210 protective for transfers to hospitals, highlighting that they were not absolutely followed. The
211 impact of these orders was largest for deaths in acute care, with an adjusted reduction of 43%
212 and 59% for DNR and DNH, respectively. DNR and DNH on admission thus seemed to be
213 associated with less intensive acute care near the end of life, when it may have been more
214 apparent that death was imminent.

215
216 The strength of this study is that it examines DNR and DNH status in an incident, large,
217 population-level cohort of LTC residents. We were also able to examine a rich set of resident
218 characteristics and outcomes through the RAI-MDS assessments and other linked databases.
219 Potential limitations include the generalizability of the findings in health systems and cultures
220 that are markedly different from our setting of a Western, developed, mostly publicly-funded
221 health care system. This is partly highlighted by the varying rates of DNR and DNH that was
222 observed in this study across residents speaking different languages. Nevertheless, we provide
223 evidence that identifying patients nearing death and discussing advance directives may impact
224 end-of-life outcomes. We were also unable to capture the complex narratives that underlie the
225 conversations leading to a DNR/DNH status, representing potentially unmeasured explanatory
226 variables for the observed differences in outcomes.

227 Similar to previous studies, many hospital stays in residents with DNR and DNH orders were for
228 potentially preventable causes, such as injuries or infections, with a significant amount of
229 transfers for those with chronic disease exacerbations and end-of-life needs.¹⁷ Although some
230 hospitalizations are both reflective of a resident's preferences (e.g., as demonstrated by the
231 varying rates of hospitalizations and hospital deaths by language spoken, even after accounting
232 for DNR/DNH status) and appropriate,³⁶ there is evidence that LTC residents and their families
233 want to instead limit aggressive, life-prolonging therapies, including transfers to hospital.^{37,38}
234 There is mounting evidence that hospitalizing LTC residents near and at the end of life is
235 hazardous and often inappropriate, leading to potentially burdensome and painful
236 interventions that are costly and often do not contribute to quality of life.³⁹⁻⁴¹

237 **CONCLUSIONS AND IMPLICATIONS**

238 Regulations that necessitate informed, standardized discussions about DNR and DNH orders
239 can likely increase the rates of such orders in LTC residents, most of whom are nearing the end-
240 of-life. Our study shows, however, that having DNR or DNH reduces, but doesn't eliminate such
241 potentially inappropriate transfers. It suggests that the decisions surrounding transfers are
242 complex, with difficult decisions about the reversibility of conditions and what symptoms may
243 be better diagnosed and treated in acute care settings. It highlights that the reduction of
244 potentially inappropriate transfers cannot be solely addressed by advance care planning but
245 will require other interventions throughout the life of the resident such as standardized care
246 pathways for acute conditions and additional services provided in the home, including
247 placement of intravenous lines, on-site diagnostics, and specialized, culture-sensitive nursing

248 services. Future studies should continue to examine the effectiveness of such interventions,
249 along with a more in-depth examination on why advance care orders are at times not followed.

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Figure 1: Incidence rate ratios and odds ratios for hospitalizations and deaths in acute care for those with a do-not-resuscitate (DNR) or do-not-hospitalize (DNH) order on admission to a nursing home, adjusted for age, sex, rurality, neighborhood income, marital status, language group, health instability, cognitive performance score, and multi-morbidity.

Table 1: Patient demographics with functional and clinical characteristics of long-term care residents on admission, broken down by DNR/DNH status, 2010-2012

Table 2: End-of-life outcomes of long-term care patients, by do-not-resuscitate (DNR) and do-not-hospitalize (DNH) status

Supplementary Table 1: Logistic regression for acute care death for those with a do-not-resuscitate (DNR) order on admission

Supplementary Table 2: Logistic regression for acute care deaths for those with a do-not-hospitalize (DNH) on admission