Predictors of adverse outcomes using a multidimensional nursing assessment in an Italian community hospital

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Abstract

Background

There is growing evidence about the role of nurses in patient outcomes in several healthcare settings. However, there is still a lack of evidence about the transitional care setting. We aimed to assess the association between patient characteristics identified in a multidimensional nursing assessment and outcomes of mortality and acute hospitalization during community hospital stay.

Methods

A retrospective observational study was performed on patients consecutively admitted to a community hospital (CH) in Loreto (Ancona, Italy) between January 1st, 2018 and May 31st, 2019. The nursing assessment included sociodemographic characteristics, functional status, risk of falls (Conley Score) and pressure damage (Norton scale), nursing diagnoses, presence of pressure sores, feeding tubes, urinary catheters or vascular access devices and comorbidities. Two logistic regression models were developed to assess the association between patient characteristics identified in a multidimensional nursing assessment and outcomes of mortality and acute hospitalization during CH stay.

Results

We analyzed data from 298 patients. The mean age was 83 ± 9.9 years; 60.4% (n = 180) were female. The overall mean length of stay was 42.8 ± 36 days (32 ± 32 days for patients who died and 33.9 ± 35 days for patients who had an acute hospitalization, respectively). An acute hospitalization was reported for 13.4% (n = 40) of patients and 21.8% (n = 65) died. An increased risk of death was related to female sex (OR 2.25, 95% CI 1.10–4.62), higher Conley Score (OR 1.19; 95% CI 1.03–1.37) and having a vascular access device (OR 3.64, 95% CI 1.82–7.27). A higher Norton score was associated with a decreased risk of death (OR 0.71, 95% CI 0.62–0.81). The risk for acute hospitalization was correlated with younger
age (OR 0.94, 95% CI 0.91–0.97), having a vascular access device (OR 2.33, 95% CI 1.02–5.36), impaired walking (OR 2.50, 95% CI 1.03–6.06) and it is inversely correlated with a higher Conley score (OR 0.84, 95% CI 0.77–0.98).

**Conclusion**

Using a multidimensional nursing assessment enables identification of risk of nearness of end of life and acute hospitalization to target care and treatment. The present study adds further knowledge on this topic and confirms the importance of nursing assessment to evaluate the risk of patients’ adverse outcome development.

**Introduction**

Intermediate transitional care models provide positive outcomes for older adults, contributing in functionality and quality of life improvements and reducing hospital admissions [1]. A Community Hospital (CH) is an intermediate care solution that has been introduced to promote the transition from the hospital to the community. Care is typically provided under the management of general practitioners. CHs ensure a rapid discharge from the hospital to a protected environment, patient safety and a convenient length of stay to achieve clinical stabilization [2]. Literature evidence shows that admission into a CH after hospitalization improves quality of life and reduces the length of hospital stay, the rate of hospital readmissions and mortality after discharge [3, 4]. CHs also admit patients that are referred by the general practitioner, because they cannot be treated at home, but do not need the intensity of hospital care (e.g. exacerbation of chronic diseases, antibiotic therapy).

CHs provide nursing care for people requiring a high level of supervision, the administration of drugs or interventions that would not be suitable for a nursing home or a home care setting [2].

Nurses have a high degree of autonomy and control over patient care within CHs [5], hence, nursing assessments are a key element of patient’s care pathway [6].

Nursing sensitive outcomes (NSOs) have been the subject of considerable research [7, 8]. The American Nurses Association has defined NSO as a measure of nursing care on patient care and patient outcome [9, 10], even if they are also correlated with patient morbidity and the care environment [11]. NSOs can be classified in three different categories: patient-related outcomes, nursing-related outcomes and setting-related outcomes [8]. Mortality and acute hospitalization are considered patient-related and setting-related outcomes, respectively [8]. The aim of this study was to assess the association between patient characteristics identified in a multidimensional nursing assessment and outcomes of acute hospital admission and mortality during the CH admission.

**Methods**

**Study design, data source and participants**

This was a retrospective observational study of patients who were consecutively admitted to a CH with 19 beds in Loreto (Ancona, Italy) between January 1st, 2018 and May 31st, 2019. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) Statement guidelines for reporting observational studies were followed for the conduction of this study [12] (S1 Checklist).
Patients were managed by four general practitioners and three specialist physicians, 16 nurses and 16 healthcare workers. The nurse/bed and physician/bed ratio were 0.55 and 0.34, respectively, indicating that patients’ care was mainly provided by nurses. Nursing care was provided 24 hours for seven day a week. In Italy, the number of beds of intermediate care (including rehabilitation) was established at the Regional level. In the Marche Region the number is 0.74/1000 persons (Regional Law 735/2013). Nursing records of all patients were analyzed to assess factors associated with mortality and acute hospitalizations during CH stay.

Main outcomes and covariates
Outcomes were mortality [11] and acute hospitalization (emergency department visit or in-hospital) [11] during CH stay. Each patient admitted into this CH underwent the standardized nursing assessment which included the following:

1. Sociodemographic characteristics (age, sex).
2. Nursing diagnosis defined using the North American Nursing Diagnosis Association International taxonomy [13].
3. Conley scale: a score ≥2 indicates an increased risk of falling [14].
4. Norton score: a higher score indicates a lower risk of pressure sores [15].
5. Presence of a vascular access device. To our purpose we considered i) midline catheter (a peripheral line between 7.5cm–20cm in length), ii) peripherally inserted central catheter (PICC); iii) a short-term central vascular access device (CVC); iv) skin-tunneled catheter; v) an implanted port [16, 17]. Peripheral cannula (less than 7.5 cm in length) was not included in our analysis.
6. Presence of urinary catheter.
7. Presence of feeding tubes: nasogastric or percutaneous endoscopic gastrostomy (PEG) tube.
8. Presence of a stoma (colostomy or ileostomy).
9. Parenteral nutrition.
10. Presence of pressure sores.
11. Functional status (Activities of Daily Living, ADL scale) [18]: ability in moving, dressing, bathing, feeding, walking and urinary and fecal continence.
12. Comorbidities recorded from a list of clinical conditions coded in 7 categories: infective, hematological, neoplastic, orthopedic, pulmonary, cardiovascular, neuropsychiatric (dementia, depression, bipolar disorders, psychosis and other psychiatric conditions).

Data analysis
Continuous variables were described as mean and standard deviation, and categorical variables were presented as frequency and percentage.
A descriptive analysis was performed to assess characteristics of patients according to 2 outcomes: acute hospitalization and mortality during CH stay.
A t-test was used to compare continuous variables. The chi-squared test was used to compare frequencies, using Fisher’s exact test as adjustment for expected frequencies less than 5.
A univariate analysis was performed to establish the association between mortality or acute hospitalization during CH stay and patient characteristics: age, sex, comorbidities, risk of falls (Conley score), risk of pressure sores (Norton scores), presence of urinary catheter, presence of any vascular access devices, feeding tubes (nasogastric or PEG), stoma (colostomy or ileostomy), parenteral nutrition, functional status (preserved ADL), presence of pressure sores at admission, nursing diagnosis defined in accordance with NANDA taxonomy (version 2009) assigned at admission.

Two binary logistic regression models were ultimately developed, using mortality and acute hospitalization recorded during CH stay as dependent variables. Regression models included variables that showed an association with the outcomes in the univariate analysis. Variables with a p value lower than 0.2 were included for conservative purpose. Variables with less than five observations were excluded. A stepwise technique was used. Statistical significance was considered for \( p < 0.05 \). Data analysis was performed with SPSS version 25 (Illinois, SPSS Inc. Chicago, IL, USA).

**Ethical statement**

Given this was a retrospective observational study, ethical Committee of Marche Region does not require a formal approval. The study was performed in accordance with the Code of Ethics of the World Medical Association for experiments involving humans (Declaration of Helsinki) and research on health databases (Declaration of Taipei).

Patients and caregivers gave their written consent to use their personal data at their admission to the CH. Patient anonymity was respected during the process of data analysis and results reporting. The patients’ medical records were accessed anonymously, and a sequential number was used to identify each patient. A.F and F.D. are members of the Community Hospital staff.

**Results**

A total of 298 patients’ records were analyzed. The mean sample age was 83 ±9.9 years (range 44–102), 60.4% (n = 180) were women. Pressure sores were identified on admission in 35.9% (n = 107) of patients and 65.4% (n = 195) of patients were at high risk to develop them. Some (84.2%, n = 251) patients were at risk for falls, 13.1% (n = 39) were under an enteral or parenteral nutrition and 41.6% (n = 124) had a vascular access device. The main comorbidities were cardiovascular (86.9%, n = 259) and neuropsychiatric (62.7%, n = 187). The main neuropsychiatric comorbidities were dementia and depression. The most frequent nursing diagnosis was risk of infection (i.e. urine infection, skin infection) (68.5%, n = 204), risk of falling (65.8%, n = 196), self-care deficit in bathing (62.4%, n = 186), impaired walking (60.1%, n = 179) and constipation (54%, n = 161) (Table 1, S1 Appendix).

At least 1 acute hospitalization was reported for 13.4% (n = 40) of patients and 21.8% (n = 65) died during CH stay. Variables associated with death (Table 2, S2 Appendix) were female sex (p = 0.031), older age (p = 0.005), length of stay (0.007), presence of pressure sores (p < 0.001), having a vascular access device (p < 0.001), urinary catheter (p = 0.011), parenteral (p = 0.003) and enteral (p = 0.003) nutrition, higher Conley score (p < 0.001) and lower Norton score (p < 0.001). Neuropsychiatric comorbidity was associated with mortality (p = 0.008). Nursing diagnoses associated with death were risk for infection (p<0.001), total urinary incontinence (p = 0.009), risk for impaired skin integrity (p = 0.013), difficulty in swallowing (p<0.001), risk of ab-ingestis pneumonia (p < 0.001).

Younger age (p < 0.001), having a vascular access device (p = 0.011), stoma (p = 0.019), higher risk of falling (p = 0.001), constipation (p <0.001) and self-care deficit in toileting (p = 0.001) were associated with acute hospitalization.
Regression analysis found an increased risk of death correlated to female sex (OR 2.25, 95% CI 1.10–4.62), higher Conley score (OR 1.19; 95% CI 1.03–1.37) and having a vascular access device (OR 3.64, 95% CI 1.82–7.27). A higher Norton score was associated with a decreased risk of death (OR 0.71, 95% CI 0.62–0.81) (Table 3).

Higher risk for acute hospitalization was associated with younger age (OR 0.94, 95% CI 0.91–0.97), having a vascular access device (OR 2.33, 95% CI 1.02–5.36), impaired walking (OR 2.50, 95% CI 1.03–6.06). A lower risk for acute hospitalization was associated with a higher Conley score (OR 0.84, 95% CI 0.72–0.98) (Table 4).

Table 1. Patients’ characteristics gathered using a multidimensional nursing assessment.

|                              | Total sample N = 298 |
|------------------------------|----------------------|
| Sex (F), n (%)               | 180 (60.4)           |
| Age (years, mean±SD)         | 83±9.9               |
| Length of stay (days, mean±SD)| 42.8±36             |
| Urinary catheter, n (%)      | 193 (64.8)           |
| Vascular access device, n (%)| 124 (41.6)           |
| Pressure sores at admission, n (%) | 107 (35.9) |
| Enteral nutrition, n (%)     | 28 (9.4)             |
| Stoma, n (%)                 | 12 (4.0)             |
| Parenteral nutrition, n (%)  | 11 (3.7)             |
| Norton score (mean±SD)       | 10.3±4               |
| High risk, n (%)             | 195 (65.4)           |
| Low risk, n (%)              | 58 (19.5)            |
| Intermediate risk, n (%)     | 45 (15.1)            |
| Conley score (mean±SD)       | 4.7±2                |
| Conley = 2 (high risk of falling), n (%) | 251 (84.2) |
| Activities of Daily Living preserved, n (%) |  |
| 5–6                          | 16 (5.4)             |
| 0–1                          | 66 (22.1)            |
| Comorbidities, n (%)         |                      |
| Cardiovascular               | 259 (86.9)           |
| Neuropsychiatric             | 187 (62.7)           |
| Pulmonary                    | 133 (44.6)           |
| Orthopedic                   | 99 (33.2)            |
| Infective                    | 68 (22.8)            |
| Hematological                | 43 (14.4)            |
| Neoplastic                   | 33 (11.1)            |
| Nursing diagnoses*, n (%)    |                      |
| Risk for infection           | 204 (68.5)           |
| Risk of falling              | 196 (65.8)           |
| Deficit in bathing self-care | 186 (62.4)           |
| Impaired walking             | 179 (60.1)           |
| Constipation                 | 161 (54.0)           |
| Risk for impaired skin integrity | 152 (51.0) |
| Impaired transfer ability    | 149 (50.0)           |
| Insomnia                     | 121 (40.9)           |
| Imbalanced Nutrition Less Than Body Requirements | 119 (39.9) |
| Risk for unstable blood glucose level | 109 (36.6) |

* > 10 patient records.

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The finding of this study identified an association between patient characteristics assessed using a standardized nursing assessment and outcomes of mortality and acute hospitalization during CH stay. Overall, patients admitted to a CH had a high mean age > 80 years, high level of disability and greater nursing needs.

Table 2. Patients’ characteristics in accordance with outcomes (mortality and acute hospitalization during CH stay).

|                      | Mortality |                      | Acute hospitalization |
|----------------------|-----------|----------------------|-----------------------|
|                      | Survivors N = 233 | Not survivors N = 65 P | No acute hospitalization N = 258 | Acute hospitalization N = 40 P |
| Sex (Female), n (%)  | 134 (57.5)  | 47 (72.3)              | 0.031  | 158 (60.8)  | 23 (42.5)  | 0.652 |
| Age (years, mean±SD) | 81±10.2    | 85+9.7                 | 0.005  | 83.2±9.8    | 76.4±11   | <0.001 |
| Length of stay (days, mean±SD) | 46±36 | 32±32              | 0.007  | 44.5±35    | 33.9±35  | 0.880 |
| Pressure sores, n (%) | 71 (30.5)  | 36 (55.4)              | <0.001 | 89 (34.5)  | 18 (45.0)  | 0.198 |
| Vascular access device, n (%) | 80 (34.3) | 44 (67.7)              | <0.001 | 100 (38.7) | 24 (60.0)  | 0.011 |
| Stoma, n (%)         | 11 (4.7)   | 2 (3.1)                | 0.741  | 8 (2.7)     | 5 (12.5)   | 0.019 |
| Parenteral nutrition, n (%) | 4 (1.7)  | 7 (10.8)               | 0.003  | 10 (3.9)    | 1 (2.5)    | 0.999 |
| Enteral nutrition, n (%) | 15 (6.4)  | 13 (20)                | 0.001  | 25 (9.7)    | 3 (7.5)    | 0.999 |
| Urinary cathete, n (%) | 143 (61.4) | 51 (78.5)              | 0.011  | 165 (63.6) | 29 (72.5)  | 0.291 |
| Norton score (mean±SD) | 11.3±3.6  | 7.25±3                | <0.001 | 10.3±4     | 10.9±3     | 0.397 |
| Norton risk group, n (%) | <0.001  |                      |         |             | 0.899      |       |
| Low risk             | 57 (24.5)  | 1 (1.5)                | 50 (19.4) | 8 (20.0)   |           |      |
| Intermediate risk    | 45 (19.3)  | 5 (7.7)                | 40 (15.5) | 5 (12.5)   |           |      |
| High risk            | 136 (58.4) | 59 (90.8)              | 168 (65.1) | 27 (67.5)  |           |      |
| Conley score (mean±SD) | 4.4±2.6  | 6.1±2.5               | <0.001 | 4.9±2.6    | 3.4±2.6   | 0.001 |
| Conley > 2, n (%)     | 187 (80.3) | 63 (96.9)              | 0.001  | 225 (87.2) | 25 (62.5)  | <0.001 |
| ADL preserved <5, n (%) | 218 (93.6) | 63 (96.9)              | 0.536  | 244 (94.6) | 37 (92.5)  | 0.461 |
| Comorbidities, n (%)  | <0.001    |                      |         |             |           |      |
| Infective             | 52 (21.9)  | 17 (26.1)              | 56 (21.3) | 13 (32.5)  |           | 0.132 |
| Hematological         | 34 (14.6)  | 9 (13.8)               | 35 (13.6) | 8 (20.0)   |           | 0.281 |
| Neoplastic            | 24 (9.9)   | 10 (15.4)              | 30 (11.2) | 4 (10.0)   |           | 0.999 |
| Orthopedic            | 81 (34.8)  | 18 (27.7)              | 83 (32.2) | 16 (40.0)  |           | 0.328 |
| Respiratory           | 105 (45.1) | 28 (43.1)              | 112 (43.4) | 21 (52.5)  |           | 0.282 |
| Cardiological         | 203 (86.7) | 57 (87.7)              | 0.903  | 226 (87.2) | 34 (85.0)  | 0.647 |
| Neuropsychiatric      | 137 (58.8) | 50 (76.9)              | 0.008  | 164 (63.6) | 23 (57.5)  | 0.460 |
| Nursing diagnoses *   |           |                      |         |             |           |      |
| Risk for infection    | 146 (62.7) | 56 (86.1)              | <0.001 | 171 (66.3) | 31 (77.5)  | 0.158 |
| Constipation          | 124 (53.2) | 37 (56.9)              | 0.596  | 150 (58.1) | 11 (27.5)  | <0.001 |
| Total urinary incontinence | 46 (19.7) | 23 (35.4)              | 0.009  | 61 (23.6)  | 8 (20.0)   | 0.611 |
| Risk for impaired skin integrity | 110 (47.2) | 42 (64.6)              | 0.013  | 136 (52.7) | 16 (40.0)  | 0.134 |
| Impaired walking      | 144 (61.8) | 35 (53.8)              | 0.247  | 150 (58.1) | 29 (72.5)  | 0.084 |
| Difficulty in swallowing | 45 (19.3) | 27 (41.5)              | <0.001 | 63 (24.4)  | 9 (22.5)   | 0.792 |
| Self-care deficit in toileting | 43 (18.4) | 6 (9.2)                | 0.074  | 35 (13.7)  | 14 (35.0)  | 0.001 |
| Risk for ab-ingestis pneumonia | 25 (10.7) | 21 (32.3)              | <0.001 | 38 (14.7)  | 7 (17.5)   | 0.600 |
| Risk for falls        | 155 (66.5) | 42 (64.6)              | 0.774  | 175 (67.8) | 22 (55.0)  | 0.111 |

* Diagnosis reported in ≥ 10 patient records among patients who died or who had an acute hospitalization were presented. A full list of nursing diagnoses and their frequency is presented in Appendix 2.

TPN = total parenteral nutrition; NGT = nasogastric tube.

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Increased risk of death was correlated with female sex, risk of pressure sores, risk of falling and having a vascular access device. Higher risk for acute hospitalization were associated with lower age, having a vascular access device, risk of falling and some nursing diagnoses such as self-care deficit in toileting and impaired walking. These results underlined the potential role of a standardized multidimensional nursing assessment to identify patients at high risk of adverse outcomes.

There is growing evidence about the role of nurses on patient outcomes in the hospital setting [19, 20], the residential care setting [21] and the primary health care setting [22]. However, scarce evidence has determined their role in transitional care setting, such as in CH, although it is a setting where nurses play a very important role.

CH is a transitional care solution to promote a rapid patient discharge from the hospital to a protected environment, to obtain clinical stabilization [1, 2]. Older adults are the main users of CH. They require long length of stay, have multiple needs and are at risk of adverse outcomes, such as pressure sores, infection, and nearness to end of life. The results of this study are consistent with this perspective. Equivalent or improved outcomes were described in community hospitals compared with acute hospital settings for mortality, readmissions and number of bed-days spent in hospital and functional independence at discharge. In CHs, nurses are the main providers of care due they hold managerial and patient-related responsibility than in acute hospitals [6].

A standardized multidimensional approach at admission allows us to identify the patients at risk of adverse outcomes. There is strong evidence that a multidimensional assessment is beneficial especially for older frail patients and its efficacy was largely demonstrated using a comprehensive geriatric assessment model [23].

Functional status, risk of falling and the presence of a vascular access device are variables associated with both mortality and acute hospitalization during CH stay, which could be a possible confounder.

| Table 3. Logistic regression model to assess factors associated with mortality during CH stay. |
|-------------|-------|-----------------|
| P | OR | Confidence interval (95%) |
| Sex (female) | 0.026 | 2.25 | 1.10 | 4.62 |
| Norton score | <0.001 | 0.71 | 0.62 | 0.81 |
| Conley score | 0.016 | 1.19 | 1.03 | 1.37 |
| Vascular access device | <0.001 | 3.64 | 1.82 | 7.27 |

Model adjusted for: pressure sores at admission, feeding tubes, urinary catheter, psychiatric comorbidity; nursing diagnoses: “risk for infection”, “total urinary incontinence”, “risk of impaired tissue integrity”, “impaired walking”, “difficulty in swallowing”, “deficit in toileting”, “risk for ab-ingestis pneumonia”.

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| Table 4. Logistic regression model to assess factors associated with acute hospitalization during CH stay. |
|-------------|-------|-----------------|
| P | OR | Confidence Interval (95%) |
| Age | 0.001 | 0.94 | 0.91 | 0.97 |
| Vascular access device | 0.046 | 2.33 | 1.02 | 5.36 |
| Conley score | 0.017 | 0.84 | 0.72 | 0.98 |
| Impaired walking | 0.039 | 2.50 | 1.03 | 6.06 |

Model adjusted for: infective comorbidity, risk of infection”, “Constipation “; ‘Risk for impaired skin integrity”, “self-care deficit in toileting”, “risk for falling”.

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Previous studies demonstrate a strong association between nursing assessments and mortality. Rothman et al. perform an observational study on a cohort of hospitalized patients over a 2-years period. They find that nursing assessments are strongly correlated with lower in-hospital and post-discharge mortality and conclude that nursing assessments can aid in physician care and possibly reduce hospital patient mortality, and they encourage more research in this field [24]. The present study adds further knowledge on this topic and confirms the importance of nursing assessment in evaluating the risk of patients’ adverse outcome development.

Older patients with a higher risk of pressure sores and several disabilities are less likely to be hospitalized. This could depend on the rate of subjects that were closer to the end of life. Previous studies in Nursing Home have shown that hospitalization at the end of life is often not beneficial [25]. Studies on end-of-life care suggested that the community hospital are perceived as preferable than acute hospital for patients and their relatives [5].

Limitations

This was a retrospective single center study. However, data are from 2 years of observation, and the nursing assessment was performed according to international nursing guidelines.

The nursing assessment did not include any tool to assess frailty in our patients. This was a limitation, due to the well-established association between frailty and mortality [26, 27] and acute hospitalization [28, 29].

Conclusion

Community Hospital cares for a mainly older population with multiple needs, one in five died during the CH stay. Using a multidimensional nursing assessment enabled the identification of mortality and acute hospitalization risk to target care and treatment. The present study adds further knowledge on this topic and confirms the importance of nursing assessment to evaluate the risk of patients’ adverse outcome development.

Supporting information

S1 Checklist. STROBE (strengthening the reporting of observational studies in epidemiology) checklist.

S1 Appendix. Complete list of NANDA codes ordered by frequency.

S2 Appendix. Complete list of NANDA codes among subjects died or hospitalized.

Author Contributions

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References

1. Sezgin D, O’Caoimh R, Liew A, et al. The effectiveness of intermediate care including transitional care interventions on function, healthcare utilisation and costs: a scoping review. Eur Geriatr Med. 2020; 11 (6):961–974. https://doi.org/10.1007/s41999-020-00365-4 PMID: 32754841

2. National Institute for Health and Care Excellence. Emergency and acute medical care in over 16s: service delivery and organization NICE guideline. NICE guideline 2018. www.nice.org.uk/guidance/ng94

3. Allen J, Hutchinson AM, Brown R, Livingston PM. Quality care outcomes following transitional care interventions for older people from hospital to home: a systematic review. BMC Health Serv Res 2014; 14:346. https://doi.org/10.1186/1472-6963-14-346 PMID: 25128468

4. Garåsen H, Windspong R, Joensn R. Long-term patients’ outcomes after intermediate care at a community hospital for elderly patients: 12-month follow-up of a randomized controlled trial. Scand J Public Health 2008; 36(2):197–204. https://doi.org/10.1177/1403494808089685 PMID: 18519285

5. Pitchforth E, Nolte E, Corbett J, Miani C, Wimpenny E, van Teijlingen E. Community hospitals and their services in the NHS: identifying transferrable learning from international developments—scoping review, systematic review, country reports and case studies. Health Service Delivery and Research 2017, 5 (19).

6. Wimpenny EM, Corbett J, Miani C, et al. Community Hospitals in Selected High Income Countries: A Scoping Review of Approaches and Models. Int J Integr Care. 2016; 16(4):13. Published 2016 Nov 24. https://doi.org/10.5334/ijic.2463 PMID: 28316553

7. Burston S, Chabyer W, Gillespie B. Nurse-sensitive indicators suitable to reflect nursing care quality: a review and discussion of issues. J Clin Nurs 2014; 23(13–14):1785–95. https://doi.org/10.1111/jocn.12337 PMID: 2410296

8. Heslop L, Lu S, Xu X. Nursing-sensitive indicators: a concept analysis. J Adv Nurs 2014; 70(11):2469–2482. https://doi.org/10.1111/jan.12503 PMID: 25113388

9. Kunavikitkul W, Anders RL, Chontawan R, Nuntasupawat R, Srisuphan W, Pumarporn O, et al. Development of indicators to assess the quality of nursing care in Thailand. Nurs Health Sci 2005; 7(4):273–280. https://doi.org/10.1111/j.1442-1842.2005.00247.x PMID: 16271134

10. American Nurses Association (ANA). Nursing’s social policy statement: The essence of the profession. 3rd Ed. American Nurses Association, Inc. 2010

11. Needleman J, Buerahaus P, Pankratz VS, Leibson CL, Stevens SR, Harris M. Nurse staffing and inpatient hospital mortality. N Engl J Med 2011; 364(11):1037–1045. https://doi.org/10.1056/NEJMsa101025 PMID: 21410372

12. von Elm E, Altman DG, Egger M, Pocock SJ, Gøtzsche PC, Vandenbroucke JP. STROBE Initiative. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. PLoS Med. 2007; 4(10):e296. https://doi.org/10.1371/journal.pmed.0040296 PMID: 17941714

13. NANDA International. Nursing Diagnoses 2009–2011: Definitions and Classification. Wiley Blackwell. 2008.

14. Conley D, Schultz AA, Selvin R. The challenge of predicting patients at risk for falling development of the Conley Scale Medsurg Nurs. 1999; 8(6):348–54. PMID: 11000772

15. Norton D., McLaren R., Exton-Smith A.N. An Investigation of Geriatric Nursing Problems in a Hospital. The National Corporation for the Care of Old People, London, 1962, 238 pp. 12 s. 6d.

16. Royal College of Nursing. Standards for infusion therapy. Fourth edition 20 Cavendish Square, London, 2018. ISBN: 978-1-910672-70-9. https://www.rcn.org.uk/-/media/royal-college-of-nursing/documents/

17. Gonski L. A., Hadaway L., Hagle M., McGoldrick M., Orr M., Doellman D. Infusion therapy standards of practice. Journal of Infusion Nursing, 2016, 39(1S), S1–S159.
18. Katz S, Akpom CA. A measure of primary sociobiological functions. Int J Health Serv. 1976; 6(3):493–508. https://doi.org/10.2190/UURL-2RYU-WRYD-EY3K PMID: 133997

19. Ingersoll GL, McIntosh E, Williams M. Nurse-sensitive outcomes of advanced practice. J Adv Nurs 2000; 32(5):1272–1281. https://doi.org/10.1046/j.1365-2648.2000.01598.x PMID: 11115013

20. Kane RL, Shamliyan TA, Mueller C, et al. Nurse staffing and quality of patient care. Evid Rep Technol Assess 2007; 151:1–115. PMID: 17764206

21. Kane RL, Shamliyan TA, Mueller C, et al. The association of registered nurse staffing levels and patient outcomes: systematic review and meta-analysis. Med Care 2007; 45:1195–204. https://doi.org/10.1097/MLR.0b013e3181468ca3 PMID: 18007170

22. Coster S, Watkins M, Norman LJ. What is the impact of professional nursing on patients’ outcomes globally? An overview of research evidence. Int J Nurs Stud 2018; 78:76–83. https://doi.org/10.1016/j.ijnurstu.2017.10.009 PMID: 29110907

23. Pilotto A, Cella A, Pilotto A, et al. Three Decades of Comprehensive Geriatric Assessment: Evidence Coming From Different Healthcare Settings and Specific Clinical Conditions. J Am Med Dir Assoc 2017; 18(2):192.e1–192.e11. https://doi.org/10.1016/j.jamda.2016.11.004 PMID: 28049616

24. Rothman MJ, Solinger AB, Rothman SI, et al. Clinical implications and validity of nursing assessments: a longitudinal measure of patient condition from analysis of the Electronic Medical Record. BMJ Open 2012; 2:e000849. https://doi.org/10.1136/bmjopen-2012-000849 PMID: 22874626

25. Dwyer R, Gabbe B, Stoelwinder JU, Lowthian J. A systematic review of outcomes following emergency transfer to hospital for residents of aged care facilities. Age Ageing. 2014; 43:759–66. https://doi.org/10.1093/ageing/afu117 PMID: 25315230

26. Chang SF, Lin PL. Frail phenotype and mortality prediction: a systematic review and meta-analysis of prospective cohort studies. Int J Nurs Stud. 2015 Aug; 52(8):1362–74. https://doi.org/10.1016/j.ijnurstu.2015.04.005 Epub 2015 Apr 11. PMID: 25986959.

27. Kojima G, Iliffe S, Walters K. Frailty index as a predictor of mortality: a systematic review and meta-analysis. Age Ageing. 2018 Mar 1; 47(2):193–200. https://doi.org/10.1093/ageing/afx162 PMID: 29040347

28. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gott diener J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001; 56(3):M146–56. https://doi.org/10.1093/gerona/56.3.m146 PMID: 11253156

29. Bandeen-Roche K, Xue QL, Ferrucci L, Walston J, Guralnik JM, Chaves P, et al. Phenotype of frailty: characterization in the women’s health and aging studies. J Gerontol A Biol Sci Med Sci. 2006; 61 (3):262–6. https://doi.org/10.1093/gerona/61.3.262 PMID: 16567375