European Review for Medical and Pharmacological Sciences 2020; 24: 13009-13014

A new model of multidimensional discharge planning: continuity of care for frail and complex inpatients

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Abstract. – OBJECTIVE: Delays in patient discharge can adversely affect hospital and emergency room productivity and increase healthcare costs. The discharge should be structured from the hospital admission towards the most appropriate environment. This study aims to investigate the efficacy of the Unit, named "Continuity of Care Center" (CCC), to guarantee a safest and fastest hospital discharge in frail patients and to test the effect of our team-approach on hospital outcomes (length of stay and hospital mortality).

MATERIALS AND METHODS: This is a prospective cohort study carried out in an acute care hospital with 1,558 beds and is equipped with 41 operating theaters. We collected data from October 2016 to June 2019.

RESULTS: The time of patient discharge had an important reduction: 15.5±30.8 in the first 3 months *vs*. 11.0±20.1 in the last 3 months considered. The median of the time of discharge in all 12 months considered was 12 day. The length of stay presented an important reduction from 33.3±47.5 during the first 3 months *vs*. 28.8±39.5 in the last 3 months of activity of CCC; and a significant reduction of hospital deaths was recorded from 20% during the first 3 months to 14% in the last 3 months of activity of CCC.

CONCLUSIONS: Results indicate a constant decrease in patient discharge time and length of hospital stay, with a consequent significant reduction of healthcare costs. According to the estimates of Italian Health Ministry concerning Latium region, every hospitalization day has a mean cost of € 674.00. Thus, the CCC activity has contributed to a reduction of approximately 12,832 days of hospitalization, in the considered period, with an estimated hospital saving of € 8,648,761.

Key Words:
Continuity of care, Discharge planning, Palliative care, Personalized medicine.

Introduction

Discharge planning (DP) is required and it should be provided to all patients admitted to acute care hospital. According to the guidelines of the Joint Commission on Accreditation of Health Care Organizations, DP is conceived as a relevant strategy to meet patients' needs after discharge[1]. DP is routinely performed in many

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countries to reduce hospital length of stay, to counteract unplanned readmission to hospital and to improve the coordination of post-acute healthcare services. Cost containment strategies to limit healthcare-related costs, preserving high quality, are a priority of all healthcare systems, especially for acute hospital services. For this reason, some approaches can represent key-points: targeting patients who incur greater healthcare expenditures, decreasing the length of stay for inpatient care, reducing the number of long-stay beds, moving care into the community, increasing the use of day services, providing increased levels of acute care at home ('hospital at home') and implementing policies, such as discharge planning[2]. It has been estimated that one-fifth of all hospital discharges are delayed for non-medical reasons[3]. Despite recent advances in the development and application of innovative care pathways, the following three factors, identified over 30 years ago[4], remain causes of delayed discharge from hospital:

– inadequate patient assessment by health professionals, determining poor knowledge of the patient's social circumstances and poor organization;
– late booking of transport services to take a patient home;
– poor communication among the hospital, follow-up care and community service providers[5].

DP is conceptualized in four phases: (1) patient assessment; (2) development of a discharge plan; (3) provision of services, including patient/family education and service referrals; and (4) follow-up evaluation. It is expected to be more effective when an interdisciplinary intervention is performed. The advantage of multidisciplinary approach is linked to the ability of different professionals in identifying and meeting the patient's home care needs. In this setting, the presence of a case manager, with established community linkages to various services, can act more efficiently to implement the aftercare services[6]. For these reasons, the Unit for "Continuity of Care Center" (CCC) was created (2016) by Fondazione Policlinico A. Gemelli IRCCS (FPG), a leading hospital in Rome, Italy, with 1,558 beds and 41 operating theaters. The CCC is a care-coordinated team composed by medical doctors and nurses skilled in case management. The aim of CCC is the protection and the coordination of patient's discharge planning a good, safe and fast transition from acute wards to other settings.

This study was undertaken to define the main clinical characteristics of the patients took charge of CCC team from the birth of the model until June 2019. The aim of our study is to investigate the efficacy of the CCC Unit to guarantee a safest and fastest hospital discharge in frail patients, and to test the effect of our team-approach on several hospital outcomes (number of requests, time of assessment request to CCC Unit from admission, time of discharge from assessment request to CCC, length of stay, rate of death during hospital stay).

Materials and Methods

The Model of Discharge Planning

Continuity of Care Center

CCC team is activated by wards physicians based on an integrate model that include the reason of admission, the possible post-discharge setting and details about a subjective assessment encoded by the Blaylock Risk Assessment Screening Score (BRASS). BRASS scale helps clinicians to identify the risk index of difficult discharge. In brief, it comprises a 10-item scale that derives a score between 0 and 40, the 10 items that are used to derive the BRASS score are: patient's age, living situation/social support, functional status, cognition, behavioral pattern, mobility, sensory deficits, number of previous admissions/emergency department visits, number of active medical problems and number of drugs. Typically, a score of 0-10 identifies patients at low risk of complications, 11-20 identifies those requiring discharge planning and scores above 20 indicate patients who require extensive discharge planning and who are likely to be discharged into different settings from the domicile[7]. Case manager assesses reported patients. They have to evaluate, together with clinicians, patients' medical history, devices' prescription, nurse and medical needs for discharge. Everyday our team, composed by medical doctors and case managers, have a meeting about all patients followed by the Continuity of Care Centre and make a personalized plan of discharge for each patient.

Patients and Family Interview

During hospitalization, several patients and their family complain the short time spent from doctors (or nurse in other country as U.S.), talking and explaining patient's clinical condition, medi-

cal care proposed and/or the expected prognosis, despite the importance of medical communication has clearly been reported in literature as a main outcome for a good clinical practice[8-10]. During our daily meeting we helped family and caregivers to accept patients' illness by explaining their medical conditions and expected prognosis, by listening their emotions and feelings, by planning with them time and appropriate setting for discharge considering social and family environment. Patients and family members are treated as member of the Care Unit, respecting their personal, cultural and religious values. We pay attention to physical, psychological, social and spiritual symptoms and needs. These moments resulted essential for family but also for clinicians to avoid medical-legal issues[11].

Data Collection

The Hospital Health Management carried out, a specific training, for the specialized nurses (Case Managers) responsible for data collection. The CCC personnel collected all patient information (personal and clinical data) on a nursing diary, during their visits to the patients in the wards. After discharge, they recorded the information (also based on the hospital admission records from the Hospital Information System) on an electronic registry.

The study is compliant with the Local Ethical Committee Standards of the Fondazione Policlinico Universitario Agostino Gemelli IRCCS (Prot. SF 45108/18; ID: 2007). The study is in accordance with the Helsinki Declaration and EU Regulation 2016/679 (GDPR) concerning the processing of personal data.

Statistical Analysis

Descriptive statistics were performed, analyzing frequency, percentage, mean and standard deviation.

Moreover, Student's *t*-test and ANOVA were used to assess the differences between quantitative variables, Pearson's chi-square test for qualitative ones. Correlation analyses between patients' age and the outcomes (length of stay, CC activation and discharge planning) were performed by Pearson's test.

The level of significance was set at 0.05. Statistical analyses were conducted with STATA software ver. 13.1 (StataCorp., College Station, TX, USA).

To estimate the hospitalization days saved by the CCC discharge program we calculated the difference between real hospitalization days (based on the total number of patients and the average length of stay) and the hypothetic hospitalization days (based on the same number of patients applying the average length of stay recorded in the last 3 months of 2016, when the Unit was not yet operational but data on eligible patients were collected).

The cost of hospitalization was calculated in euros (€) and is equal to € 614,00 per day according to the 2017 reimbursement fees of the Italian Health Care System[12].

Results

A total of 4,057 frail and complex patients were assessed by the CCC from 1 January 2017 to 30 June 2019 with a mean of 135 patients per month. All patients were included in the analysis.

The mean age was 71±17 years; 2,038 (50%) were female, 2,019 (50%) were male. 1,680 (41%) had an oncological diagnosis, 2,377 (59%) had a non-oncological diagnosis. Assessment requests were 3,118 (77%) from clinical division, 939 (23%) from surgical wards.

The planned discharge settings were the following:

– 1,215 (29.9%) palliative services (hospice or palliative home-care);
– 1,152 (28.4%) home-care;
– 484 (11.9%) rehabilitation;
– 366 (9.0%) long-term care;
– 84 (2.1%) transfer to another care facility;
– 78 (1.9%) nursing home.

The average length of stay was 28.9±33.5 days.

We found differences between oncological and non-oncological diagnosis (25.1 *vs.* 31.6 days, $p<0.001$), medical and surgical wards (27.0 *vs.* 35.3 days, $p<0.001$), respectively.

The overall in-hospital mortality rate was 16.6% (675 assessed patients).

We found differences in mortality between oncological and non-oncological diagnosis (17.7% *vs.* 15.9%, $p<0.001$), males and females (18.6% *vs.* 14.7%, $p<0.001$), medical and surgical wards (18.1% *vs.* 11.7%, $p<0.001$), respectively.

Table I shows the average length of stay, the time of discharge planning and in-hospital mortality rate of the patients assessed by the CCC over three years (2017, 2018, 2019) and the same values (referring to eligible patients) in the period preceding the start of the Unit (last 3 months

Table I. Average length of stay, time of discharge planning and in-hospital mortality over three years.

	2016	2017	2018	2019*	p
No. of patients	173	1421	1736	896	
Length of stay (days)	32.9 ± 44.7	29.4 ± 32.8	30.6 ± 36.8	24.9 ± 26.9	< 0.001
CCC activation (from wards)	16.3 ± 19.3	17.1 ± 22.7	18.0 ± 28.6	14.9 ± 22.1	= 0.026
Discharge planning (days)	16.6 ± 38.0	12.3 ± 20.4	12.6 ± 23.1	10.0 ± 12.7	< 0.001
Mortality rate (%)	18.5	18.4	16.1	15.0	0.267

*2019 only till the end of June.

of 2016). Table II shows the average length of stay and time of discharge planning for the different settings. Finally, in the considered period (30 months), we estimated 16,166 hospitalization days spared, with a total saving of € 9,925,924 for the hospital.

Discussion

In the present study, we demonstrate how the introduction of CCC in hospitals positively influences outcomes, such as length of stay, with a significant reduction in days of discharge planning. Index length of hospital stay was reported in previous studies[13-15] with no significant differences in older adults who received early discharge planning compared with those who received usual care.

Our findings have relevance to clinicians, hospital administrators, and policy-makers. In fact, in the considered period (30 months), we estimated an important spared hospitalization days, with a consequent sparing of millions of euros for the hospital. These reductions may have significant resources implications. In fact, reduction of used economic resources may allow investment policies in post-acute and territory services. Continuity may become increasingly important for the countries with old population, like Italy, considering the comorbidity and the associated use of multiple medicines[16-19]. To the best of our knowledge, no published studies has so far assessed the effectiveness of CCC taking into account the logic of continuity of care.

Moreover, it has been estimated that one-fifth of all hospital discharges are delayed for non-medical reasons[20] thus arguing that unit like CCC could help by improving patient-clinician communication and complex decision-making.

In our study, as reported in an exhaustive systematic review, discharge planning do not affect the proportion of patients discharged to home rather than to residential care[2].

In the perspective of a recent meta-analysis, suggesting that earlier referral to a palliative care team specialist was associated with a greater benefit, after the introduction of CCC, we can see a trend of earlier activation of the unit[21].

In a recent systematic review, high-level continuity of care has also been associated with lower mortality rates. Our hospital population did not show significant differences on mortality rate even if a reduction trend is intelligible[22].

The management of the continuity of care is fundamental especially in chronic or complex clinical diseases, often implemented in different settings.

Evidence documented the existence of a period, after hospital discharge, characterized by increased risk for morbidity, often leading to re-admission and negative outcomes in elderly.

Table II. Average length of stay and time of discharge planning for discharge setting.

Discharge setting	Home-care	Long-term care	Nursing home	Palliative services	Rehabilitation	Transferred	p
No. of patients	1152 (28.4%)	366 (9.0%)	78 (1.9%)	1215 (29.9%)	484 (11.9%)	84 (2.1%)	
Age (mean±SD)	66.6 ± 19.3	78.4 ± 12.1	74.8 ± 13.0	72.4 ± 13.9	66.7 ± 18.5	70.7 ± 21.0	<.001
Length of stay (days)	30.5 ± 32.0	27.4 ± 22.9	43.5 ± 42.8	24.3 ± 34.9	35.1 ± 30.6	26.8 ± 19.7	<.001
CCC activation (from wards)	19.2 ± 26.2	16.5 ± 16.3	16.4 ± 18.7	14.0 ± 28.8	20.7 ± 21.2	15.2 ± 14.9	<.001
Discharge planning (days)	12.2 ± 21.9	10.9 ± 12.3	27.1 ± 30.7	10.3 ± 17.2	14.4 ± 17.9	11.6 ± 10.8	<.001

This condition has been identified as post-hospital syndrome[23] and the intervention from the organizational point of view is a way to reduce the impact of this syndrome. This is possible with the identification of early high-risk patients for negative effect of discharge, reserving them a correct planning for discharge. This study shows that the presence and the increment of assessment made by CCC are associated with a reduction of principle length of stay in wards. In addition, it shows that a hospital Care Coordinator Team facilitates diagnosis and prognosis for families contributes to the appropriate placement of patients. A good strategy of discharge is associated to a reduction of length of stay[24,25]. The predictors of readmission is an important topic in literature, especially in elderly, frequently readmitted to hospital after a discharge, and so called "revolving doors" [26]. A good and appropriate discharge is essential just for avoiding readmission[27,28].

Conclusions

We think this approach is the feature of all healthcare systems, especially for acute hospital services, as indicated by worldwide institution (e.g., "Better Outcomes by Optimizing Safe Transitions" project, launched by the American Society of Hospital Medicine; project BOOST and the last but not list, Joint Commission on Accreditation of Health Care Organizations). Our results underline significant hospital cost savings and may be associated with the improvement of quality of life perception for patient and family, particularly important in emergency period[29], reducing medical-legal issues[30].

We think *"Successful Discharge Planning Starts at Admission"*. This paper shows our experience and our findings underline how a new Continuity of Care Unit, in an emergency hospital, could reduce healthcare system direct and indirect costs and increase its efficacy and efficiency. We hope further studies will be produce about argument.

Conflict of Interest

The Authors declare that they have no conflict of interests.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

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