A quasi-experimental evaluation of an intervention to increase palliative medicine referral in the emergency department

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Abstract

Objective: To evaluate a new intervention intended to increase referral rates from the emergency department (ED) to the palliative medicine service (PMS) in acute hospitals.

Methods: We conducted a quasi-experimental evaluation in an urban teaching hospital in Dublin, Ireland. Data were collected over two eight-week periods in November/December 2013 and May/June 2015, with the PALliative Medicine in the Emergency Department (PAL.M.ED.) intervention implemented in the intervening period. All adults who were admitted to the hospital via the ED during the two time periods and who received a palliative care consultation during their hospital stay were included in the study. Our primary analysis evaluated the impact of PAL.M.ED.™ on PMS referral in the ED. Our secondary analysis evaluated the impact of PMS referral in the ED on length of stay (LOS) and utilization, compared to PMS referral later in the admission. We controlled for observed confounding between groups using propensity scores.

Results: PAL.M.ED.™ was associated with an increase in PMS referral in the ED (p < 0.005; odds ratio: 10.5 (95%CI: 3.8 to 28.7)). PMS referral in the ED was associated with shorter hospital LOS (p < 0.005; −10.9 days (95%CI: −17.7 to −4.1)).

Conclusions: Low PMS referral rates in the ED, and the poor outcomes for patients and hospitals that arise from admissions of those with serious illness, may be mitigated by a proactive intervention to identify appropriate patients at admission.

Keywords

emergency department, length of stay, palliative care

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Introduction

Background

Acute hospital admission of people with serious chronic illness, frailty and functional impairment is a well-known international policy concern. This population has frequent inpatient admissions that may be avoidable; these are often associated with poor outcomes for patients and families, high costs, and worse hospital performance, and many such admissions occur through the emergency department (ED), making this a pivotal location for determining care trajectories.

Palliative medicine services (PMS) for hospital inpatients with serious illness are increasingly common in both Europe and the United States, and studies show that consultation teams can improve patient and family experiences and shorten length of stay (LOS), with the greatest effect occurring if PMS services are made as soon as possible following admission.

Despite recent growth in access to PMS, and recognition that the ED is an established first point of admission for many people with serious illness, palliative care integration with the ED is often poor, with significant barriers and challenges. One US study at a large urban hospital found that while a majority (51%-62%) of PMS consultations are for patients admitted through the ED, only 3-6% of these consultations are initiated by ED staff, with referrals often coming days later.

Importance

The international evidence base suggests there is scope for significant improvement in quality of care and patient experience, as well as a reduction in the avoidable utilization of hospital services, through improved integration of PMS and ED teams. Given this evidence, as well as low referral rates to palliative medicine in the EDs of Irish hospitals, the PALliative Medicine in the Emergency Department (PAL.M.ED.) intervention was developed and implemented at an acute urban hospital in Ireland. The PAL.M.ED intervention, including the P.A.U.S.E. tool, was conceived by the first author (ET), prompted by evolving international literature on palliative care in the ED and the impact of earlier referral during a hospital admission. Development of the intervention was also influenced by the model of direct medical specialty referral outlined in Ireland’s Report of the National Acute Medicine Programme.

Goals of this investigation

The primary objective of this study was to evaluate the impact of the PAL.M.ED intervention on palliative care referral in the ED, compared to later in the hospital admission, i.e. for a cohort of adults with palliative care needs who presented at the ED, was the intervention associated with any change in the rate of PMS referral in the ED? The secondary objective was to evaluate the association between a PMS referral from the ED and in-hospital utilization, including LOS and specific diagnostic tests, compared to a PMS referral subsequently in the admission.

We hypothesized that the intervention increased the likelihood of palliative care referral in the ED, and that referral from the ED was associated with reduced hospital LOS and ancillary utilization.

Methods

Study design and setting

This is a quasi-experimental before-and-after study design conducted at a single site over two eight-week periods in November/December 2013 and May/June 2015. The PAL.M.ED intervention was implemented between these time periods and the data for November/December 2013 were collected retrospectively.

St Vincent’s University Hospital (SVUH) is a large urban academic hospital in south Dublin. Palliative care provision in Ireland is based on a national policy of universal access free at the point of use on the basis of need, including consultant-led services for hospital in-patients. Studies evaluating access to and the impact of Irish palliative care are scant.

The study received approval from the Clinical Audit Committee, St Vincent’s Healthcare Group at the study site. The Audit Committee did not identify any ethical issues with the study. The lead author (ET) sent a copy of the study protocol to all the admitting medical and surgical teams in advance of the intervention study period, to make them aware of the study, and to offer them an opportunity to critique or opt out of the process, which no one did. Patients did not provide informed consent; all data were collected as a part of routine clinical practice.

Selection of participants

Patients were included in the study only if they presented in the ED at SVUH and subsequently received a consultation from the PMS during their admission. These eligibility criteria were chosen as all patients had the opportunity to receive our exposure of interest (a PMS consultation in the ED) and were deemed during their hospitalization to have palliative care needs (since all subsequently received a PMS consultation). Data
were recorded routinely and there were no missing data for any eligible person in any field used in this study. Patients admitted via the ED and seen by the PMS more than once over the two study periods were included for their first visit only.

**PAL.M.ED.™ intervention**

The PAL.M.ED.™ intervention, whose objective was to increase referral rates to the PMS from the ED, had four components:

1. **‘Flagging’ system.** Patients referred to the PMS during an admission to SVUH in the three years prior to the study period, and then discharged from hospital, had their records in the ED database ‘flagged’ so that, should they present to the ED at a later date, an alert would appear indicating that they were previously known to palliative care. A prompt encouraged the ED physician then to contact a member of the PMS to discuss the appropriateness of a consultation. A prior Irish hospital study found that only 57% of patients known to community palliative care services were referred to the hospital PMS on admission. This can sometimes lead to patients previously known to the PMS having inappropriate investigations and interventions in the early stages of their admission. Hospital-based palliative medicine consultations are typically initiated over a week into admission, rather than in the critical initial days when goals of care should be established.

2. **Checklist.** A checklist ‘P.A.U.S.E.'™ was developed to identify patients not previously known to the PMS in SVUH, but potentially appropriate for a referral to the service (see Figure 1). All ED staff were asked to refer to the checklist when admitting a patient. This tool, based on a synthesis of the key items from other tools, as well as the expert opinion of the project group members, was designed to be brief and easy to administer. A number of screening tools have previously been developed, but most, for example SPEED, are for use only with cancer patients. P.A.U.S.E.’™ was developed for both cancer and non-malignant conditions.

3. **Proactive PMS engagement.** Each morning, a member of the PMS liaised with the ED team to screen for patients registered at the ED in the previous 24 h who might be appropriate for referral to palliative care. As well as the daily morning visit to the ED, the PMS were available to evaluate patients in the ED weekdays (7:30 a.m. to 5 p.m.) and weekends (9 a.m. to 4 p.m.), and provided telephone consultation outside of those hours. Visibility, ready availability and rapid response by the PMS have previously been identified as key to improving partnership between palliative medicine and ED services.

4. **Education.** Training on palliative care and the PAL.M.ED.™ project, with particular focus on the introduction of the ‘flagging’ system and the P.A.U.S.E.’™, was designed and delivered by the PMS to ED doctors and nurses through a series of interactive multi-disciplinary 1-h workshops. Topics covered included symptom management, communication and ethical challenges in end-of-life decision-making.

A PMS consultation consists of a multidisciplinary team led by a specialist consultant; the team typically integrates with existing management of patients with a life-limiting illness, providing expert guidance on pain and symptom management as well as engaging the patient and their families in goals-of-care discussions.

**Measurements**

**Data collected and data sources**

Sociodemographic and clinical baseline data, and subsequent in-hospital utilization data, were collected on all patients in the study through a combination of chart review and database extraction:

- **Sociodemographics:** Age (years), gender, nationality (Irish/non-Irish), marital status (yes/no), living situation (alone/with another/in a nursing home), residence (Dublin city, Dublin county, other county), private insurance (yes/no), medical card to access hospital care and other health services free of charge (yes/no);
- **Clinical baseline data:** reason for ED admission (stratified into five categories by two palliative care consultants [ET & DW] following data collection), triage status (priority attributed by admitting staff in the ED on a scale of 1–4 where 1 designated low and 4 designated high-priority), admitting specialty, primary diagnosis (record via patient notes and categorized by ET & DW), comorbidities (extracted from hospital database as ICD-10 codes, converted to the Charlson index using Charlson command in Stata 12), and whether the patient was previously known to palliative care services either in the community or at SVUH (yes/no);
- **Utilization data:** location of PMS consult (ED or elsewhere), hospital LOS, and numbers of computed tomography (CT) scans, magnetic resonance imaging (MRI) scans, ultrasounds, haematology
tests, biochemistry tests and microbiology tests during admission.

**Dependent and independent variables in analysis**

In the primary analysis, the dependent variable is a binary variable: did the patient receive a PMS consultation in the ED compared to later in the admission? The main independent (exposure) variable is also binary: during which phase of data collection did the patient enter the hospital (pre-intervention or post-intervention)? Additional independent variables are all those in Table 1.

In the secondary analyses, the groups from pre- and post-intervention are pooled. The dependent variables are continuous utilization variables listed in Table 2: LOS, and numbers of specific investigative scans and tests. The main independent (exposure) variable is binary: did the patient receive a PMS consultation in the ED? Additional independent variables are all those in Table 1.

**Analysis**

**Bias**

In both primary and secondary analysis, the groups were balanced for observed confounders using propensity score weights. All variables included in the propensity scores are listed in Table 1. These variables were chosen because they were hypothesized to be associated with outcome of interest, or both treatment and outcome. The balance of the samples after propensity score weighting was evaluated using absolute standardized difference, where 10% is the rule of thumb for acceptable standardized difference, as illustrated in
Table 1. Additionally, propensity scores were evaluated for balance across the distribution of fitted values.

**Statistical methods**

For the primary analysis, we performed a multivariate logistic regression to estimate an odds ratio (OR) using ‘location of first palliative care consultation’ as the dependent variable and ‘phase’ as the primary independent variable (the first phase being prior to implementation of PAL.M.ED, and the second phase post-implementation). Additionally, we controlled for all baseline covariates in Table 1 and applied the weights.

Secondary analysis is concerned with evaluation of utilization outcomes. These outcomes for the whole sample are summarized in Table 2, using medians and interquartile ranges given skew typical to healthcare utilization data. Taking into account distribution characteristics of each outcome variable, we evaluate exposure impact on outcome using a generalized linear model (gamma, log) for the LOS and tests, and a simple t-test for scans and ultrasounds.

**Results**

**Characteristics of study patients**

The final analytic sample size is 141 patients (Table 1), reflecting all eligible adults admitted during the designated study periods but excluding seven readmissions for patients already included in the study.

In the primary analysis, the intervention group comprised patients admitted in May/June 2015 (i.e. following the intervention, n = 84) and the comparison group comprised patients admitted in November/December 2013 (before the intervention, n = 57). These groups were balanced using propensity score weights and a comparison made of referral rates in the ED: for a cohort of adults admitted through the ED with palliative care needs, did receipt of a palliative care consult in the ED impact LOS or ancillary utilization?

**Secondary results**

Results of the secondary analyses are presented in Table 4. These find that a PMS consult initiated in the ED (versus later in the hospital stay) is significantly associated with reduced LOS (p < 0.005; −10.9 days (95% CI: −17.7 to −4.1)), fewer haematology tests (p < 0.005; −9.8 (95% CI: −15.6 to −4.0)), fewer biochemical tests (p < 0.005; −30.0 (95% CI: −50.5 to −9.6)), fewer microbiology tests (p < 0.005; −3.2 (95% CI: −5.0 to −1.4)) and fewer CT scans (p = 0.03; −0.4 (95% CI: −0.7 to 0)). There is no statistically significant association with number of MRI scans or ultrasounds.

**Sensitivity analyses**

Estimates of associations with in-hospital utilization using observational data are vulnerable to a number of potential biases. Results may be sensitive to right-hand skew and outliers, use of propensity scores,
and choice of modelling approach. To assess the robustness of our results in Table 4, we re-ran the analyses with the sample trimmed at 95% on the LOS distribution, propensity score weights omitted and alternate modelling approach. Results for LOS and tests did not change substantively; the estimate for CT scans was not statistically significant in any sensitivity analysis. See Appendix 1 (online supplement) for details.

**Discussion**

**Key results**

The introduction of a four-part intervention, PAL.M.ED.™, was associated with a significant increase in early referral to a hospital PMS from within the ED. An ED referral was also found to be associated with significantly lower in-hospital utilization, including reduced LOS, compared to subsequent referral.

These results highlight the scope to improve relatively simply the integration between ED and PMS in acute hospitals, as well as some of the benefits of improved integration. International evidence suggests that such improvements are widely needed. The ED is the gateway and point of entry for triage for the majority of patients admitted to acute hospitals, and many patients with serious and life-limiting illness attend the ED because of worsening symptoms that have been inadequately addressed in an outpatient setting. However, palliative care referral rates in the ED remain low and if referral does not occur in the ED, it may be delayed until days into the admission. Palliative medicine review in the ED offers an opportunity to redirect the focus of care and re-evaluate goals of care, when appropriate. In addition to the impact on in-hospital utilization reported in our secondary analysis, increased PMS involvement in the ED may result in increased referral to hospice, improved patient and family satisfaction, less utilization of intensive care and cost-savings.

The most significant impact of the earlier referrals to the PMS was the reduction in mean LOS. The estimated magnitude of reduction is larger than that reported by a prior US study. While the specific magnitude of estimated effect may be sensitive to outliers in our small-sample study, the LOS results we report are substantively unaffected by sensitivity analyses that exclude outliers. Our study also found that early referral to the PMS resulted in lower utilization of laboratory investigations and CT scans. These results are consistent with recent evidence that for a given hospital admission, earlier palliative care consultation is systematically associated with larger impact on utilization including LOS.

**Limitations**

This is an observational study in which exposure assignment for each specific patient was not under investigator control. Reported results could therefore arise due to unobserved confounders associated with both treatment and outcome and not controlled for in our analyses. It is possible that exogenous events within the wider hospital or health system context during the study period may have biased our analyses, e.g. increased incentives to refer to palliative care or to discharge seriously-ill inpatients. However, the research team was aware of this risk throughout the study and is unaware of any such changes in external influence. We have controlled for observed confounding using propensity scores, a well-established method in health services research on hospital palliative care.

This study was conducted in a large urban university teaching hospital in Ireland with a well-established PMS. Results may not be generalizable to other settings and health systems, although it is notable that the background and rationale for our study are consistent with the national and international literature on PMS in the ED. An additional strength is that the tool is applied to all patients with cancer and non-cancer diagnoses alike.

PAL.M.ED.™ represents a complex intervention, with four distinct though inter-related elements, namely, (i) the ‘flagging’ system, (ii) the P.A.U.S. E.™ checklist, (iii) proactive PMS engagement with the ED, and (iv) the education programme delivered to ED doctors and nurses. As such, it is not possible to determine to what extent the individual elements of PAL.M.ED.™ contributed to the overall outcomes. Further work would be required to isolate the effects of the individual elements, and determine their relative impact. This work should include validation of the P.A.
If a patient has a serious life-limiting illness.....

**P.A.U.S.E.**

.....and think Palliative Care if one or more of the following apply:-

- **P** - Palliative care requested by patient or family, or, previously known to palliative care services.
- **A** - Advanced care planning: assistance desired with decision making around goals of care, e.g. resus status, withdrawal of treatment.
- **U** - Uncontrolled symptoms – e.g. physical / psychological / declining performance status
- **S** - Surprise Question – Do you think the patient will die in this admission or within the next 12 months?
- **E** - ED repeat attendances over recent months.

*Figure 1. P.A.U.S.E. checklist.*

The P.A.U.S.E.™ tool, which was conceived and developed for use in this study, and analysis of adherence to the intervention over time. Utilizing the framework developed by the Medical Research Council for implementation of complex interventions would assist in deconstructing the individual component parts and refining the intervention further through piloting and modelling. Incorporation of a qualitative component to capture individual patient and family experience would further strengthen the design. Qualitative feedback from the ED physicians and nurses suggested that improved access to the PMS and a daily visit by a member of the PMS team were possibly the most valued element of the PAL.M.ED.™ intervention.

This study does not evaluate the impact of early PMS referral on patient outcomes. Reported impacts on in-hospital utilization, including shorter LOS, are therefore taken to be beneficial only on an assumption of treatment non-inferiority – i.e. outcomes are at least as good for patients who received a PMS in the ED as those who received one later. While reduced LOS and associated utilization imply lower cost of hospital stay, meeting increased demand for PMS staff will require additional resources and any savings must be offset against these additional costs. The two phases of data collection were at different times of the year, which may have increased the risk of bias. Pre-intervention data (November/December 2013) were collected retrospectively at the outset of the project in 2014, while the protocol was developed and the training programme implemented. Post-intervention data (May/June 2015) were collected once all components of the PAL.M.ED.™ intervention had been implemented. This is a small-sample study in which specific treatment effect estimates may be sensitive to analytical approach and outliers. However, sensitivity analysis excluding high-utilization outliers, employing alternative modelling approaches and checking results without propensity scores did not substantively impact our main findings.

**Generalizability**

This is a small study, and it will be important to replicate the approach in more hospitals and in different health care systems. However, we report a setting that is typical of most European hospitals that offer services free at the point of use, and it is common for hospitals in Europe to face the problem of overuse of ED services by frail elderly people. We therefore consider that our results will be of relevance to international practice, albeit specifics of the reported approach may have to be altered and validated to meet local circumstances.

**Conclusions**

A four-part intervention resulted in a significant increase in referral to a hospital PMS from within the ED. Referral from the ED was also found to be associated with significantly lower in-hospital utilization, including reduced LOS, compared to referral subsequently during the admission. At a time when health systems internationally are trying to manage high numbers of burdensome, often avoidable hospital admissions among seriously-ill older adults, the PAL.M.ED.™ intervention offers scope to improve care and reduce hospital costs for adults with serious illness admitted via the ED.

**Declaration of conflicting interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Ethics approval and consent to participate**

The study received approval from the Clinical Audit Committee, St Vincent’s Healthcare Group at the study site. The Audit Committee did not identify any ethical issues with the study. Patients did not provide informed consent; all data were collected as a part of routine clinical practice and anonymity measures were taken throughout the study.
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