Original Article

Early Supported Discharge for patients with febrile neutropenia – Experience at a large district hospital in the UK

C Brunner, J Botten, N Wennike, L Ford, K Michaels, A Stephens & R Baker

Abstract

Neutropenic sepsis can be life threatening, with mortality 2-21%. The heterogeneity of patients referred with "suspected neutropenic sepsis" has led to strategies being developed to risk-stratify patients and identify those with a low risk of septic complications that could be managed in the outpatient setting, such as The Multinational Association for Supportive Care in Cancer score (MASCC).

Outcomes for patients referred with suspected neutropenic sepsis were assessed before and after use of MASCC guided early-supported discharge.

50/123 (41%) patients over 24 months were eligible for early-supported discharge. 26/50 patients had same-day discharge, 14 had overnight admission, 8 stayed 2 nights and 2 stayed 3 nights. Patients received on average 2 follow-up telephone consultations. There were 5 readmissions (10%) and no adverse events. In comparison group; 8 patients over 3-months would have been suitable, potentially saving 40 bed-days.

This shows MASCC guided early-supported discharge is safe and cost-effective.

Keywords

"neutropenic sepsis", "early-supported discharge", "MASCC score" "cost-effective"

Key points

- Use of the MASCC score can identify which patients with febrile neutropenia are suitable for early-supported discharge
- Early-supported discharge for patients with MASCC score ≥21 is safe
- Early-supported discharge for patients with MASCC score ≥21 reduces length of hospital stay and has the potential for considerable cost savings

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Introduction

Febrile neutropenia is a well recognised and potentially life threatening complication for patients undergoing chemotherapy treatment, with the mortality rate estimated to be 2-21%.[1] It is well documented that early administration of intravenous, broad spectrum antibiotics reduces mortality and that time to antibiotic administration is critical.[2,3]

However, although patients are referred for assessment with "suspected neutropenic sepsis", this encompasses a range of conditions from febrile neutropenia to neutropenic sepsis.[4,5] The Multinational Association for Supportive Care in Cancer score (MASCC) was published in 2000 and is a validated scoring tool used to predict risk of serious complications and death from neutropenic sepsis[6,7,8] and its use in risk assessing this group of patients is recommended in the NICE guidance for prevention and management of neutropenic sepsis.[9]

A number of studies have investigated using the MASCC score to identify patients who are at low risk, by having a MASCC score ≥21, and therefore could be considered for management in an ambulatory setting.[10,11] This has been shown to be a safe and cost effective way to manage these patients.[12,13] In the Oncology community this scoring system has been in place for many years but is still in its infancy amongst non-specialist hospitals. A recent publication by Taplitz et al[14] has offered guidance as to the selection of appropriate patients for outpatient management of fever and neutropenia in adults treated for malignancy, and recommends use of the MASCC score along with clinical judgment and further psychosocial and logistical criteria which are similar to those employed in our study.

At Musgrove Park Hospital, Taunton, approximately 30 patients a month are admitted with suspected neutropenic sepsis. During working hours, the majority of these patients are assessed and managed in the Ambulatory Emergency Care (AEC) setting. On arrival the Sepsis 6 bundle is initiated and a stat dose of intravenous broad spectrum antibiotics is given prior to medical assessment.[15]

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This has been facilitated by the introduction locally of a Neutropenic Sepsis Alert Card.[15] The patients then have an assessment by the Medical and Acute Oncology Service (AOS) teams. If the patient is found to be neutropenic, the MASCC score is calculated and this is used as a tool to aid decision making about early-supported discharge.

To ensure optimal patient safety analysis was undertaken to assess the outcome for patients who had been identified as suitable for early-supported discharge, as guided by the MASCC score. Outcomes for patients presenting to Musgrove Park Hospital with suspected neutropenic sepsis over a 24 month period were analysed and this was compared to prior to the routine use of MASCC scoring as part of initial admissions process.

Method

The MASCC score was embedded into practice in Musgrove Park Hospital and included in the local protocol for assessing patients with suspected neutropenic sepsis. Patients with suspected neutropenic sepsis are treated with a STAT dose of IV antibiotics on arrival while investigations and assessment are undertaken.[15] Patients who have confirmed neutropenia (neutrophil count <1 x 10^9/L) are then assessed using the MASCC score. Those who have a MASCC score ≥21 are considered for early-supported discharge depending on the following criteria:

1. No ongoing clinical concern, e.g. ongoing fevers
2. Easy access to Musgrove Park Hospital and live within a 30 minute radius.
3. Adequate social setup to ensure escalation to Secondary Care in case of patient deterioration (including transportation back to hospital)
4. No history of non-compliance with treatment/ advice

Those who were eligible were discharged on appropriate oral antibiotics and had routine telephone follow up from the AOS team the following day, who would triage and arrange further follow up via telephone, review or readmission as appropriate. Patients also have access to a 24-hour AOS helpline telephone service, which they were advised to contact if they had any concerns.

Prospective analysis was undertaken to identify all patients admitted to Musgrove Park Hospital with possible neutropenic sepsis between 1st January 2016 and 31st December 2017. The following data was collected; primary cancer site, neutrophil count, MASCC score, length of stay, place of assessment, suitability for early supported discharge, readmission and number of follow up telephone calls from the AOS team.

For comparison retrospective analysis of all patients admitted with neutropenic sepsis prior to the routine use of MASCC scoring and early-supported discharge was also undertaken. Review of patient notes was undertaken for patients admitted with neutropenic sepsis between 1st January and 31st March 2014 to identify any patient with MASCC score greater than or equal to 21 and determine their length of hospital stay.

Results

Between January 2016 and December 2017, 123 patients with confirmed neutropenia were assessed at Musgrove Park Hospital. These patients had a variety of primary cancers and this is also reflected in the characteristics of patients suitable for early supported discharge (figure 1a and b).

50 of the 123 patients (41%) had a recorded MASCC score of 21 or higher (figure 2) and their length of stay ranged from same day discharge to 72 hours in hospital (table 1). All patients were discharged home on a course of appropriate oral antibiotics for the suspected source of infection. A further 37 patients had a MASCC score of 21 or above but did not have an early supported discharge. Current practice is that the MASCC score is only utilised by the Oncology team and due to service constraints this is only available 09:00 – 1600 Monday to Friday. 3 of these 37 patients were admitted outside the working hours of the Acute Oncology team and therefore did not have their MASCC score calculated to aid discharge. Reasons the remaining patients were not suitable for early-supported discharge include; infected portacath, florid cellulitis, possible upper gastro-intestinal bleed, urinary retention, lived over 30 minutes away or continued fevers.

Patients received a mean of 2 follow up telephone consultations calls from the acute oncology team after discharge (table 2). Of the patients suitable for early-supported discharge, 5 patients (10%) required re-admission and there were no deaths or escalations to Critical Care. All 5 patients were re-admitted due to ongoing fever in the community despite oral antibiotics.

In comparison between January and March 2014, 8 patients were identified who would have been appropriate for early-supported discharge according our current practice, and their mean length of stay was 5 days (table 3).

Discussion

There is ever increasing pressure on hospitals and clinicians to deliver the right care in the right setting in order to minimise length of stay and avoid admission if at all possible.[16] In order to achieve this

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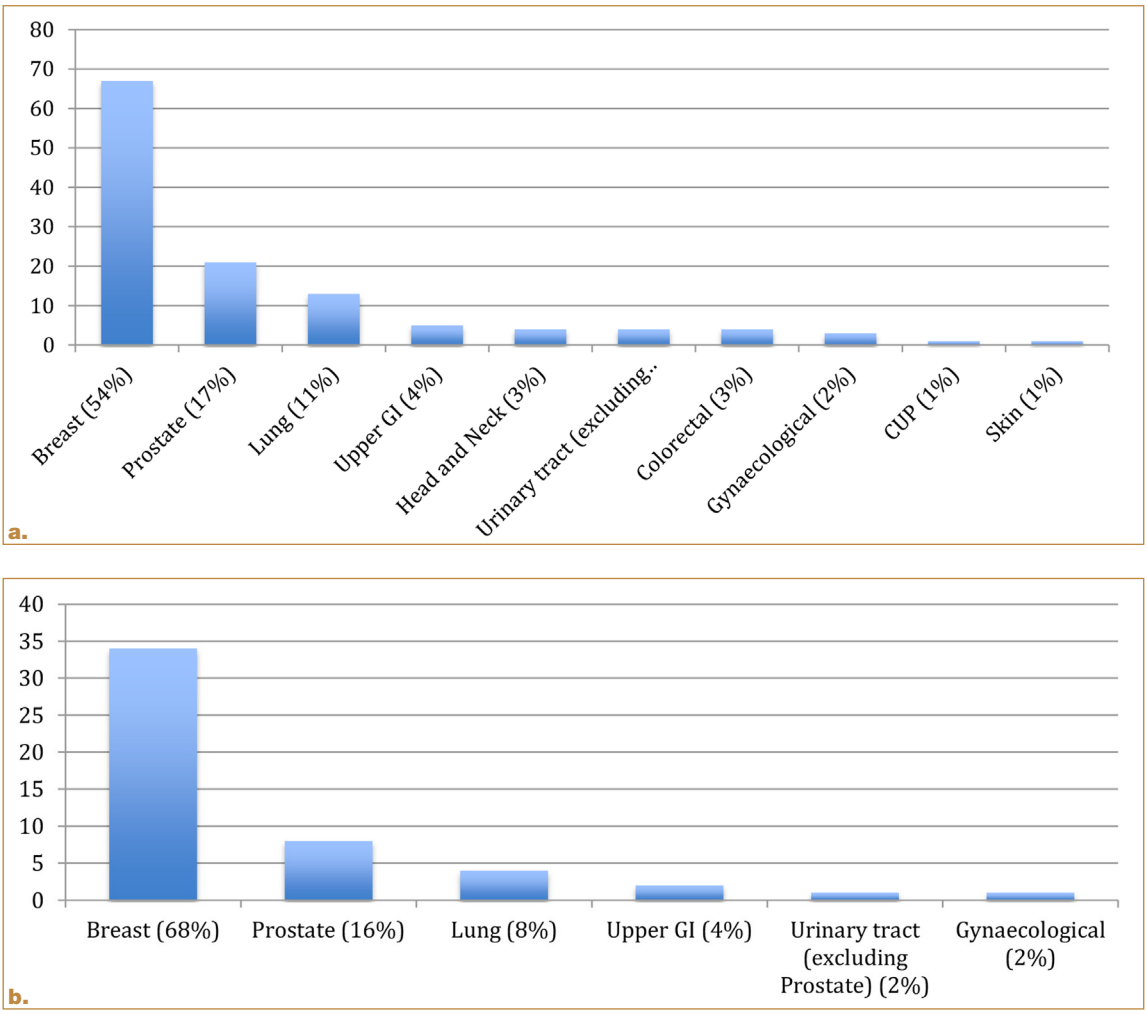

Figure 1. Charts to show the underlying cancer type for all patients a) admitted with neutropenia and b) found to be appropriate for early supported discharge

it is necessary to identify those patients who are suitable for ambulatory management and set up the systems to do so safely. In the case of patients who develop febrile neutropenia, it has been shown that they can be subdivided into high and low risk groups by the use of the MASCC scoring system.[4,7] This can then be used to identify those patients who are potentially suitable for early-supported discharge and management in an ambulatory setting.[10,11] The re-admission rate in our study was 10% and none of the patients required escalation to critical care. This is in line with published literature, which shows a re-admission rate of 5-20%.[17] This shows that using the MASCC score is helpful in identifying low risk patients who may be suitable for early-supported discharge. It also shows that using telephone follow up to re-assess patients and give appropriate advice, or facilitate re-admission if required, was an effective way to ensure patients receive individualised patient centred care and minimise the need for unnecessary attendances for clinical review. Our data also shows that this practice is safe for patients, as even those who required re-admission had no adverse features requiring escalation to Critical Care.

The population served by Musgrove Park Hospital is a mix of rural and urban communities, with some patients living a significant distance from the hospital. In order to ensure that early-supported discharge was safe in our population, the MASCC score was not used in isolation but as a tool to initially identify those who might be appropriate. There were then further criteria to ensure that patients would not be at unnecessary risk if discharged early. The criteria chosen included any ongoing clinical concerns, time to get back to the hospital if needed, appropriate support at home to ensure that patients could respond to any deterioration quickly and no previous non-compliance with treatment. Low readmission rate and no need for critical care shows that these criteria are allowing patients to be selected and supported appropriately. When implementing

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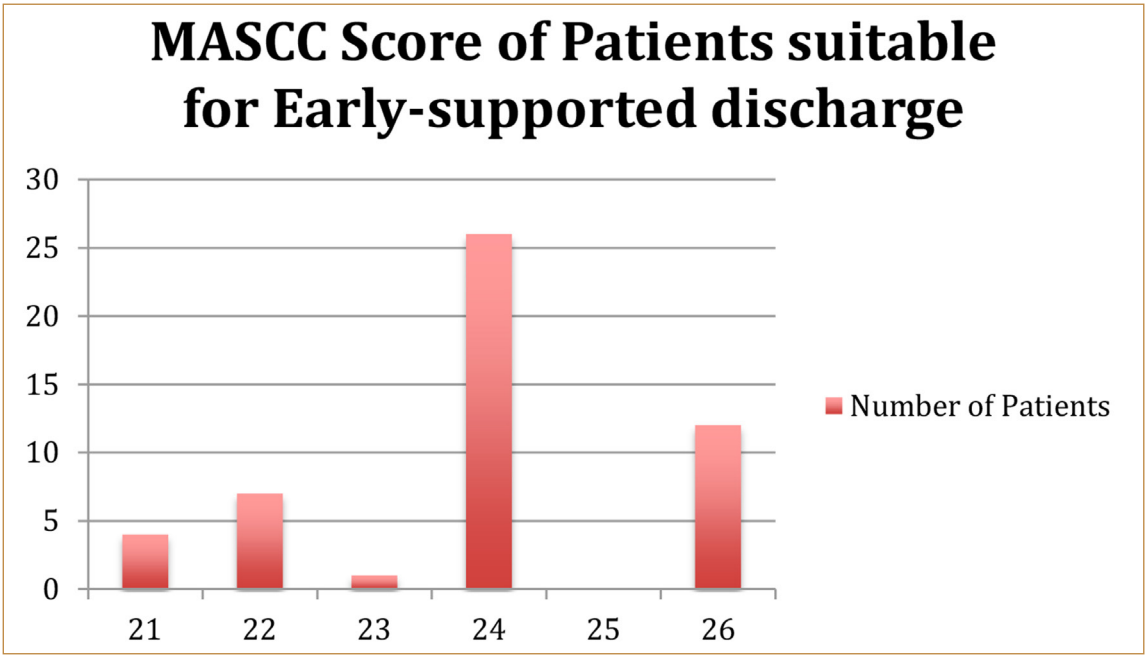

Figure 2. Graph showing the distribution of MASCC scores for patients found to be suitable for early supported discharge

this practice in other hospitals, these criteria may need to be reviewed and adjusted for population specific characteristics.

At Musgrove Park Hospital, our local antibiotic prescribing guideline does not have a standard oral combination of antibiotics for all patients with febrile neutropenia. This is because there may be many reasons for a patient to be febrile and it is important that clinical judgment can be used to help prevent unnecessary over prescription of antibiotics where the fever may be secondary to a non-infective cause. This also prevents exposing patients to potentially harmful side effects of broad-spectrum antibiotics unnecessarily. Advice from our Microbiology Department suggests using empirical antibiotic treatment for patients with neutropenic fever with a clinical or microbiologically proven focus of infection, and the choice of antibiotic would be as stated in our local antibiotic guidelines for that site of infection. For those patients who have a fever from a non-infective cause (e.g. thrombo-embolic disease, tumour lysis, drug reaction) and in those where the cause is unknown, a clinical decision is made as to whether ongoing antibiotics are required and if so the choice of antibiotic. As all patients receive ongoing telephone follow up and have access to a 24-hour helpline these decisions can be reviewed based on the patients progress. Our results show that this practice is safe for patients and may help improve antibiotic stewardship.

Table 1. Table to show the length of stay for patients suitable for early-supported discharge

	Length of hospital stay (nights)			
	0	**1**	**2**	**3**
Number of patients	26	14	8	2

Table 2. Table to show the number of follow up consultations for patients who were suitable for early supported discharge and were not re-admitted

Number of follow up consultations	Number of patients
0	1
1	23
2	15
3	4
4	2

Table 3. Table to show the MASCC score and length of stay for patients admitted with neutropenic sepsis between 1/1/14 and 31/3/14.

Patient	Date of admission	MASCC Score	Length of hospital stay (days)
1	08/01/14	26	6
2	12/01/14	24	10
3	26/01/14	24	6
4	07/02/14	22	4
5	19/02/14	24	2
6	26/02/14	26	5
7	06/03/14	24	4
8	22/03/14	22	4

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Currently the pathway is only operational between 09:00 – 16:00 on weekdays and there would potentially be an increase in number of patients suitable for this pathway if extended to the out-of-hours period but this would need an increase in staff and facilities. At Musgrove Park Hospital, Oncology consultants are available 24/7 for advice and do ward rounds at weekend, but currently reviewing all patients with neutropenic sepsis across the hospital is not part of their regular clinical commitments at the weekends. Expanding either their role to include this or the utilisation of the MASCC score and selecting patients for early supported discharge by the General Internal Medicine consultant with a phone call from Oncology the next day are both options which could be explored and could have allowed 3 further safe discharges in the study period.

Early-supported discharges prevent unnecessary admission and help minimise length of hospital stay and so are a cost-effective practice. In our comparison group from 2014 the average length of stay was 5 days, which was reduced to <1 day by introducing early-supported discharges. This could potentially have saved 40 bed days within that 3 month period, at a cost saving of approximately £250 per night. Therefore suggesting a putative saving of £10,000 per year. In agreement with previous studies this shows an opportunity for significant savings and reduction in bed pressures.[12,18] However there is some investment needed to ensure that the practice is safe, including training staff to assess MASCC score accurately and having appropriate follow up provisions. In our service follow up is via telephone consultation with the AOS team and all patients also have access to a 24-hour advice helpline that they can contact if there are any concerns following discharge. We have also facilitated rapid antibiotic therapy on patient arrival via the use of the Neutropenic Sepsis Alert Card, meaning that on initial presentation and if a readmission is required patients can be treated with IV antibiotics rapidly.[15] The early goal directed treatment ensures antibiotics are given early in the patient journey and thus optimises patient safety.

This project has been extremely beneficial for our Trust and allowed for excellent collaboration between the AOS and Acute Medicine departments. Our developments have been a Neutropenic Sepsis Alert Card and early-supported discharge of patients with febrile neutropenia, which have improved patient flow and reduced length of hospital stay. Whilst this process may be transferrable to other Trusts consideration of the local facilities available needs to be taken into account.

Conclusion

Early-supported discharge guided by identifying low risk patients using the MASCC score is both safe and cost effective. It minimises length of stay and can prevent unnecessary admission. However when implementing this practice local population factors and access to follow up and support must be taken into account.

Conflict of interest

There is no conflict of interest.

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