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ORIGINAL ARTICLE

Potential reduction of hospital stay length with outpatient management of low-risk febrile neutropenia in a regional cancer center

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Abstract

Background: Febrile neutropenia is a serious complication of chemotherapy. The Multinational Association for Supportive Care in Cancer (MASCC) risk index score identifies patients at low risk of serious complications. Outpatient management programs have been successfully piloted in other Australian metropolitan cancer centers.

Aim: To assess current management of febrile neutropenia at our regional cancer center and determine potential impacts of an outpatient management program.

Method: We performed a retrospective review of medical records for all patients admitted at our regional institution with febrile neutropenia between 1 January 2016, and 31 December 2018. We collected information regarding patient characteristics, determined the MASCC risk index score, and if low risk, we determined the eligibility for outpatient care and potential reduction in length of stay and cost benefit.

Results: A total of 98 hospital admissions were identified. Of these, 66 had a MASCC low-risk index score. Fifty-eight patients met the eligibility criteria for outpatient management. Seventy-one percent were female. The most common tumor type was breast cancer. Forty-eight percent were treated with curative intent. The median length of stay was 3 days. The median potential reduction in length of stay for each admission was 2 days. The total potential reduction in length of stay was 198 days. No admission resulted in serious complications.

Conclusion: This review demonstrates a significant number of hospital admission days can be avoided. We intend to conduct a prospective pilot study at our center to institute an outpatient management program for such low-risk patients with potential reduction in hospital length of stay. This will have significant implications on health resource usage, service provision planning, and patient quality of life.

KEYWORDS
early discharge, febrile neutropenia, length of stay, low risk, MASCC

Abbreviations: ASCO, American Society of Clinical Oncology; ESMO, European Society of Medical Oncology; MASCC, Multinational Association for Supportive Care in Cancer; MET, medical emergency team.

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1 | INTRODUCTION

Febrile neutropenia is a medical emergency with a major complication rate of up to 30% and mortality rate of 10%.[1] Management has traditionally involved hospital admission and broad-spectrum intravenous antibiotics until resolution of both fevers and neutropenia. This constitutes a significant impact on quality of life for the patient and use of health resources for the community.

The Multinational Association for Supportive Care in Cancer (MASCC) risk index score can reliably identify patients with febrile neutropenia at low risk of serious complications.[2] The use of oral antibiotics and outpatient management of febrile neutropenia is effective. A recent Cochrane review found no difference in treatment failure, mortality, duration of fever, or duration of neutropenia when outpatient care was compared with inpatient care.[3] ASCO Clinical Practice Guideline supports the use of the MASCC febrile neutropenia risk index to identify patients with febrile neutropenia who are at low risk of complications and therefore candidates for outpatient management.[4] Similarly, ESMO guidelines recognize the growing evidence in this strategy.[5]

In the Australian setting, guidelines support this management approach.[6] Outpatient management programs utilizing protocol-based risk stratification, daily ambulatory nursing visits, telephone follow-up, and early outpatient review have been piloted in several Australian cancer treatment centers.[7] The experience has had mixed success. An early discharge program at Gold Coast University Hospital failed to result in a significant impact on inpatient admissions with only one case managed as an outpatient.[8] Experience from St George Hospital found significant challenges with implementation of a risk-stratified protocol for management of febrile neutropenia with low rates of protocol adherence.[9] Conversely, feasibility studies [10,11] at other institutions have demonstrated the efficacy and safety of early discharge programs. A center in metropolitan Melbourne reported that 56% of febrile neutropenia admissions were low risk and 38% were eligible for early discharge.[10]

We sought to examine current practice for the management of febrile neutropenia at our cancer center, assess the potential number of patients who would be candidates for outpatient management, and the resultant reductions in hospital admission duration.

2 | METHODS

Our cancer center is located 2 hours outside of metropolitan Melbourne in a regional center, servicing a population of approximately 110 000 people. We performed a retrospective review of medical records for all patients admitted with febrile neutropenia between 1 January 2016, and 31 December 2 018. We collected information regarding patient characteristics, cancer diagnosis and treatment, and calculated the MASCC risk index score. Patients with a risk index score of 21 or greater were deemed low risk. We then determined the patient's eligibility for oral antibiotic therapy and outpatient care based on a specified assessment tool (Figure 1). Finally, we calculated the potential reduction in length of stay had the patient been discharged from the day these criteria were met, translating to a cost saving for the hospital and also more efficient allocation of beds.

3 | RESULTS

A total of 98 hospital admissions with febrile neutropenia was analyzed. Of these, 66 were determined to have a low MASCC risk index score. Fifty-eight patients met the eligibility criteria for outpatient management. Characteristics of the patients are summarized in Table 1. Forty-one (71%) patients were female. The most common tumor types were breast, prostate, and gynecological. Twenty-eight patients (48%) were treated with curative intent.

The median length of stay for a hospital admission was 3 days. Had patients meeting both low MASCC risk index score and eligibility for outpatient care been managed as an outpatient, the calculated

Criteria for oral antibiotic therapy
• No multi-resistant organism isolated • Not on prophylactic antibiotics • Able to swallow oral medications • Stable mental state • Normal chest X-ray • Haemodynamically stable • Minimal diarrhoea
Criteria for outpatient management
• Availability of responsible caregiver • No infection requiring intravenous antibiotics • Access to a telephone • Live within 1 hour of emergency department • No allergy to oral antibiotics • No history of non-compliance

FIGURE 1 Assessment tool

TABLE 1 Patient characteristics

Characteristic	Number	Percent
Met criteria for outpatient care	58	
Gender		
Male	17	29
Female	41	71
Treatment with curative intent	28	48
Solid organ malignancy		
Breast	27	47
Prostate	5	9
Gynecological	4	7
Gastric	3	5
Lung	3	5
Pancreas	1	2
Merkel cell carcinoma	1	2
Hematological malignancy		
Non-Hodgkin lymphoma	5	9
Multiple myeloma	4	7
Chronic myelomonocytic leukemia	2	3
Myelodysplastic syndrome	1	2

median potential reduction in length of stay for each hospital admission was 2 days. The total potential reduction in length of stay was 198 days. The cost of inpatient care, based on the National Efficient Price,[12,13] is reduced by approximately $3000 for each admission and approximately $297 000 for the 198 days saved. An additional benefit is the 198 bed days that are now available to accommodate other patients, improving the provision of a valuable health care resource.

The safety of such a program is paramount given the regional setting of our institution. No admission had a serious complication such as a medical emergency team (MET) response call, escalation to intensive care unit admission, or death.

4 | DISCUSSION

Our study identified almost 100 hospital admissions for febrile neutropenia over a 3-year period. Two-thirds had a low MASCC risk index score and over half of the patients met the criteria for eligibility for outpatient management. Significant reductions in hospital admission duration can be achieved with this management strategy. This is comparable with other published reports from Australia[10,11] and United Kingdom.[14] This strategy appears safe with no observed clinical deterioration occurring during the hospital admissions. While it is likely a similar outcome would have occurred during outpatient care, the effect of more available assessment in the inpatient setting to prevent serious deterioration cannot be excluded from this retrospective review.

The majority of Australian cancer specialists express a willingness to adopt a risk-based management strategy for febrile neutropenia and consider outpatient care; however, significant barriers including lack of awareness, inadequate knowledge, and insufficient institutional infrastructure remain.[15] This is especially relevant to our institution situated in a regional setting, where provision for an ambulatory nursing service, access to early outpatient review, and prompt attendance to an emergency department would be required to ensure the safety of outpatient management of febrile neutropenia. Given the expanding evidence of oncological presentations that potentially could be managed in an ambulatory setting, engagement across the health service, especially with the emergency department, will be critical to ensure any change in practice of this nature is fully implemented, well-coordinated, and sustainable.[16]

Changing practice from routine inpatient care to outpatient care for febrile neutropenia is cost-effective[17] and potentially can reduce health care costs by 30%.[18] Outpatient care is also the preference for the majority of patients,[17] reduces the risk of hospital acquired infections or iatrogenic complications,[19] and is associated with improved quality of life.[20]

It is, however, important to note in the current COVID 19 climate that such programs can have its utility in reducing hospitalizations and thus exposure to our immunocompromised population in a high-risk "hospital" setting. However, this is also complicated by the fact that any ambulatory program in the setting of COVID 19 would require an emergency presentation for a COVID 19 result in the context of a fever. This would be the only environment where a potential COVID 19 patient with possible neutropenia can be isolated while the results come back as well as receive their first dose of intravenous antibiotics. Prior to COVID 19, the first dose could be given in day oncology or another day center while they are being assessed.

5 | CONCLUSION

This retrospective review will lead to a prospective pilot study at our center to institute an outpatient febrile neutropenia program for such low-risk groups with potential reduction in hospital bed length of stay. This has significant implications on health resource usage, service provision planning, and patient quality of life.

CONFLICT OF INTEREST

The authors declare that they do not have any conflicts of interest in relation to this manuscript.

AUTHOR CONTRIBUTIONS

Conceptualization, *Writing Review Editing*, *Data Curation*, *Formal Analysis*, *Project Administration*, *Writing Original Draft*, M.N.; *Data Curation*, *Formal Analysis*, T.J.; *Conceptualization*, *Data Curation*, *Formal Analysis*, *Project Administration*, *Writing Original Draft*, *Writing Review Editing*, J.T. and A.W.

ETHICAL STATEMENT

Appropriate ethics approval was obtained from the institutional Human Research Ethics Committee.

DATA AVAILABILITY STATEMENT

Data used from this study are available from the corresponding author on reasonable request.

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