

## Blood Pressure, Orthostatic Hypotension and Falls in Patients with Advanced Cancer

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### Abstract

#### **Aim**

Orthostatic Hypotension (OH) is an indicator of deteriorating autonomic dysfunction. Adherence to BP and OH measurement guidelines in an inpatient specialist palliative care unit (SPCU) was unknown. Compliance of BP and OH measurement in an advanced cancer cohort was audited.

#### **Methods**

A retrospective analysis of four consecutive months of patients admitted with an advanced cancer diagnosis to the inpatient SPCU was conducted. Data was obtained from 168 clinical records, and audited against current institutional clinical standards.

#### **Results**

Falls risk screening including BP and OH measurements were not measured on admission in 19% (n=32) cases as recommended by institutional guidelines. Where falls risks were identified in 94 (69%) patients only 71 (76%) of these had completed risk assessments. OH testing was incomplete or not conducted in 59% (n=42) of risk assessments. This had patient care and safety implications e.g. under-reporting falls risk. In addition, institutional guidelines were inflexible in clinical practice specific to a palliative care cohort of patient.

#### **Conclusions**

Institutional guidelines need regular reviewing. In cases where a healthcare professional determines it is inappropriate to perform an assessment, we recommend a modification to the tools allowing for recording of this decision. OH is an underestimated reality in hospice populations and the impact on hospice services is worthy of further study.

## Introduction

Although there are many proposed definitions of orthostatic hypotension (OH)<sup>1</sup> or postural hypotension, in our hospice setting we used a widely accepted definition of: OH is present if a  $\geq 20$ mmHg drop of systolic blood pressure (BP) or a  $\geq 10$ mmHg drop in diastolic BP occurs one to three minutes after standing<sup>2</sup>. OH occurs from orthostatic stress due to a change in body position, typically when a person stands up from a seated or lying position. It is diagnosed through serial BP measurements taken while lying or sitting, and then standing (with at least a one-minute delay after position change). The prevalence of OH is 30% in older people and 40% in a hospice setting<sup>3</sup>. OH is usually transient and represents a delay in the normal compensatory ability of the autonomic nervous system<sup>4</sup>. Symptoms include blurred vision, cognitive impairment, dizziness, fatigue, headache, nausea, palpitations, tremulousness, and weakness. Symptoms often resolve when the patient lies down<sup>5,6</sup>, or when causative factors such as dehydration are treated<sup>2</sup>. Contributory factors include co-morbidities, OH-associated medications, dehydration and polypharmacy<sup>3,7</sup>. OH and orthostatic symptoms are important risk factors for falls and fractures in older people<sup>8</sup>.

The risk of a fall in an older person increases with a cancer diagnosis<sup>9</sup> and this further increases as cancer advances<sup>8,10</sup>. Falls in patients receiving inpatient palliative care are associated with significant morbidity and mortality; the incidence is underestimated<sup>11</sup>. OH is a major precipitating factor of falls in palliative care settings<sup>12</sup>. Other risk factors include anti-hypertensive medications and polypharmacy<sup>8</sup>, though reasons for falls are often complex and multi-factorial. As polypharmacy is especially prevalent at the end of life<sup>7</sup>, regular review and rationalisation of medications is recommended to minimise drug-associated OH<sup>13</sup>.

Healthcare facilities caring for those with advanced disease should have policies and procedures to screen for falls risk including identification of OH as a modifiable risk factor. If OH is identified, falls prevention strategies should be implemented. The importance of clinical audit in this context ensures quality assurance and identifies areas for enhancement, with the aim of improving patient care and service provision<sup>14</sup>. In our specialist palliative care unit (SPCU), local clinical standards direct how patients are screened for a falls risk. Adherence to these clinical standards was assessed through clinical audit. The audit aimed to a) report completion rates of falls screening, falls risk assessment and BP measurement standards on admission to our SPCU, and b) identify gaps in standards compliance and make recommendations for clinical practice.

## Methods

Audit Standards were drawn from institutional guidelines, with 100% adherence expected as per institutional policy (Table 1). The institutional policy is derived from the Fall Risk Assessment Tool (FRAT) pack issued by the national health service executive (HSE) in Ireland as part of the National Strategy to Prevent Falls and Fractures in Ireland's Aging Population<sup>15</sup>.

A retrospective chart review of consecutive admissions of patients with cancer to the SPCU over a four-month period was conducted. Inclusion criterion was a diagnosis of malignant cancer, and exclusion criterion was non-malignant diagnoses. Healthcare records, care plans, screening tools, admission tools, checklists and vital signs charts were examined, and relevant information recorded using a standardised data collection sheet. Demographic patient information like diagnosis, metastatic burden, and admission details were recorded. Institutional policy asks that all admissions are screened for falls risk with the Falls Risk Screening Tool, and if positive, a further formal clinical Falls Risk Assessment Tool should be completed. The Falls Risk Assessment Tool includes a test for OH. Completion of these tools was audited. Data collection was completed by three auditors. The institutional healthcare audit committee approved the project as a clinical audit that measured practice against agreed institutional standards<sup>16</sup>. Descriptive statistics were generated using Microsoft Excel (2021) and Prism GraphPad Software V7 (La Jolla, USA).

## Results

### *Demographic Data*

There were 197 admissions during this audit period, and of these 170 met the inclusion criterion of cancer diagnosis. There were 27 were non-malignant diagnoses and these were excluded from the audit. Two charts were unavailable for analysis, and 168 medical records were reviewed. Mean age was 72 years (Range=16-97 years). 52% (n=87) were female. Of the records reviewed 92% (n=154) had known metastatic disease, and 59% (n=99) were admitted for 'End of Life Care'. The admission outcome was death for 77% (n=130), and discharge for 23% (n=38) (Table 2).

**Table 1. Audit Standards.**

	<b>Audit Standards</b>
<b>1.</b>	Every patient should be assessed using the local 'Falls Risk Screening Tool'.
<b>2.</b>	If the falls risk screen identifies a falls risk, the patient should have a full falls risk assessment using the 'Falls Risk Assessment Tool', including an Orthostatic Hypotension (OH) assessment: BP should be measured supine/sitting and standing to test for OH.
<b>3.</b>	If patient has symptoms of OH (falls or postural dizziness) then: BP should be measured supine/sitting and then standing to test for OH.
<b>4.</b>	BP should be recorded in the resident/patient chart, in particular on admission.
<b>5.</b>	If patient is on antihypertensive medication, then BP should be measured regularly.

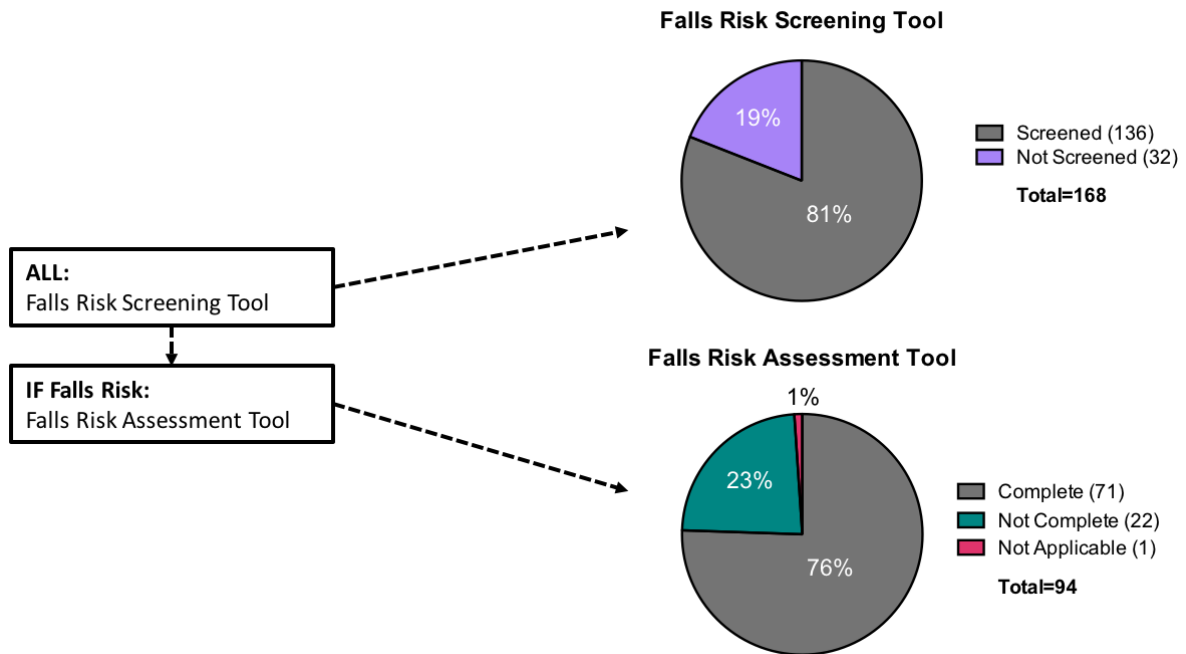
**Table 2.** Clinical Characteristics and Demographics of the Audit Population.

<b>Demographics</b>	<b>(n=168)</b>	<b>(%) [Range]</b>
Male	81	(48%)
Female	87	(52%)
Mean age (years)	72	[16-97]
<b>Primary Cancers</b>	<b>(n=168)</b>	<b>(%)</b>
Lung	35	(21%)
Upper Gastrointestinal	28	(17%)
Lower Gastrointestinal	38	(23%)
Genito-urinary	33	(20%)
Breast	18	(10%)
Other	16	(9%)
<b>Metastatic Spread</b>	<b>(n=168)</b>	<b>(%)</b>
Metastatic	154	(92%)
Localised	8	(5%)
Not documented	6	(3%)
<b>Reasons for Admission</b>	<b>(n=168)</b>	<b>(%)</b>
End-of-Life-Care	99	(59%)
Symptom Control	60	(35%)
Respite	6	(4.5%)
Rehab	3	(1.5%)
<b>Outcome of Admission</b>	<b>(n=168)</b>	<b>(%)</b>
Death	130	(77%)
Discharge	38	(23%)

*Audit Standard 1: Every patient should be assessed using the Falls Risk Screening Tool*

Of the 168 patients who met the eligibility criteria, 136 (81%) had the Falls Risk Screening Tool completed (Figure 1).

**Figure 1. Falls Risk Screening and Assessment Among Admissions.**



All patients audited (n=168) should have been screened with the Falls Risk Screening Tool. 81% (n=136) had it completed. Of those that should have had the Falls Risk Assessment Tool completed: in 76% (n=71) it was completed, 23% (n=22) it was not and 1% (n=1) indicated it was not applicable.

*Audit Standard 2: If the falls risk screen identifies a falls risk, the patient should have a full assessment using the Falls Risk Assessment Tool*

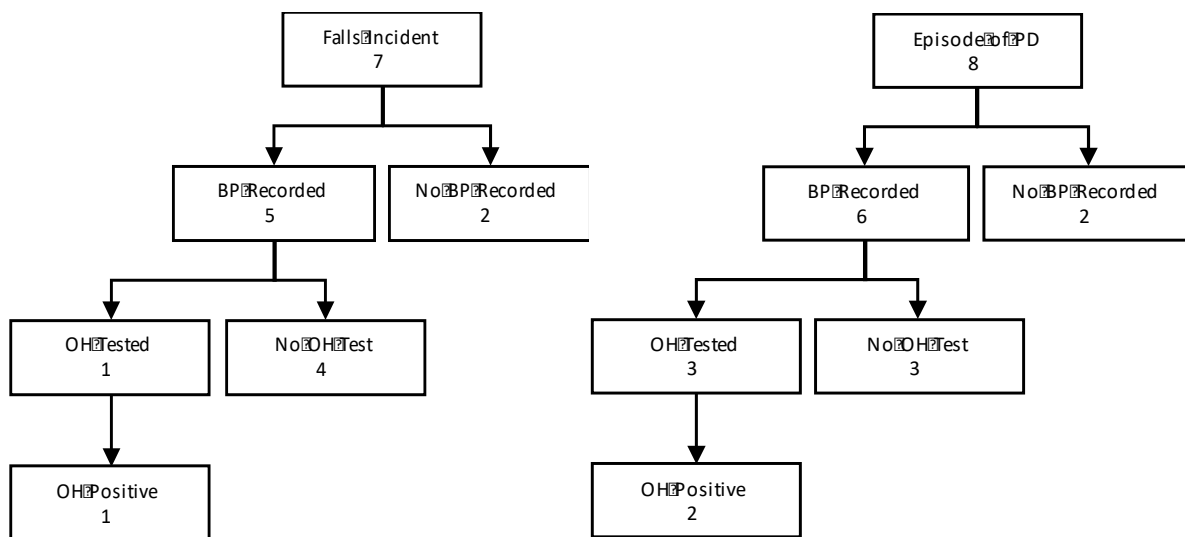
Of the 136 patients who had the screening completed 94 (69%) were at risk of falls, and of these only 71 (76%) had a Falls Risk Assessment completed (Figure 1). Falls risk was unknown for those who did not have a completed Screening Tool (n=32). Of the patients requiring a formal falls risk assessment 42 of the 71 Risk Assessments (59%) had an unfinished or incomplete OH test. This was recorded as "Tried But Failed", i.e. the OH test could not be completed as the patient was: "unwell", "unable to stand", "too weak" or it was "not appropriate". A further seven were deemed not at risk but had a full Risk Assessment Tool completed when it was not indicated.

There were seven falls during the audit period. Of these, five had BP measured, and only one had their OH assessed. There are numerous possible explanations for non-completion, but none were recorded. There were eight episodes of postural dizziness during the audit. Of these, six had their BP measured later and only three tested for OH. As per institutional policy, following a fall or if an OH symptom is present a full Falls Risk Assessment should be repeated. We found that it was completed in a minority; four of fifteen, which is below reported rates<sup>8,10,17</sup>. No explanations for non-completion were documented.

*Audit Standard 3: If patient has symptoms of OH (falls or postural dizziness) then, BP should be measured supine/sitting then standing to test for OH*

Following a falls related incident or episode of postural dizziness, a Falls Risk Assessment Tool, which includes BP measurement and OH assessment, must be completed. Seven falls were documented during the audited time period. Subsequently, five of the seven had their BP measured. Only one was tested for OH and was positive. Postural dizziness was documented for eight patients. Six had their BP measured afterwards. Of these, three were assessed for OH, two of whom tested positive (Figure 2).

**Figure 2.** Falls Risk procedure after a fall or episode of postural dizziness.



*A fall or an episode of postural dizziness (PD) was documented in 15 patient records. Of these, only four had their Orthostatic (OH) tested, three of whom were positive.*

*Audit Standard 4: BP should be recorded in the patient chart, in particular on admission and Audit Standard 5: If a patient is on anti-hypertensive medication, BP should be measured*

Institutional guidelines advise that BP be recorded on admission when patients were receiving anti-hypertensive medications. 85% had BP recorded on the vital signs chart. The median number of recordings was one per admission, most commonly on admission. Regular anti-hypertensive medications were charted in 62 patients (37%). Of those, 54 (87%) had BP measured at least once during their admission.

## **Discussion**

The purpose of this audit was to examine institutional standard compliance and identify areas where improvements are needed in clinical practice in a cohort where falls are prevalent and problematic. This audit demonstrated poor adherence in falls screening, risk management, and both BP and OH measurement in a SPCU. It demonstrated some areas of good practice and highlighted where improvements are necessary.

Every patient admitted to the SPCU should be screened for falls risk, as per institutional policy. This standard was achieved in over 80% of admissions. Almost 20% of cancer inpatients did not undergo screening for falls risk within one week of admission; this is of concern given the negative consequences of falls for patients with cancer<sup>11</sup>. This audit did not identify the reasons why forms were not completed. To account for cases where clinical judgement by a healthcare professional determined that it was inappropriate to perform the assessment, we recommend revision of the assessment tool with a section dedicated to documenting the reason for non-completion. We would also recommend a qualitative study or focus groups among staff to explore reasons for non-completion of forms.

Those identified at falls risk on initial screening should proceed to a full risk assessment. In almost a quarter of cases (23%) this did not happen. The reasons are unclear but may relate to priorities of care in advanced disease. Interestingly, our audit demonstrated that a substantial number screened and found to be at risk of falls could not have the OH test completed. The reasons for non-completion included: "unable to stand", "unwell", "bedbound" and "too weak". Additionally, seven patients who were not at risk of falls had a complete Risk Assessment Tool completed where there was no indication. This illustrates that the policy and the Assessment Tool form is unclear and led to unnecessary assessment, using valuable resources in a clinical setting, and patient time.

Monitoring vital signs is relatively recent in palliative care settings<sup>18</sup>. Recording of vital signs should be kept to a minimum as set by an institution, and tailored to patient specific considerations<sup>19-21</sup>. In the actively dying, the priority is palliation and excessive assessment can distract from patient comfort<sup>21</sup>.

Our institutional policy states that everyone should have BP measured on admission and then on an as per clinical need, with particular emphasis on those prescribed anti-hypertensives. Our current practice did not meet this standard, as 25 (15%) had no BP measurement on admission. The current clinical standard may not be appropriate to the clinical setting and further clinical review may be warranted.

Those on anti-hypertensive medication should have BP measured regularly, as clinically appropriate. Eight patients on anti-hypertensives did not have BP measured at all, even at initial admission. Considering the link between anti-hypertensives and OH, the necessity to measure BP and assess need for ongoing anti-hypertensives is apparent. It may be appropriate in this setting to taper off medications, including anti-hypertensives, as clinical status declines<sup>12</sup>. The need for medication reconciliations is well recognised especially in older patient cohorts and those in palliative care settings<sup>22,23</sup>. However, this cannot be completed without monitoring the indication and effect of the medication<sup>7</sup>, in this case monitoring BP at a minimum on admission, and thereafter 'regularly' as deemed clinically appropriate.

Study limitations included the variation in admission procedures (inter-clinician variation, non-completion of proformas) and incomplete healthcare records. Additionally, our audit was retrospective and relied on the quantity and quality of documented evidence. Where reasons for non-completion were not documented, clinical judgements could not be captured, and this was commonplace. This is a limitation of retrospective data collection, common to most health care audits and can be improved by including specific sections in clinical tools to document reasons for non-completion. Ideally real-time prospective observation would be preferable.

Our data reinforces the importance of OH assessment in order to reduce the risk of further falls<sup>10,24</sup>. The institutional policies set out clear guidance for the screening and assessment of falls risk in the patient cohort. The tools themselves would benefit from reformatting and clarification, which could improve compliance and completion rates. Indeed, this could also prevent unnecessary Falls Risk Assessments and redirect clinical resources more appropriately. Audit results were presented at the institution's Grand Rounds meeting, and recommendations made to the institutional Falls Prevention Committee. National standards for vital sign measurements and falls risk evaluations would be valuable to inform practice. Others believe that in best care of the dying patient unnecessary intervention including measurement of vital signs should be discontinued<sup>25</sup>. We recommend that any future standards must reflect the clinical considerations in a palliative cohort; specifically, that it may be impossible or inappropriate for some patients to undergo a full OH assessment. A prospective study could observe clinical teams in the SPCU to actively monitor and document the use of the Falls Risk screening and assessment tools. There is uncertainty about the benefits of vital signs measurement in palliative cohorts<sup>20,21</sup>, especially if it will not alter management. A revision of institutional policy around assessment and documentation is warranted, in particular to clarify procedures for documenting when and why a decision was taken to not assess vital signs or OH.



Those with advanced cancer are at significant risk of both falls and OH. This audit highlighted that there was incomplete adherence to the clinical guidelines. In cases where a healthcare professional determines it is inappropriate to perform an assessment, we recommend a modification to the tools allowing for recording of this decision. We also recommend consideration be given to the frequency of anti-hypertensive prescribing and reviewing of the BP measurement policy; with the suggestion that there should be no requirement to measure BP where clinically inappropriate. Finally, the clinical standards, admissions forms, and screening tools should be reviewed and revised regularly, as clinically indicated and as evidence-base evolves.

**Declaration of Conflicts of Interest:**

There are no conflicts of interest to declare.

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