

Introduction

National guidelines directing the use of platelet transfusions for the UK written by the British Society for Haematology (BSH, formerly the British Committee for Standards in Haematology [BCSH]) have been available since 1992 using the best available evidence to outline the clinical indications for transfusions. These guidelines direct clinical practice by outlining when platelets are clinically indicated and when they are unlikely to benefit patient outcomes or indeed cause harm (BSH 1992, BSH 2003, BSH 2016). These guidelines have formed the basis of audit standards to examine the standard of platelet care in the UK for over a decade. These guidelines also align with American Society for Clinical Oncology guidance on platelet transfusion in adult cancer, suggesting they should only be used prophylactically at predefined thresholds in reversible bone marrow failure (Schiffer et al, 2018).

National Comparative Audits of Transfusion (NCA) have been undertaken in response to Serious Hazards Of Transfusion (SHOT, UK Haemovigilance scheme) guidance, which advocated regular audit to ensure appropriate use of blood components. Three large audits of transfusion practice in relation to platelets have subsequently been conducted (NCA, 2007; 2010; 2016). In 2007, the audit examined the use of platelets across different specialities; haematology, cardiac and critical care and concluded 43% of the 4400 transfusions were non-compliant with guidelines and potentially unnecessary (NCA, 2007). In the 2010 NCA audit, the focus was entirely on use in haematology patients and feedback from the 2007 audit lead to extra factors being taken into account (platelet expiry, documented thresholds) when assessing the appropriateness of the transfusion. However, despite this measure to accommodate other reasons for the transfusion, 28% of the episodes assessed remained in the category of inappropriate transfusion (NCA, 2010). Therapeutic use was less problematic with only 13% of audited transfusions assessed as outside the BSCH (2003) guidelines. The most recent audit in 2016 focused solely on use of platelets in haematology; where 22% of prophylactic episodes were considered

inappropriate (NCA, 2016). This demonstrates an improvement in practice over the last decade but there is still room for further changes in practice.

The implication arising from these audits centres on patients receiving unnecessary platelet transfusions and the clinical consequences are multifold. A reported drop in new donors of 40% over the past decade (National Health Service Blood and Transplant [NHSBT], 2015) ultimately risks supply not meeting the increasing demand. Although it is recognised that the main pressure on demand does not necessarily stem from inappropriate use (Estcourt, 2014), rather from broader changes in aging populations and treatment modalities (BSH, 2016). However as the numbers of transfusions increase the percentage of inappropriate transfusions given (accounting for 22% of all transfusions) remains and therefore continues to contribute to the pressure of demand.

The risks of receiving transfusions are well documented and include: acute transfusion reactions; allergic and anaphylactic reactions with varying degrees of patient morbidity (Serious Hazards Of Transfusion [SHOT] 1996; 2019). They are also a cause of Transfusion Related Acute Lung Injury (TRALI) and Transfusion Transmitted Infection (TTI) (Blumberg et al, 2010; Estcourt et al, 2011; Estcourt et al, 2012; Murphy et al, 2013). Transfusion practice guidance has focused on administration of sufficient platelets to optimize patient outcomes while avoiding unnecessary transfusions, in relation to the aforementioned risks (Kaufman et al, 2015).

Previous studies have focused on interventions designed to change transfusion decision behaviour and evaluated their subsequent outcomes on transfusion practice (McCullough, 1988; Rosen, 1992; Lam et al, 1997; Tinmouth, 2005). A systematic review noted a range of behavioural interventions designed to influence transfusion behaviour (including red cells and other blood components) failed to have a sustained effect on platelet transfusions remain inconclusive (Tinmouth, 2005). Complex conditions were posited as a possible reason for inability to produce sustained change (McCullough 1988).

Transfusion knowledge in relation to anaemia has been suggested as socialisation in practice as opposed to formal education (Bishop et al 2011). Anaemia was deemed low on the list of clinical priorities, and red cell transfusion decisions were characterised by uncertainty and the decision to transfuse on one clinical parameter, the haemoglobin result (Bishop et al 2011). This concept is arguably transferable to platelet transfusions where there are often areas of uncertainty in the decision making, platelet thresholds are used to inform the decision and education can be variable. Transfusion education was found to be inconsistent at undergraduate medical level in several studies (Karp et al 2011, Coffey and Narayan 2013, Graham et al 2017).

Studies where clinicians were interviewed regarding their own '*inappropriate*' use of blood components have noted that it was viewed as a rare event and uncommon in their own practice. (Francis 2009, Rafat 2012, Clinical Excellence Commission [CEC] 2012). '*Inappropriate*' was considered by the NCA as anything out with the guidelines (NCA, 2007), and this term has subsequently been assimilated into the literature as an accepted concept. It was seen that individual cases of inappropriate use were not necessarily assessed in any depth to ascertain if all factors had been taken into consideration (CEC 2012). Given the lack of evidence regarding platelet transfusion decisions, the aim of this study was to explore possible factors from a range of perspectives that influence decisions to give prophylactic platelet transfusions, in cases that where the transfusion would have been considered not clinically indicated in audits against guidelines. It was anticipated that this would help inform future strategies to limit unnecessary transfusions.

Study

Setting and case background

The study was conducted across one cancer specialist trust with two hospital sites in the UK. Each site has a transfusion laboratory and platelet ordering is independent of the other (although transfer of platelets does occur to prevent wastage). There is

variation in the stock holding of platelets. Site one, which is linked to case one reported below, holds up to 12 stock platelets daily, site two (case two) has stock platelets dependent on patient activity, it varies from none to two. 50,000 patients are treated each year in the trust as outpatients or inpatients.

Methods

An instrumental case study approach was undertaken to allow examination of the transfusion episodes in detail and provide broader information and lessons. This approach, linking interviews to a recent case, helps to limit recall bias previously reported in transfusion qualitative interviews (CEC, 2012). Stake (1995) defined instrumental as an approach where the case itself is not the primary importance but rather the platform from which the whole complex phenomenon can be examined. In exploring decisions and factors in transfusion practice, a case study approach, allows a global perspective with data extracted from numerous data sources and therefore helps details and to illuminate decisions (Schramm 1971, cited in Yin 2009 p17). Zucker (2009) highlighted that is it often used as a research approach when no other methodological approach will ascertain the level of description the researcher is trying to obtain. Case studies allow the opportunity to look at the complexity of the actual phenomena, in clinical context, the interplay of factors, while also assimilating evidence from a variety of sources in a systematic way. The study was not designed just to look at knowledge of guidelines but how it is applied in practice and how different factors influence the practice of making a platelet transfusion decision. Propositions were described at the outset in order to identify potential researcher bias and confirmation bias and then analysed in light of key findings as per instrumental case study methods (Supplemental file 1) (Yin, 2009).

Two case studies were carried out in different clinical areas so that impact of clinical context could be compared and contrasted. Case study evidence came from 2 main sources; documentary evidence and the interviews of ten staff (doctors [n=3], nurses [n=4], Biomedical Scientist [BMS] [n=2] and medical laboratory assistants [MLA] [n=1]). Yin (2003) suggests this is an adequate sample for case study methods, when

combining qualitative data with other data sources. Documentary evidence provided information on patient data; pre and post platelet counts, evidence of blood tests and timings, and documented entries in the patient's medical records related to any transfusion decisions. All documents in relation to the transfusion episode were collated; guidelines, policy and laboratory request forms. Key individuals in clinical areas were asked for local area documents which contained any information on platelets including care plans and local Standard Operating Procedures (SOPs). Interviews were carried out with members of staff who were key stakeholders involved in the platelet transfusion episode. Eligibility criteria for cases to be analysed is outlined in Table 1.

Table 1. Eligibility of case study for analysis

Study approval

The trust's Committee for Clinical Research reviewed the project and deemed it to be service evaluation, as per HRA (2016) guidance, granting approval on behalf of the trust Research and Development department, therefore no formal additional ethical review was required. Since the service evaluation involved audio-recorded interviews, participating clinicians were given an information sheet and invited to take part. Informed written consent (and verbal processual consent post-interview) was taken for each participant. Interviews were audio-recorded and transcribed verbatim.

Case Selection and Data acquisition

The requests in the laboratory were reviewed until a transfusion episode could be identified that would be defined as inappropriate by the algorithm in the NCA audit. The episodes were selected to examine as many factors as possible, the first case involved decisions for a patient newly diagnosed with leukaemia, and not incrementing with platelet transfusions, and the second case was a longstanding inpatient who had ongoing transfusion support. However, the episodes of care and

decisions were the focus, not patient characteristics. The cases were purposively sampled (critical care unit and haematology unit) in order to provide a clinical contrast. For instrumental case study, cases should have clearly defined boundary, scope and endpoint (Crowe et al, 2011). All staff that were identified as potentially involved in the episode were contacted and invited to interview. All staff that could be contacted (had not been bank or left the trust) agreed to be interviewed. The interviews and analysis were carried out by a transfusion practitioner (WS) with a background in haematology nursing and experience of working with several laboratories and two trusts as a transfusion practitioner. The interviews and analysis were reviewed and overseen by an experienced researcher (NP) who acted as the study lead, but was independent to the clinical practice area.

Themes were generated and developed for each case by exploring all sources of data (interviews and documentation) for an understanding of what was impacting transfusion decisions that were primarily unseen and undocumented in the national audit reports or transfusion literature. The interview transcript analysis was guided by the step by step approach outlined in Braun and Clarke's (2006) Thematic Analysis framework. Patterns and reoccurring salient points affecting decisions were codified and then extrapolated in preliminary themes, what Braun and Clark (2019) term as producing themes. These were refined and agreed by NP and WS in collaboration. Thematic maps (diagram 1) were developed by analysing how the factors interplayed in the decision process. The data from the interviews was subsequently triangulated with the documentary evidence to reach the final themes.

Table 2 outlines the diagnosis and transfusion episode details of each case. Table 3 outlines the documentary evidence of blood result times, platelet count, collection of platelets times from electronic records and assessment of if the transfusion would be out of national guidance.

Table 2: Cases for review

Table 3. Documentary evidence

Findings

The themes that emerged from the thematic analysis were identified in case one were: *Job Influence, Power and Persuasion; Knowledge and information; Faith in platelet thresholds; Complexity of patient; Planning for uncertainty*. In case two, the themes were: *Individualised decision-making; Communicating decisions; Managing safety, Planning for uncertainty and Medical predominance*. Data were triangulated across cases, using cross-case analysis approaches (Miles and Huberman, 1994; Silverman, 1995), and as outlined in Gillard (2011), in order to enhance confirmability of findings; this is presented at the end of the findings as key summary points (Table 4). Four overarching themes emerged: *Perspectives informing decisions; Planning for uncertainty; Job influence, Power and Persuasion; Managing safety* (see Figure 1).

Perspectives informing decisions

The primary source of knowledge appeared to often be experiential. How information was accessed was dependent on context, the laboratory or the clinical area, which changed the motives for guiding the use of platelets. The laboratory perspective is one of a global, utilitarian nature:

'I think we have more knowledge of how crucial platelet stocks are.... So in that circumstance we should be able to challenge if we feel that it is unnecessarily ordered.' (Medical laboratory assistant 1)

In contrast, clinical staff were more concerned with the outcomes for individual patients and are guided by information that informs the decision for an individual rather than impact on a finite resource.

'I do think about that (overall platelet availability) ...but actually I actually worry more about the potential complications...it's much more significant if it

happens to a patient who didn't have a definite indication for that transfusion.' (Doctor 2)

These decisions were also highly individualised, especially with complex patients. Patients with bone marrow failure in critical care were viewed as having specialist platelet requirements due to the multiple factors, perceived higher risk of bleeding, requiring higher platelet counts. The patient in case two had sepsis, two central venous access sites, tracheostomy and was on haemodiafiltration with systemic anti-coagulant.

'Our population is clearly a very different population from other units they need (junior doctors) to understand that the needs of these patients are different' (Doctor 2)

Consideration was also given to previous response to platelet transfusion when assessing how much to transfuse and for the biomedical scientist how much to challenge the request.

'If you had someone with a platelet count of 20 and you know they might not increment from past experience - then you'd probably order 2 pools of platelets' (Biomedical scientist 2)

A corollary to informing decisions related to how those decisions were communicated. Processes showed that requisitions came from Foundation Year 2 (junior) doctors, who did not make the decision to transfuse. The biomedical scientists found challenging requests that were outside guidance stressful and frequently futile, with consultant preference cited as the reason by the requestor.

Job influence, power and persuasion

This theme is defined by each professional role having a particular responsibility and influence in the provision of a platelet transfusion and at different points in the process. In case one, haematology nurses identified themselves as deciders for platelet transfusions

'So that is kind of what my role is, deciding if a patient needs a platelet transfusion.' (Nurse 1)

The nurses played a powerful role in platelet decisions; they were the requestors, they initiated the prescription, challenged medical decisions and administered the product. The biomedical scientist's largest influence lay at the point of assessing the request,

'Quite often we or I take a call and they may be asking for two or more and em it's my duty to ask why they require more than one platelet' (Medical laboratory assistant 1)

The medical influence was exerted around the complexed patients, such as the patient in the study. In case two, there was an issue related to medical predominance, since all platelet decisions were consultant-led. There was little or no influence on the decision by staff below consultant level, these nurses and doctors were powerless to change decision making, and nursing influence was particularly absent.

'It is a consultant-led decision' (Nurse 4)

'It's normally the consultant. Occasionally if there are really set targets then it will be the registrar' (Doctor 3)

Another facet to this theme was power and persuasion, defined by the level of staff knowledge but essentially by the power they had to influence decisions. Some staff had good knowledge of clinical indications for platelets and could persuade the

decision so that it was within guidelines but the decision to challenge was not consistent. Some staff had knowledge but felt powerless to inform the decision. This frequently caused decision dissonance and sometimes staff conflict:

'I have had arguments from consultants who phoned me up and told me that I was rubbish nurse for a sending a patient (for a procedure) because their platelets were not high enough' (Nurse 1)

Planning for uncertainty

There was a balance between ease of obtaining platelets and an ever-changing clinical situation. Clinical uncertainty created confusion around when to request and, in turn, affected laboratory resources and decisions.

'I potentially sometimes used to organise platelets where I knew that the patient was potentially going to spike [develop a pyrexia]....you think that the likelihood is that they are going to spike.. you might have to do something further in the night' (Nurse 1)

In case one, there was a lot of effort in the testing, provision and planning for HLA matched platelets.

Complexity of the patient was determined by how difficult the transfusion requirements were to manage. Uncomplicated decisions were marked by a low platelet count, with patients responding well to platelet transfusions, and no interventions required. Complex decisions centred on difficult risk-benefit analyses, and decisions related to clinical judgement rather than a guideline, there was no local guideline for managing non-incrementing platelet counts while awaiting further tests. Assessing bleeding risk in complex patients was difficult. Multiple factors that might impact on bleeding risk appeared to lead to a cautious approach.

'We err, well, I err on the side of giving platelets rather than not in that situation' (Nurse 1)

Another element to this caution was the theme, *Faith in platelet thresholds*. There was a strong belief that reaching thresholds would prevent bleeding. A lot of emphasis is placed on thresholds and every attempt will be made to reach them as a way to lessen bleeding uncertainty. Some staff were apparently willing to overlook the risk inherent in the platelet transfusion in pursuit of a threshold.

'They [doctors] will always want to try to increment their platelets to a fairly reasonable level' (Nurse 2)

The pragmatic aspects of reaching thresholds was also discussed which had an impact on out of guideline use, such as timing related to procedure.

'...because of practical difficulties we're just saying oh we will give this many platelets rather than give this many and see what the platelet count actually is' (Nurse 1)

For case two, uncertainty was characterised by prediction of platelet requirements for an unstable patient group frequently requiring interventions that were both planned and emergency. The platelet threshold was said to have been raised for the day as a procedure was planned, however there was no supporting documentary evidence. For interventions that were cancelled or postponed, documentation around platelets was absent. The timing of requests also had impact on what was requested and not progressing patient care was a risk factor taken into consideration, as exemplified here.

'I think that is one of the biggest challenges because we would rather ask for more platelets knowing that there is spare in the bank em because the thing that we struggle most with is waiting for the platelets and we are often ordering them in the morning and can't do procedures until late afternoon

and therefore impacting on...the care and the progress of the patient.'

(Doctor 2)

Managing Safety

This theme was defined by managing two distinct threats to safety: management of the potential threat of bleeding and the impact on patient safety. The second threat was to professional safety. The biomedical scientists were concerned that they would be fully accountable for bleeding episodes by the clinicians if they had recommended any decrease in platelet requirements,

'...it scares the biomedical scientists sometimes you know and a big investigation comes in...the people from the clinical side they want to protect themselves in one way or another.. the time the products came and the time that we supplied it' (Biomedical scientist 1)

The clinician looking after the patient in case 2 appeared concerned with managing bleeding and any untoward incidents where a colleague or member of the public may query their professional judgement in regard to reaching 'safe' platelet levels.

'if you do, for example, a procedure with a platelet count of 20 there might be...subjective criticism....why did you not get the platelet count higher then you would not have had the risk of bleeding. One also practises a little bit of defensive medicine in that' (Doctor 2)

The concern for managing patient safety was supported by the documentary evidence in the patient's records, whereby what was considered all the patients' risks for potential bleeding were listed, (temperature spike, tracheostomy inserted, deteriorating) followed by 'plan 2 pools of platelets'.

Key Points from cross case analysis

- **Both cases involved complex transfusion decisions with patients who did not increment well with platelets**
- **The ability of different staff to influence the decision was entirely different in each case**
- **Both cases involved forward planning to manage uncertainty and risk**
- **The risk of platelets becoming less effective with more transfusions was not discussed as an adverse outcome; neither was limiting transfusions to prevent formation of HLA antibodies and case one patient had an HLA antibody**

Discussion

As outlined, the aim of this study was to explore factors that influenced the decision to transfuse outside the BSH guidelines. The cases studied were complex with multiple factors and contextual considerations. Interventions designed to influence out-of-guideline use of platelets did not take this complexity into consideration, as evidenced in Tinmouth et al's (2005) systematic review.

The first issue of note is who could potentially influence the decision to transfuse. In the haematology setting, it was nurses who were the key influencers in the decision, and took responsibility for monitoring the platelet count, requesting platelets and initiating the prescriptions. However, in critical care, nurses considered it part of their role to administer and monitor the patient but did not appear to contribute to the decision to transfuse. Unlike haematology, it was considered a consultant role by everyone interviewed. Graham et al (2016) noted that doctors acknowledged how transfusion education is being provided by nurses, and suggested that all grades of professions should be educated together in order to provide consistent care and transfusion knowledge, as juniors educated in transfusion practice may frequently encounter seniors overruling their decisions.

The role of the biomedical scientist across the cases also varied in ability to influence the decision in relation to being able to guide clinical staff. This was interesting to note as one of initiatives to address out-of-guideline use in the UK is to 'empower' scientists to be the gatekeepers for platelets (Knight 2014). Biomedical scientists were aware of their limitations regarding directing platelet use, especially if they were unsupported by a consultant-in-charge of clinical care. Like clinical professionals, they were concerned about professional safety if a patient did bleed.

Complexity of the patient was important. The risk/benefit analysis decision was difficult to assess, with lack of specific guidance in local guidelines on how to manage patients who did not increment. This increases the likelihood of the transfusion being administered out of national guidelines and in both cases described, excess platelets were given.

The BSCH (2003) guidelines, now superseded by the BSH (2016) guidance, stipulated using clinical judgement in order to determine transfusion decisions and assumed the patient will respond well to transfusions and thereby limit the need to give multiple packs in order to reach documented thresholds. There was little guidance for patients who required a procedure with a predetermined threshold and did not respond to platelets. This guidance was not in BSCH (2003) guidelines, it stipulates using clinical judgement in this situation however this then would then raise the question of what education is informing the clinical judgement. The BSCH 2003 guidelines did stipulate to give one pack and then evaluate before further transfusions. More evidence has been published since the 2003 guidelines and the current guidelines have alternatives for platelet transfusions that would be beneficial to all patients including those refractory to platelet transfusions (BSH 2016). It is possible that these guidelines would have been more influential in promoting good practice patient benefit was clear. For instance, limiting transfusion to prevent eventual decreasing increments in long term supportive care (Slichter 2005). A large proportion of patients in this Trust, which is a regional centre for haemopoetic stem cell transplantation, respond poorly to platelets due to long term platelet support as a consequence of treatment (local HLA-matched platelet provision for the trust is 15% [Trust Audit Data, 2017]). This undoubtedly influenced decisions and practice.

Bleeding was perceived as a severe consequence of a low platelet count. This therefore led to a decision where a perceived immediate, possible catastrophic risk was balanced with a future risk of lower increments, possible reaction or antibody formation.

The Platelet Transfusion guidelines for Patients with Cancer published by the American Society of Clinical Oncology (2017) acknowledge in their external review that it is difficult to provide guidelines for patients that present with multiple chronic conditions. They highlight that the evidence to inform guidelines is often from studies that have excluded patients with multiple conditions. They argue that this adds another layer of complexity and uncertainty in decision making that is not taken into consideration by guidelines. These complex decisions require subtle balance of risks and benefits. Complexity is created by decision conflicts, limited options and the resulting uncertainty (Islam et al 2014). The consequences of uncertainty in decision-making have been found to result in increased stress and anxiety for the clinician which in turn can impact decisions, such as over ordering of tests, and can eventually result in patient harms (Farnan et al 2008). This was seen in both case studies, there was concern of availability of platelets when required, fear of potential consequences of a low platelet count and anxiety about professional safety. It could be argued that combined it would result in a cautious excessive transfusion approach. Trimble and Hamilton (2016) discuss how preparing the decision, thinking, data gathering, then thinking about the thinking are important steps for good clinical decision making. However, this is a labour-intensive thinking process and transfusion is often considered a low clinical priority (Bishop et al 2011), so energies for complex decisions are concentrated elsewhere. Consideration of the potential bleeding consequence impacted on two other themes that developed. In both cases uncertainty played an important role, and in case 2 there was an additional threat to (patient) safety and to professional safety. Professionals were concerned about managing incidents and colleagues' reactions as a consequence of not reaching thresholds. In both cases there were strong elements of uncertainty regarding spontaneous bleeding risk with low platelets; out-of-hours transfusion, patient response to transfusion and future need for interventions requiring platelets.

Bishop et al (2011) attributed overutilization of red cells to uncertainty. In the case of platelets, this uncertainty is coupled with the necessary forward planning as hospitals do not hold high stock levels and it is resource intensive to maintain platelet stocks (Kaufman et al 2015). It could be argued that forward planning for uncertainty is a difficult skill and was a factor in out of guidelines use in both cases. HLA platelets planned for and given over a weekend that were not required due to quick response to treatment, threshold achieved for a procedure that was likely to have been postponed or cancelled. Both McNeil (2001) and Djulbegovic (2004) stressed the contribution that uncertainty had made to medical decisions; the consequence of which is often poor care (Saini et al 2017). McNeil (2001) felt that had it contributed to over-utilization of medical procedures in general and Djulbegovic (2004) stated that medical students not only had to be taught how to assess evidence but also how to make decisions rationally in the face of daily uncertainty. Heuristics is simplified clinical decision-making, which consciously or sub-consciously, omits certain information. The phenomenon of heuristic decision-making occurs when clinicians base their judgements on past experiences, and do not clinically rationalise, taking cognitive shortcuts (Tversky and Kahneman, 1974). It can be very clinically useful when quick decisions are needed (Marewski and Gigerenzer 2012) but equally can lead to biases, particularly over-confidence (Thompson, 2003).

The issue of professional safety has not been considered as a factor in the platelet intervention or red cell literature. Both the doctors and the biomedical scientists were concerned about the consequences of a sudden bleed at a low platelet count, not only from a patient perspective but also in terms of professional accountability and defending decisions.

The combination of heuristic decision making with professional safety could be influencing the decision to transfuse liberally. The decision to transfuse in these case studies alluded to a risk benefit decision where the perception of a threat of an imminent bleed were being counterbalanced with risks that require more complex reasoning and where the risks are not imminent nor as catastrophic in outcome for

the patient. The latter appeared to have a more profound effect on professional safety.

The patient blood management recommendations stress that it is good practice in transfusion decisions to consider the thresholds and the evidence base, the overall clinical context, patient preferences, and alternative therapies (NBTC, 2014), suggesting that experiential knowledge is insufficient as the sole basis for clinical decision-making (Thompson 2003). As this study attests to, several factors have to be taken into consideration in transfusion decisions, beyond thresholds and guidelines.

Implications for practice

- Local guidelines should reflect and align with national recommendations and include complex risk-benefit analysis support escalation processes, and senior contact information.
- Doctors and nurses of all levels require education on the current evidence for, and clinical indications of, platelet transfusions where there is a risk of bleeding.
- Processes for obtaining platelets in urgent situations and a protocol for minimum request time to administration in guidelines may help to relieve anxiety around possible bleeding situations.
- There should be education regarding individual patient response to platelets; specifically, in regards to previous poor increment response to platelet administration and patient management.

Limitations

This study was limited in several respects: although a large amount of data was collected in each case study it was still limited by being two cases in a single centre, which limits transferability and reproducibility. There are, however, general principles which can be applied as our recommendations suggest. Confirmability and researcher bias is possible, since the researchers' own subjective feelings may have

influenced the case study and responses. However, the use of independent researchers to develop themes enhanced credibility and confirmability, the qualitative notions of rigour.

Conclusion

Two large national audits had deemed a high percentage of platelets to be administered out with the national guidelines. No qualitative studies could be identified which had examined this phenomenon. The study site had a high population of patients who require long term platelet support therefore it provided the opportunity to explore the factors in transfusion decisions. Both cases involved complex transfusion requirements. Haematology nurses, in this study, had a fundamental role in educating the junior doctors and influencing the decision to transfuse. The clinical context has an important impact on who can influence the transfusion decision. Findings would suggest that there are several overarching factors that influence decisions, including: planning for uncertainty, the job role and influence over decisions was context specific, managing safety, dealing with differing perspectives and how they inform the decisions. The role of uncertainty underpinned these themes and how this could be better managed warrants further investigation in terms of interventions to address decisions and behaviours in transfusion decisions.

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