

Large-scale acute hospital bed and mattress implementations: insights and recommendations

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Abstract

Background/Aims Hospital-wide replacement of beds and mattresses, often referred to as an 'implementation', can be an efficient way of ensuring that these products are up to date. However, large-scale implementations can be daunting for healthcare managers, with a lack of guidance to support them through this process. This service evaluation aimed to provide practical suggestions to NHS managers who are planning a hospital-wide acute hospital bed and mattress implementation from peers who have completed similar projects.

Methods Interviews were conducted with a purposive sample of seven NHS staff members, all of whom had held a leading role in managing and executing an implementation project with the provider Medstrom. Exploratory, qualitative, semi-structured interviews were conducted, with data analysed through content-driven narrative analysis, using NVivo software.

Results Four themes relating to large-scale bed and mattress implementation were identified: drivers; specification process; financial process; and physical implementation and training. Communication and planning were considered crucial, as was selecting a provider that could offer support throughout the implementation. Participants had been able to successfully implement a large volume of products, but all felt that a resource allowing healthcare managers to draw on the experiences of others who had previously completed a large-scale implementation project would be beneficial.

Conclusions Large-scale mattress implementations are achievable with the right input and support. Learning from the experiences and knowledge of peers who have previously been involved in implementations can be very useful for healthcare managers embarking on this kind of project.

Key words: Capital equipment; Equipment replacement; Implementation; Installation; Mattresses; Profiling beds

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Introduction

Medical devices play a key role in the delivery of healthcare services. They are vital to diagnostics, therapy, monitoring, treatment, rehabilitation and care provision (Seo et al, 2022; Sandham, 2023). Effective management – including the purchase, maintenance and replacement – of this important resource is required to ensure high-quality patient care, as well as clinical and financial governance, including minimisation of the risk of adverse events (Seo et al, 2022; Sandham, 2023).

Medical devices need to be managed proactively to prevent incidents (Sandham, 2023). Older medical devices are more likely to malfunction (Seo et al, 2022), while 25–35% of equipment 'downtime' is caused by the absence of preventive maintenance, inability to conduct repairs and lack of spare parts (Sandham, 2013). This has serious implications for patient care. For example, a defective bed side rail can result in patient entrapment or falls (Medicines and Healthcare products Regulatory Agency, 2023) and over-inflated or 'bottomed-out' mattresses can result in pressure injuries (Ovens, 2017; Aria and Gbeneol, 2021). The Care Quality Commission (2023a; 2023b) requires healthcare providers to ensure that their equipment is fit for purpose, properly used and maintained, and meets the latest regulatory standards. It also requires that arrangements are made for the purchase, renewal and replacement of equipment. Failure to complete these actions can result in a

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requirement or warning notice, which will state the improvements that must be made in a given timeframe (Care Quality Commission, 2023a; 2023b).

It is generally accepted that the life expectancy of an electric profiling bed is around 10 years, assuming that recommended servicing is carried out. For foam and dynamic mattresses, the expected life expectancies are 5 years and 5–7 years respectively, if correct maintenance is performed (Iglesias et al, 2006; Beeckman et al, 2019; Nixon et al, 2019). Data suggest that good procurement practices can save 30–50% of spare parts and maintenance costs, and reduce equipment downtime by 25–35% (Sandham, 2023). Therefore, for both beds and mattresses, there is a need for an ongoing replacement programme.

An efficient way to do this is via a hospital-wide replacement of beds and mattresses, often referred to as an ‘implementation’. Standardising new products across the hospital can prevent problems caused by old or faulty equipment, make training easier, control costs and help to reduce human errors (Ventola, 2008; Carter, 2016; Seo et al, 2022; Moses, 2024). However, the prospect of such a large undertaking may feel overwhelming to healthcare managers and staff.

The authors of this study undertook scoping searches of Embase, PubMed and Google Scholar in October 2022 and February 2024, looking at literature published in English within the previous 10 years, using the following search terms: ‘profiling bed’; ‘profiling bedframe’; ‘section profiling bed’; ‘section profiling bedframe’; ‘air mattress OR dynamic mattress’; ‘hospital AND implementation OR installation OR tender OR equipment purchase OR replacement programme’. This search yielded little published material to support people responsible for undertaking large-scale implementations of acute hospital equipment, with no publications providing reflections, experiences or practical suggestions from individuals who had already undertaken projects of this nature. While research has been published detailing changes observed after a large-scale implementation, the authors only found two studies that (briefly) mentioned the actual process (Fletcher et al, 2016; McGrath et al, 2016).

In the authors’ experience, people who lead these projects often have no previous experience of doing so. For some, it may be a once-in-a-career undertaking. In informal conversations with the authors, healthcare staff noted that there is a high burden of responsibility associated with implementations; the equipment must be future-proof and beneficial to staff and patients throughout its lifespan to justify the cost outlay, while the implementation itself cannot severely disrupt the day-to-day running of the hospital. Managing the expectations of clinical and non-clinical staff, and coordinating the switch over while minimising disruption to patient care, can be a daunting prospect. However, in the authors’ experience, it can be achieved smoothly and successfully.

This article focuses on projects implemented by NHS trusts in partnership with Medstrom Ltd (Castle Donington, UK), which employs the authors and provided the funding for this study. Medstrom is an independent UK manufacturer of hospital beds and is the second largest provider of total bed management to the NHS, with over 25% of the UK’s acute care beds and mattresses under its management. Total bed management services are unique to each trust or health board, but typically include service and maintenance, clinical training and ongoing support, and decontamination.

This study was conducted to share the experiences of NHS managers who have undertaken a hospital-wide acute bed and mattress implementation, to provide a resource for others who may be planning or considering such a project. This study was conceived following discussions with individuals who had undertaken projects of this nature, who frequently commented that they were unable to find any resources to assist them and that they wished they had been equipped with the experience they gained from managing the project at the beginning of the process. The authors aimed to gather helpful insights, including what participants wished they had known at the outset, what had worked well and anything they would do differently.

Methods

A qualitative interview design with narrative analysis was deemed the most appropriate approach, as the desired material was based on individuals’ past experiences. The narrative approach emphasises the analysis of content in its original and intact form (Bowling, 2014) and has been used previously to examine implementations in hospital settings (Brown, 1998).

Narrative analysis was undertaken following the work of Nasheeda et al (2019) and Scheffelaar et al (2021). Steps included: choosing interview participants; transcribing interview transcripts; collaborating with participants; familiarisation with transcripts; analysing for shared key elements; chronologically sequencing key elements; and presenting the story (shared perceptions, events, setting and context).

Participants

Participants were recruited using purposive sampling. To be eligible for inclusion, individuals must have been involved in a hospital-wide implementation project within the previous 12 months. As the Medstrom database was used to identify eligible participants, all included individuals had worked in NHS trusts that had partnered with Medstrom to deliver the implementation. A total of 10 potential participants were contacted via email, with those who expressed an interest in participating then being contacted by telephone. Seven individuals agreed to participate, each from a different trust. Participants’ job roles and trust codes are shown in **Table 1**. All trusts were located in England but were not concentrated in any one region.

Data collection

The authors created a topic guide to conduct semi-structured interviews with participants. The guide included 13 main questions, which were written based on the authors’ experiences and observations of the implementation process. Questions were open ended, such as ‘What were the aims of the project?’, ‘Were there any concerns or anxieties in undertaking a project of this scale?’ and ‘What was the experience of the implementation?’. All interviews were conducted using an online video meeting platform between March and July 2023. Interviews lasted between 18 and 74 minutes. Participants were all given the opportunity to review the transcripts of their interviews and asked to ensure that it reflected their experiences, provide further comments and clarify any points that were not clear after transcription. At this stage, two participants provided clarification of abbreviations used and additional information regarding the internal processes that were followed for tenders. All participants reviewed the chronological sequence of key elements to validate the final presentation.

Data analysis

Recorded interviews were transcribed verbatim and participant identifiers were removed. After familiarisation with the transcripts, they were analysed using NVivo 12 software. The first author independently sequenced the common events from the transcripts and the second author cross-checked the sequencing. The researchers then met to review the chronologically sequenced transcripts iteratively, until the final structure was agreed.

Validity and rigour

Participants came from different backgrounds, hospital trusts and environments to reduce the potential for bias that may be caused by having many respondents from the same organisation or discipline. Validation of the transcripts’ contents was provided by participants.

Table 1. Participants’ job roles and anonymised trust

Trust	Participant role
1	Patient equipment manager
2	Operational manager
3	Portering manager
4	Health and safety manager
5	Capital project manager
6	Medical engineering team manager
7	Clinical procurement nurse specialist

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Credibility was ensured through use of direct participant quotations. The coding process was undertaken and cross-checked by the authors. All participants were asked to verify final sequence of key events and findings.

Ethical considerations

This study was undertaken as a service evaluation, so did not require formal ethical approval. This was confirmed using the Health Research Authority decision tool. All participating trusts gave permission for the study to be conducted as a service evaluation. The researchers explained that participation was entirely voluntary to participants, all of whom gave verbal consent. Participant details were stored privately and all data were anonymised before analysis.

Results

All seven participants had been involved in large-scale bed replacement projects, while six had also replaced mattresses as part of their implementation. The number of old beds and mattresses that had been replaced varied considerably among trusts. The number of beds replaced in each trust ranged from 120–2500. Of the six trusts that had replaced mattresses, the number of products replaced ranged from 440–1500. The duration of the physical implementation stage also varied, lasting between one weekend and 12 consecutive weekends.

Data from the interviews indicated that key events during implementation projects commenced when the need for new beds and mattresses was identified and culminated after the products had been physically implemented into the hospital. Three key stages were identified: pre implementation; the physical implementation itself; and post implementation (**Figure 1**). Pre-implementation activities included identifying the drivers for replacement, specifications and required financial processes. These preceded the physical implementation stage, which required consideration of concerns and anxieties relating to the size of the project, timescales, disruption to services and the need for training. When discussing the post-implementation stage, participants described key considerations, or what they had learned and wanted to pass onto others, and noted the need to debrief and continue training after implementation.

All participants noted that being able to draw on the experiences and knowledge of managers who had already completed a large-scale implementation would be beneficial to individuals embarking on this process for the first time. For example:

‘[A resource drawing on others’ experiences] would have been very useful for me to have when I was first starting!’

‘We had a lot of issues very early on that from a procurement and hindsight perspective, if we’d known what we know now we would have mitigated a lot of that noise.’

Four key themes were identified from the data: drivers for change; specification process; financial process; and physical implementation and training.

Drivers for change

Drivers for change, which ultimately resulted in large-scale bed and mattress implementations, could be divided into two categories: necessity and a desire for positive outcomes (**Table 2**). All respondents identified drivers in both categories, demonstrating multi-faceted motivators for change, improvement and modernisation. In some instances, drivers were mentioned more than once by a respondent; in these cases, comments that were related to separate products or subjects were counted twice (eg ‘both the beds and mattresses were obsolete’), while comments that related to the same product (eg ‘the beds were really old, over 10 years old’) were counted once. Factors contributing to drivers varied between respondents, but all came to the overall conclusion that a large-scale implementation was the best solution.

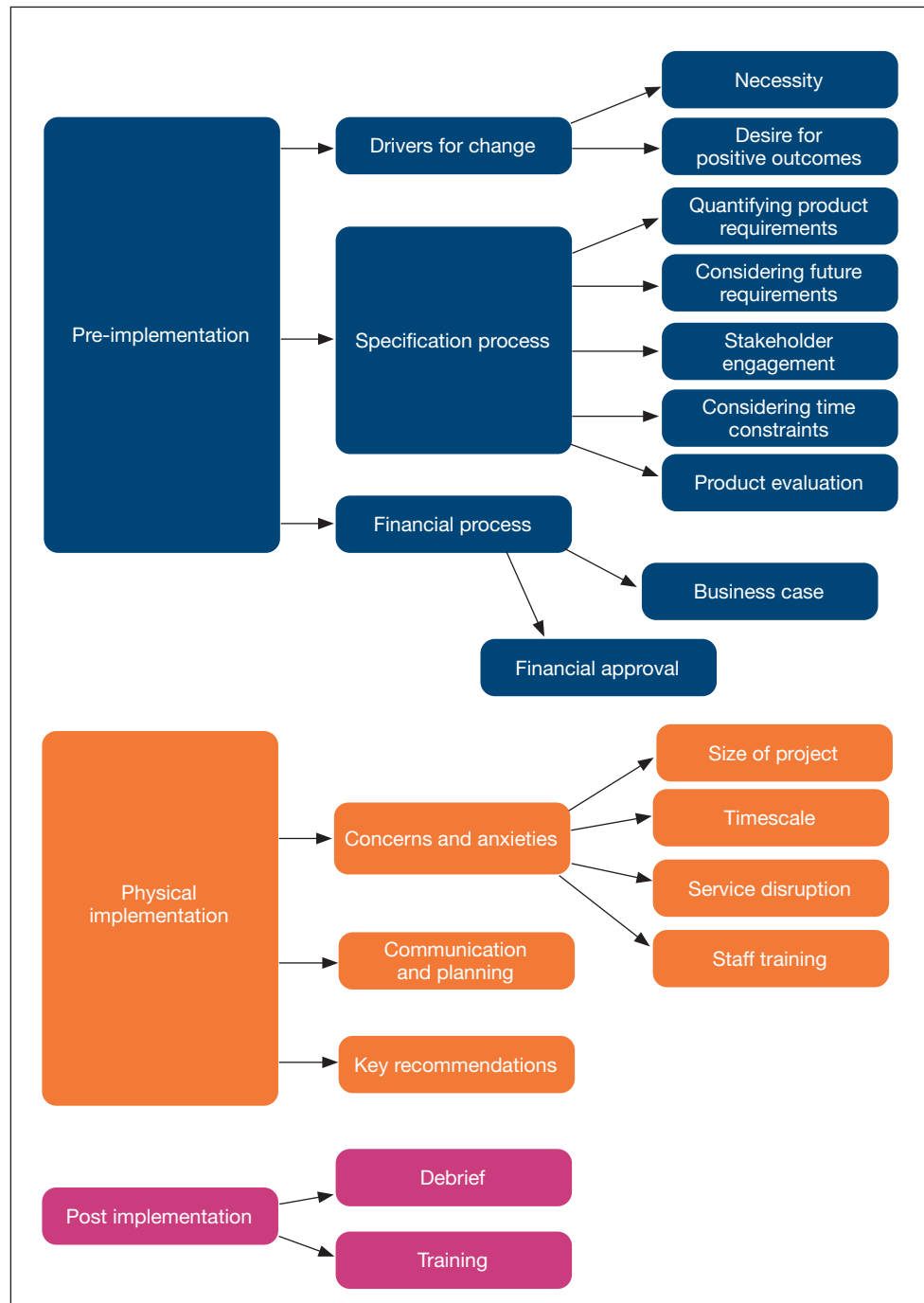


Figure 1. Key stages and considerations of bed and mattress implementation projects described by participants.

Specification process

An overarching theme was that the correct product specification was key to the success of the project. Having the right products to deliver optimal benefits was considered essential to meet the drivers for change (both necessary and desired). **Table 3** shows the key challenges in this area, with summarised feedback from participants.

Financial process

Five of the seven participants reported that their trust required a business case to be developed at the start of the financial process for the implementation. In two trusts, business cases had already been submitted – one had capital underspend and the other held end-of-year money. In both cases, the business cases were prioritised for this money.

Table 2. Drivers for change identified by participants

Type of driver	Driver	Times mentioned	Number of participants who mentioned each driver
Necessity	Age or obsolescence of equipment	12	7
	Unsupported product, spare parts not available, lack of storage space for spare parts and broken products	6	5
	Excessive downtime, poor performance of equipment (eg old beds that were hard to manoeuvre and posing manual handling risks)	5	5
	Cost of repairs and replacements	5	4
	End of lease	4	4
	Risk register, new regulations	3	3
	Need to reduce rental	2	1
	Reduce waiting times for products	2	2
Desire for positive outcomes	Improved ergonomics, manual handling, staff wellbeing, staff time	11	6
	Improved patient outcomes and quality of care (eg ultra-low beds to help reduce falls, improved mattress specification and choice to reduce pressure ulcer incidence)	9	4
	Standardised products	7	4
	Improved financial resources	5	4
	Single supplier, service delivery efficiencies	4	4
	Total managed contract	2	2
	Improved aesthetics (appearance of beds)	1	1

Several stages of approval were required for the large-scale implementations described by participants. The process was different in each case, but typically involved the creation of a business case and finalisation of product specifications by a multidisciplinary team of key stakeholders, followed by review and sign off by various senior trust committees, boards and staff members. One participant described how approval had been delayed by the trust’s chief executive:

‘Then they took [the business case] to the executive board... It was presented and it was approved. And then it goes... to the chief executive. Because of the amount. And our chief executive didn’t approve it... and so it bounced back to me.’

Once funding was approved, procurement needed to provide a purchase order. In some cases, this was delayed, pushing the implementation schedule back. One participant described involving procurement early in the process, but still experienced delays:

‘I got procurement involved quite early. They’re the ones who provide a purchase order. No matter whether the chief executive said yes or not, there are still steps that they have to take... in order to provide a purchase order. So that was delayed. Everything’s delayed when it comes to that kind of money.’

In another participant’s trust, the business case had to pass through multiple committees before approval:

Table 3. Challenges related to product specifications		
Challenge	Participant quotes	Further explanation
Number of products required	<p>‘Our team... said they used to rent a lot of mattresses. So when we looked at the data for decontamination it may not have been reflective of the actual number of mattresses going through it, because when you rent them, you don’t get the information.’</p> <p>‘With specialist beds, bariatric and critical care, what we’ve learned subsequently is you actually need to have more mattresses than the specialist beds that you order, because as they come off they need to be decontaminated. It’s not a one-to-one ratio.’</p>	<p>As well as owned mattress stock, rental volume must be considered. An under-estimation of the number of new mattresses needed could occur if rentals are not all counted in current use</p> <p>At any one time, a number of mattresses will be away from the clinical areas, undergoing decontamination. Managers must consider how many extra are needed to address this</p>
Current and future requirements	<p>‘You’re selecting a bed that is going to have to be future proofed for the next 10 years.’</p> <p>‘It is a big investment. It’s also a risky investment if you haven’t got the right bed.’</p>	<p>Bed frames need to be suitable for the present and future. Hospital beds should be seen as a treatment aid, not simply a piece of furniture. Investing in inappropriate beds with the wrong specifications wastes resources</p>
Stakeholder engagement	<p>‘Make sure that you get infection control, manual handling, physiotherapy, occupation therapy... very heavily involved, make sure the specification is right.’</p> <p>‘[Referring to a previous bed purchase several years before the large-scale implementation] the main thing that came up was [the bed] needed to be ultra-low, for physiotherapy, because it turns out the last couple of... times we’d bought any number of beds for when the new wing opened... nobody had taken into consideration that they needed to go ultra-low to be able to do physiotherapy. Little bit annoying, because I had asked, at that point, in 2017, I had asked lots of different groups, to give their feedback, and nobody had mentioned that.’</p> <p>‘The cost stacks up and getting the money for that is really hard... which is part of the problem we had. So we got the catheter hooks and the extra mattresses and the second pendants on another capital year end underspend.’</p>	<p>Input and feedback are needed from many different departments. Finding and engaging the right people at the right level can be challenging but, without this, the product choice may not be optimal</p> <p>People who were engaged later in the process added specification requirements that had not previously been considered. Earlier engagement of all stakeholders would have been better</p> <p>Retrospective changes can result in retrofits, extra accessories and further product purchases, impacting efficiency and increasing costs</p>
Time constraints	<p>‘I would say it’s pretty essential [to appoint a full-time project manager] to be honest. I think that’s one of the reasons why the project hadn’t progressed earlier because people were trying to do it as a little part of their normal day job, and you just can’t do it like that. You need to be dedicated to it when you’re looking at something this significant, a lot of the time is spent chasing round clinical teams and other colleagues to get information or to get agreement. You can’t be doing that part time. You have to be consistent and really proactive.’</p>	<p>Appointing a full-time project manager was highly beneficial and helped to get the stalled process moving again</p>
Evaluation time	<p>‘As part of the evaluation we ended up with three [shortlisted] suppliers that put forward bids into the tender, so we invited them to bring all of their products in and we went through a series of tests over a 2-week period in our simulation centre and we went through daily scenarios. So how easy is it to pull the [cardiopulmonary resuscitation] handle? How easy is it to transfer a patient? What about the sides up and down on the bed? How easy did the foot and head [board] come off? What about a drip stand? Where would you put a, you know, a tray? All of that sort of stuff. From that evaluation we got reports of all of the different products and a score and then feedback. There were some showstoppers where we were like absolutely no, we can’t continue with that product, so I think that was really, really useful.’</p> <p>‘Time is of the essence, often. And if people don’t feel involved early, it can make it challenging to understand and get on board quickly. When we did the product show and tell... we did lots of [communications]... but again, I think it was all about timing. It was in the midst of those COVID-19 [restrictions]. And I think people were maybe exhausted, didn’t have time etc.’</p>	<p>Product testing in real-world scenarios is crucial to predicting performance and suitability. This should be carried out early – it is important not to skip this step because of time pressures, as this can lead to problems later.</p> <p>Engaging all stakeholders who will interact the product is important, but staff engagement can be challenging, especially when time pressures are high</p>

‘First ... it went to the health and safety committee. Then it went to our trust infection prevention committee... and the tissue viability group as well. Then it went through three finance committees. It’s signed off by the last trust board [financial] committee. And they’re the ones who actually give the green light. Then it’s signed off by the chief executive.’

Financial agreements were organised in advance, with the timescales ranging from approximately 7 months to 7 years:

‘[The business case approval] probably started about 7 or 8 months in advance of us actually having the equipment delivered, and then the physical deliveries and implementation was over about 3 or 4 months.’

‘We had an envelope of money, which was basically what the spend was ... that we couldn’t go over. It was a project that had, I think it’s fair to say, started and stalled for a number of reasons over the preceding 3 or 4 years, but it really needed doing, so I came in on a contract to do that.’

‘I came in on an 18-month contract to implement the replacement bed project. However, of course COVID-19 happened then, so the project had to go on hold several times... So it was originally supposed to be 18 months but it probably took just under 3 years [and therefore 6 to 7 years in total] with all of the stops and starts that we had to do.’

Physical implementation and training

Concerns and anxieties

Participants described a number of issues relating to the physical implementation process, which reflected feelings of concern and anxiety (Table 4). Participants noted that some concerns did not come to fruition, such as worries among nursing staff about the level of disruption to bed-bound patients.

Communication and planning

Six of the seven respondents reported that repeated communication and meticulous advanced planning were essential to the smooth running of the implementation.

Participants emphasised the importance of ensuring that communication reached the whole trust, through multiple channels, to ensure that as many staff members as possible know what is happening and when. Methods of communication included ward bulletins, email, trust news articles, handouts, electronic forms, QR codes, posts on Facebook and WhatsApp groups, posters and information stands in staff and public areas, and verbal reminders given during visits to wards and ward handovers:

‘Communication is incredibly important, but it has to be continually reinforced. And it has to be in a form that the wards and departments are comfortable with. They all have their own slightly idiosyncratic ways of communicating with the staff. You need to be on board with that, so whether it’s just a poster or a bit of information that they show at their team meetings or social media... you need to be able to react to that.’

‘We did generic communications through the staff bulletin, which goes out twice a week to all trust email addresses which just had a very brief “what is happening and what people should expect”. And then we had targeted communications to specific wards or matrons, or areas if you were going to go to a certain area and included in that communication would be people like the porters... and trust transport teams.’

Two of the participants noted that having Medstrom clinical advisors working in the trust was highly beneficial for communicating with staff ‘on the ground’:

‘If the message keeps going out at least 3 months before implementation, desirably twice a week, but at least once a week, it gets into the mindset of the people who are

most affected [who] tend to be staff in the areas where we do the implementation. So if you're looking at the wards and departments, it's getting in there. And that's why it's really, really useful for us to have [Medstrom] clinical advisors who actually do that.'

'It's about the planning, the communication... And Medstrom provided plenty of that.'

Table 4. Concerns or anxieties around the physical implementation process and respondents' experiences		
Concern/anxiety	Description	Participant quotes
Size of the project	Volume of products going in or out on any given implementation day	'You'll always find at an implementation day about halfway through the day... you've put 100 beds in [and] you can have about 70 or 80 old beds in the yard. And if you don't take that into account you are going to end up blocking major entrances and exits, so you need to actually work out what you're going to do when that happens.'
Timescale	Short time frame to complete before the old contract runs out Failure of old products before new ones are installed	'[The implementation project] happened quite quickly towards the end, because [of]... our previous service contract ending and the obsolescence of our beds. So I think we had a lot of pressure because our old beds were starting to fail and we weren't able to repair them. We couldn't get the spare parts, so we were a bit conscious of the window [of time], our bed stock reducing before all the new ones came in.'
Service disruption	Swapping out products with bed-bound patients Perceptions held by nursing staff that the swap over will take a long time, disrupt care and require additional staffing Overloading infrastructure, especially lifts Physical site restrictions, such as loading bays used to load or unload beds while other deliveries continue, lack of space, narrow corridors, small lifts	'Their [renal] patients are on their beds permanently and having dialysis... and they were quite concerned about how the beds would physically be removed and replaced [and] how that fits around their clinic time and I think actually things like that were really positive, so the staff were really pleased about how smoothly it went and how accommodating Medstrom were.' 'I think that certainly the chief nurse... was quite anxious because it's got potential to be incredibly disruptive and I think there was a perception that it would require a lot of nursing time to do the swap out. That didn't materialise.' 'The feedback was the weekends were much easier to get the beds in and out because the lifts had less demand on them than on a weekday.' 'I don't think we probably anticipated how difficult it would be managing around the lifts in the main site... so we said that we'd only like deliveries on the weekend.' 'There was... the logistics of trying to get four articulated lorries into a space about the size of a postage stamp... when there's [other] deliveries coming and going. This is another reason we did it at the weekend.' 'One of [the hospital sites] is a really old Victorian building, the corridors are very narrow, the lifts are tiny, there's hardly any space... and quite significant ramps.' 'When we were physically taking the beds in and out, you end up with a row of beds down the corridors and it's probably quite narrow.'
Training	Concern about poor attendance, especially during COVID-19 restrictions One trust required at least 50% of staff to be trained before implementation, which resulted in a delay – the delay was not mentioned by the participant but was noted in records from the time	'Because it was still COVID-19, people were quite reluctant [to attend training] and were still quite busy in hospitals, so releasing people for that training was quite difficult.' 'The policy within our trust is that a minimum of 50% of the staff in an area are trained before a medical device can be deployed. Training was a huge part of our planning. We set up a training subgroup as part of the project implementation governance. I think in total we had to train over 7000 staff on multiple products, as a minimum the bed and the various mattresses.'

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This level of communication and engagement reportedly had a substantial positive impact on the process:

‘During the implementation [it was] very, very positive. We had an unprecedented level of cooperation clinically and I think this because we’ve got the communication right and there were some areas that were so well prepared when we came in. It was unbelievable, you know, to the extent it took us 15 minutes to swap out 30 beds, they were so well prepared. You know, overwhelmingly positive.’

‘You are always mindful that patients actually come first. Because when you get that right, it goes really, really well. So I can’t overemphasise it that that bit of communication is really, really key.’

Participants noted the wide range of different staff members that they needed to communicate with, including matrons, ward managers, porters, transport teams, cleaning teams, senior operations groups, duty managers, fire officers, health and safety officers, estates managers and the various levels of command (gold, silver, bronze and gold on call):

‘Security and car parking must be aware of what you’re doing and how you’re going to do it. And if you’ve got a huge operation on board, you’ve got to get your fire safety officers involved as well, because you may have been inadvertently causing an access problem which would affect the usual fire safety protocols, particularly entrances and exits for fire engines.’

‘I think it’s about the planning. It’s about the engagement. Communicate as much as you can. You’ll never get it right because you’ll always get to one ward and they’re like: “Well, I never knew you were replacing our beds today. I don’t know anything about it” but as much as you possibly can, be really positive, I think, be really enthusiastic and positive and it will carry you through.’

‘And you need to make contact with the key people that are affected by what you’re doing. So other than car parking security, the operational managers and gold commander on duty on the day, every single area you need to start communicating with them at least 3 months beforehand.’

During the physical implementation, ensuring that everyone had a point of contact on the implementation team was seen as essential. One participant explained:

‘First and foremost be there on the day. You are a trust representative. You have to be there. On the day, everybody needs to know who you are, what your role is. You need to be contactable. I wear a high-vis [jacket] that has my name written on the back. It sounds like a simple thing, but it’s really effective.’

Similarly, it was important that those planning the implementation had operational knowledge or experience, such as knowing what the needs of different clinical areas are, including times that they could not receive installations. Getting this right led to smoother implementation on the wards, as described by one participant:

‘One of the big fears actually of some of the project team, internally, [was] that some of the wards would say “You can’t do it this weekend”. And we didn’t have that at all. The wards were just incredible. That’s probably down to the planning and the engagement and the communication beforehand.’

Practical implementation and training

Table 5 summarises the key recommendations from the participants, describing what they would advise anyone planning a large-scale implementation to consider and action.

Table 5. Key recommendations for large-scale implementations from participants

Recommendation	Rationale	Participant quotes
Choose a supplier that is willing to work flexibly with you and be fully involved in the implementation and training process, and will provide ongoing practical support (training, technical, 24/7 clinical)	This is essential to achieve a smooth and successful implementation and to allow staff and patients to derive the most benefit from the products	<p>‘The [Medstrom] clinical advisor going up to the wards... she got there first and she’d be taking mattresses off, moving beds.’</p> <p>‘We had a dedicated trainer from Medstrom as part of the contract who coordinated all of the training programme, liaising with ward teams, securing training spaces and facilities etc. [Medstrom] also provided a number of other staff so we could have [at any one] time five or six of their staff training [trust staff] on the products.’</p> <p>‘[Medstrom] are really visible. Every time we’ve asked them to come, they’ve been there. We’ve asked them for training; they’ve delivered it. We’ve had problems and... they’ve dealt with it. Yeah, just a fantastic supplier to us. Just can’t rate them highly enough.’</p> <p>‘They [Medstrom] were brilliant... It’s their technical lead and his team that are on our site 7 days a week doing all the logistics for us and yeah, they were really responsive, really accommodating. Very flexible. Massive can-do attitude I think is the best way of summing it up.’</p>
Specify that all providers intending to bid must attend a site visit	Check that the bidder has the capability to deliver in large volume, to all trust sites	‘We did ask for everybody that was intending on making a [tender] bid to actually come to the site and visit. While I could have provided measurements of the lifts and corridors which we did in the tender, you really needed to come and see it and actually try and navigate a bed round.’
If possible, appoint a project manager with decision-making abilities to be able to drive the process forward	Busy clinical teams cannot fit this this work on top of their normal role, which typically does not involve project management and is not part of their skillset	‘Having a project manager is quite crucial. I mean the clinical teams are incredible, but project management is a completely different skillset. I know I’d say that as a project manager, but... I think it’s vital to have somebody in that position that’s got that helicopter view of the whole thing.’
Wherever possible, install during the weekend and look for times that impact each clinical area least. One trust initially tried to install on weekdays, but this did not work, so the dates were changed to weekends	Install when lifts are less busy and footfall is reduced, avoiding ward rounds and mealtimes	‘We did some trialling of things during the week, you couldn’t get a bed in the lift because the lifts are constantly in use, with people going up for operations, or going to clinic or whatever. The traffic was just horrendous with deliveries and things, and there was a lot more people in the hospital, a lot more footfall. When we were bringing the lorries in [at the weekend], it was much quieter. We were able to offload quite a lot and then start with the wards... after breakfast and then start swapping them out after that.’
Consider access rights for those who are not permanent hospital staff, such as honorary contracts	Facilitate smooth implementation through clinical areas	‘[Medstrom staff] had to have an honorary contract because they were going to be physically working with our staff and patients, and being in clinical areas.’
Get the serial numbers of the beds arriving each day, so asset tags can be prepared in advance	Sticking asset tags on the beds as they arrive can save a considerable amount of time	‘Medstrom sent me through all the serial numbers in advance. So, we knew which 60 were coming in [each day]. We divvied up six bags of 10 tags, those 10 tags were assigned to asset numbers and serial numbers, so we did a print out, and attached it to each bag. So when one of the Medstrom team rolled a bed into the commissioning area, one of my team would check the serial number... find it on the bags, take the printed asset sticker out [of the bag] and then put it onto the device and then do a safety test. So it was... very, very quick.’
Record the serial numbers of products being removed as they go	Accurate record of which products have gone and which are still on site, saving time	‘With the assets that were removed, the serial numbers weren’t recorded. So because we have a mixed fleet and we didn’t [replace] all the beds, we had 500 extra beds on our asset register that we are trying to work out which beds are gone and which beds haven’t gone.’

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Table 5. Key recommendations for large-scale implementations from participants (continued)

Recommendation	Rationale	Participant quotes
Consider the other items that the equipment being replaced may interact with	Avoids problems after implementation, such as incompatible bed movers, bed movers and beds not fitting in a lift etc	‘How do you check the beds fit in the lifts? Have you checked the bed movers that your trust uses fit with the [new] beds?’
When a site is close to a city centre, avoid dates of major events there	Reduces the risk of delivery and removal hold ups	‘We did our best to avoid... any weekend where there were major sporting fixtures because the city football club is very near the hospital. It can be absolutely chaotic if you’re going to get lorries on and off site.’
If parking or loading/unloading space is limited, block some car parking spaces for delivery vehicles	Reduces the risk of delivery and removal hold-ups	‘For us to actually deliver [at the weekend], we shut eight staff car parking spaces [next to the loading area]. At the weekend who would actually use those car parking spaces? And the fact is it’s nobody.’
Consider the through flow of vehicular traffic to the site, use a specific entrance or exit	Reduces the risk of delivery and removal hold ups, and general disruption to the running of the hospital	‘Part of our communication was “You will not be able to get out of this particular gate. Use this alternative gate to exit instead.”’
Consider having a one-way flow of beds through the hospital from entrance to removal, ensuring lifts and corridors are not due for maintenance	More efficient delivery and removal of products	‘We liaised closely with the wards, so we planned out the whole implementation and basically what we did, we started at the top and just worked our way down the floors.’
Conduct a thorough debrief after implementation	Helps to improve future installations (of any product) and identifies what worked well and areas for improvement	‘Make sure, and you should involve everybody in this, get feedback on your implementation. You know you need feedback because [the] two most important things are you need to understand what went well and what could be [done] better.’
Train as many staff as possible before or immediately following implementation	Smoother transition from old to new products, reduced risk of human error, improved patient care	‘I think the training ahead of deployment was essential. We found that therapists were raising a number of issues with the new products, so in conjunction with the Medstrom team we put on some specific sessions with the Medstrom clinical advisors. Following that... we put on half day training sessions at each campus once a month specifically for their staff.’
Use alternative methods of training, such as pre-recorded Microsoft Teams training videos	When attending in-person training is problematic (for example, during the COVID-19 pandemic), alternative methods which can be used at any time to increase the number of staff trained	‘[Discussing putting QR codes on products that link to training videos] What worked really, really well is QR coding everything. People look at the QR code, and I must admit I’m a convert.’
Ensure that follow-up training is delivered regularly	Ensures that new staff are trained and provides a refresher of the full functionality and clinical benefits of the products	‘[Training] doesn’t just start and stop when you put the bed into the ward. That training, it needs to be ongoing and consistent.’
Engage non-clinical staff, such as human resources or finance officers	Provides additional support from those who will not affect clinical service delivery and also provides exposure to ward environment for office staff	‘The volunteer force [from human resources and finance] that we got made a huge difference... and I know the guy said they’d never had that before and they thought it was great.’ ‘And from my perspective, I thought it was really helpful for them to understand what actually happens on a ward.’
Ensure that charging cables are available	Old equipment may not hold charge	‘We... got the estates team to put in some extension cables because the old beds weren’t holding power by the time they came off the wards [and] they couldn’t lower them down properly to break them down, to get them on the lorry. So we had to put charge on those.’

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Discussion

This service evaluation aimed to provide insights from healthcare managers with experience of a large-scale bed and mattress implementation, to offer guidance and useful suggestions to others who are considering undertaking a similar project.

In the authors' experience, there may be an initial reluctance to undertake a large-scale implementation for bed and mattress replacement; the scale of the task and the potential disruption to services can be a strong deterrent. However, from financial, regulatory and efficiency perspectives, this is arguably better than having to manage an ageing fleet of products that often break down, or only replacing products on an ad-hoc basis when they are beyond repair.

In the large-scale implementations described by participants, some of the main drivers for change were the need to replace ageing products, provide a better working environment for staff, improve clinical outcomes and standardise equipment. These drivers fed into the product specification requirements – a new fleet can address the problems posed by ageing products and allow for standardisation. The specification also helped to address some of the other change drivers, such as reducing manual handling risks and patient falls, and improving mobilisation and pressure area care, as shown in [Table 2](#).

One participant was a full-time project manager, who was employed by one trust to manage the entire process. As described in [Table 5](#), this participant felt that this was essential to success and helped the project to move forwards after it had been stalled several times previously. The same trust carried out a 2-week evaluation on shortlisted products in their simulation centre to see how they performed in practice, as described in [Table 3](#). This was arranged and co-ordinated by the project manager, with general and speciality nurses, healthcare assistants, porters and cleaners all taking part. All products were scored and written feedback obtained. This proved an extremely valuable exercise, as it meant that decision makers were not just relying on a tick-box specification document with a brief product demonstration or trial to make their choice.

Participants reported that many of the concerns and anxieties that they had experienced relating to service disruption during implementation did not materialise, or were not as severe as they had expected. Some participants described how working flexibly with Medstrom and other colleagues at the trust helped to resolve any issues. For example, one trust initially tried to install on a weekday, but it quickly became apparent that the disruption caused was too significant as the hospital was extremely busy during the week. After discussion with Medstrom, all subsequent implementations were moved to weekends, which worked much better.

Planning was a recurrent requirement in many stages of the implementation process, as evidenced by participants' comments regarding the specification and financial processes, as well as the physical implementation and training stage. Planning was crucial to give participants the time needed to ensure that the product specification was correct and complete the often lengthy financial process. Product providers have a duty to recognise that hospitals should not be left without products at the end of a contract and should actively engage with the hospital and new supplier (if applicable) to allow a smooth transition. Advanced planning allowed obsolete products to be replaced before a contract ended or breakdowns became a major problem.

Communication was a key requirement of the implementation process and was heavily emphasised by participants, all of whom recognised the need to communicate frequently, in many different ways, both before and during the implementation. This included in-person communications on the ward, which were carried out by both trust staff who were involved in the implementation and Medstrom employees. In some cases, Medstrom clinical advisors were present in the trust before the physical implementation began and so were already well-known in the relevant clinical areas. These individuals played a key role in both the communication and the swap-out processes.

In-person training could sometimes be problematic, particularly in terms of staff attendance. This was especially challenging for implementations that occurred when COVID-19 restrictions were still in place, as clinical staff were extremely busy, with highly unpredictable workloads and constantly shifting priorities. To address this, Medstrom developed online training tools that could be used by staff members whenever

Key points

- There is limited published practical support for healthcare managers and administrators undertaking large-scale implementations.
- Financial, regulatory and efficiency benefits of large-scale implementations can outweigh potential deterrents.
- The specification process is key to achieving desired outcomes.
- Robust planning and good communication, both within the organisation and with the product supplier, is crucial to the implementation process.

they had time. Although scheduled in-person training continued, the flexibility of the online training (which could be accessed via QR codes) helped to increase the numbers of trained staff.

One trust had a policy whereby at least 50% of staff in a clinical area needed to be trained before the equipment could be implemented. This caused a short delay to implementation in some areas, but the trust worked with Medstrom to reschedule. A Medstrom project manager was working in this trust on a full-time basis to organise and deliver the training schedule. Medstrom staff were actively involved in training for all trusts, working flexibly to ensure that the required level of training was delivered, with multiple staff drafted in on given days for optimal training delivery.

Limitations

The sample size in this study was small, with seven participants, all of whom worked in the acute sector in NHS England. The study was limited to individuals who had experience of a large-scale implementation specifically with Medstrom, so their experiences may not be generalisable to other trusts or areas of the UK. The recommendations provided are from individuals who willing to participate in the study and may vary from the views of those who declined to participate or were not eligible for inclusion. Narrative analysis inherently involves conveyance of the participants’ views through those of the authors.

Conclusions

The participants in this study had all successfully implemented large volumes of products, with some doing so in a relatively short time period. Their experiences demonstrate that large-scale implementations are not an insurmountable task and can be effectively achieved with the right input and support. The appointment of a project manager with decision-making abilities was recommended to drive the process forward and keep it on track. Participants also emphasised that it is vital to choose a supplier with the experience, willingness and flexibility to fully support the project before, during and after the implementation. All participants felt that a resource drawing on the experiences and knowledge of people who had already completed a large implementation would be beneficial for those embarking on one.

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Author contribution statement

Conceptualisation, methodology and project administration was carried out by DM. Data curation, formal analysis, software, validation, writing of the original draft and review and editing were performed by DM and LA.

Conflicts of interest

Both authors are employed by Medstrom Ltd.

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Data sharing statement

The data are not publicly available as participants of this study did not give written consent for their data to be shared publicly.

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