NICE National Institute for Health and Care Excellence

NICE guidance

Bed frames for adults in acute medical or surgical hospital wards: late-stage assessment

HealthTech guidance
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Your responsibility

This guidance represents the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take this guidance fully into account, and specifically any special arrangements relating to the introduction of new interventional procedures. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

Commissioners and/or providers have a responsibility to implement the guidance, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties. Providers should ensure that governance structures are in place to review, authorise and monitor the introduction of new devices and procedures.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Contents

This guidance replaces HTE33.

1 Recommendations

1.1 Procure bed frames for use in acute medical or surgical hospital wards with the following standard features, as a minimum:

- a design that prevents patient migration (sliding down the bed)
- adjustable to a low height position
- an ergonomic brake system
- steering assistance (for example, a fifth wheel or double-bogie castor configuration).

1.2 There is not enough evidence to determine whether price variation is justified between bed frames for other features, including:

- in-built weighing scales
- bed exit alarms
- turn assistance (for turning or repositioning the patient)
- power drive (motorised to assist with moving the bed)
- connectivity (between the bed and other systems or appliances).

1.3 Procure the most appropriate bed frames, taking into account, among other considerations:

- patient needs and safety, including whether the bed frames have features to reduce injuries to the person using the bed, patient infections and patient falls
- the preferences of the multidisciplinary teams using the bed frames, including the usability of bed frames and their features, and staff training needs

- compatibility with existing accessories and fixtures (such as hoists and mattresses) within the local NHS trust
- full life-cycle costs of the bed frames, including costs and turnaround time for repair and maintenance, and availability of spare parts and accessories
- lifespan and obsolescence of the bed frames, including sustainability and environmental impact, digital integration and future proofing.

1.4 If more than one bed frame model is appropriate, choose the one that is least expensive.

What information is needed

More information is needed to show if price variation between bed frames for use in acute medical or surgical hospital wards with the features outlined in recommendation 1.2 can be justified. Key outcomes that should be captured include those relating to:

- specific groups of patients, such as people with cognitive impairment, who may be affected differently by particular bed frame features
- the impact of bed exit alarms on patient falls
- the impact of in-built weighing scales, turn assistance and power drive on musculoskeletal injuries to the person using the bed
- the accuracy of measurements from in-built weighing scales
- the safety, effectiveness and impact on resource use associated with connectivity features.

Evidence should be generated across different groups of people (patients and people using the bed frames) in real-world settings and contexts, including acute medical and surgical wards.

What this means in practice

Procurement and commissioning considerations

- NHS trusts should not expect to pay more to procure bed frames with the features identified in recommendation 1.1, as these should come as standard on bed frames for use in acute medical or surgical hospital wards.
- The features in recommendation 1.2 may be more suited to some NHS trusts than others. For example, hospitals on large sites may benefit from features that help with moving beds across the site.
- NHS trusts may consider standardising bed frame models within their hospital. This may mean shorter turnaround times for bed frame repair and potentially fewer risks because of familiarity with the bed frames and their features.
- The recommendations in this guidance do not apply to specialised hospital wards, such as psychiatric units, maternity wards or intensive care units. Specialised bed frames that may be rented on a short-term basis, such as bariatric beds, are also excluded from this assessment. Bed frames for use in acute medical or surgical wards should be able to meet the different needs of people across a range of physical health conditions.
- Exploratory modelling indicates that features that reduce the incidence of patient falls, infections and musculoskeletal injuries to the person using the bed have the biggest potential cost savings. Reductions of 10% in the rate of patient falls, infections and musculoskeletal injuries could give savings of £487, £503 and £640 per bed frame per year, respectively.
- Bed frames for use in acute medical or surgical wards can have many different combinations of features, so it is difficult to estimate how much an individual feature contributes to the overall cost of a bed frame. But some features are more likely than others to increase the cost of a bed frame. These include bed exit alarms, in-built weighing scales and features enabling connectivity (including Bluetooth connectivity, patient assistance features and e-medical records).

Considerations for healthcare professionals

- Healthcare professionals may identify that a patient needs a different bed frame from what is available. If so, an NHS trust may be able to rent a specialist bed on a short-term basis.

NICE has produced tools and resources to support the implementation of this guidance.

Why the committee made these recommendations

Bed frames for adults in acute medical or surgical hospital wards have a range of features to help reduce incidents such as musculoskeletal injuries to the person using the bed or patient falls, pressure ulcers and infections. This assessment aims to determine whether the differences in clinical, economic and non-clinical outcomes attributed to the different features could justify price variation.

The features identified in recommendation 1.1 should be included as standard, as a minimum. These features were highlighted as being important to people using bed frames in the user preference assessment and are not expected to add cost to the bed frame.

In-built weighing scales and bed exit alarms are likely to be drivers of bed frame cost, but evidence of their effectiveness is uncertain. Some groups of people could benefit from these features, but currently there is no evidence to show this.

There is some evidence related to technical outcomes for power drive and turn assistance, but there is no evidence of their impact on user injuries. Connectivity features are likely to be drivers of bed frame cost, but there is no evidence of their impact on safety, effectiveness or resource use. Connectivity features on bed frames may be important in the future to support a digitally integrated NHS. More information is needed to justify price variation between bed frames because of these features.

Bed frames may have other features that are not included in these recommendations. But there is no evidence to justify price variation between bed frames because of any other feature.

2 The technologies

2.1 There are around 117,500 acute medical and surgical adult beds available within the NHS in England. Some bed frame procurement in the NHS comes through NHS Supply Chain, and some comes through other frameworks. There is considerable price variation among the bed frames that are available through NHS Supply Chain's framework.

2.2 Acute hospitals provide care for people who are experiencing severe or urgent physical or mental health conditions. They are made up of different types of wards or units, each of which is designed to meet specific patient needs and conditions. This guidance covers acute medical or surgical units in which people are admitted for treatment of a physical health condition. These units include:

- Acute medical wards, which provide rapid assessment, investigation and treatment for medical emergencies. Patients may spend several days to weeks on acute medical wards.
- Acute surgical wards, which provide care for people before and after surgery. The length of stay can vary depending on the type of surgery and the recovery process.

Specialised hospital wards, such as for acute inpatient mental health care, maternity wards and intensive care units, are outside the scope of this assessment. The following types of bed frames are also excluded from the scope:

- ultra-low floor beds
- bariatric beds
- junior beds for adult patients with atypical anatomy
- beds with integrated mattresses.

2.3 There are different groups of bed frame users and decision makers within an NHS trust. These include:

- patients
- family members and other visitors
- nurses, nursing associates and healthcare assistants
- manual handling leads
- infection control and domestic teams
- falls prevention teams
- tissue viability nurses
- physiotherapists and physiotherapy support workers
- occupational therapists
- portering staff
- clinical engineering teams
- procurement teams.

2.4 Many acute medical or surgical hospital wards will use electric profiling beds that have different sections that can be adjusted (for example, raised or lowered) using a remote control. These beds can have many different features, with proposed benefits for patients, carers and other users.

2.5 Adult bed frames for use in acute medical or surgical hospital wards should comply with the following safety standards and legislation:

- BS EN 60601-2-52:2010+A1:2015, which applies to basic safety and essential performance of medical beds for adults, and BS EN 50637, which applies to beds for smaller adults
- BS ISO 22882:2016, which applies to castors for hospital beds
- CE or UKCA marking, with evidence to demonstrate compliance.

2.6 NHS trusts choose bed frame models through procurement exercises that consider the views and preferences of different user groups within the trust. NHS

trusts may choose to purchase a limited number of bed frame models that support the needs of a range of patients, healthcare professionals and other users. Other specialised bed frame models may be rented or specially purchased to accommodate the needs of specific groups of patients.

3 Committee discussion

The advisory committee considered evidence from several sources to determine whether price variation between bed frames could be justified by differences in their clinical, cost effectiveness or non-clinical outcomes important to users. Full details are available in the project documents for this guidance.

Clinical effectiveness

Key evidence

3.1 There were 17 studies included in the external assessment group (EAG) evidence review. Across these studies, there was evidence on 8 types of bed frame feature:

- designs to prevent patient migration (sliding down the bed)
- steering assistance
- mechanism to adjust to a low height position
- bed exit alarms
- brake location
- power drive
- turn assistance
- in-built weighing scales.

Evidence reporting technical outcomes is acceptable

3.2 Studies on bed exit alarms and low bed height position reported on the impact of these features on rates of patient falls. Studies on the other features reported technical outcomes, for example a reduction in the force needed to move the

bed. For features with evidence reporting technical outcomes, the impact of the feature on incidents, such as musculoskeletal injuries in users, is uncertain. The committee agreed that evidence demonstrating proof of concept using technical outcomes may be acceptable for decision making, as evidence reporting the impact of these features on incidents is unlikely to become available in the future. This is because there are ethical concerns about comparative studies, in which people in 1 study arm may be exposed to a higher risk of experiencing an incident.

Evidence limitations

3.3 There was no evidence available that compared the effectiveness of the same bed frame feature on different bed frame models. But the committee noted that the effectiveness of bed frame features is likely to depend on the technology used, so may vary among bed frame models.

3.4 The committee noted factors that could affect the effectiveness and perceived usefulness of bed frame features. These included the type of mattress used, staffing levels, training practices and IT infrastructure. The committee acknowledged that the effectiveness of a bed frame feature could not be estimated in isolation of these external factors. The effectiveness of a bed frame feature should be considered in the context of the environment and facilities of the NHS trust that is considering using the feature.

Economic evaluation

Full details of the economic evaluation are in section 5 of the assessment report.

Exploratory analysis

3.5 The EAG developed an exploratory model to give an indication of which features may give the most value for money when selecting a bed frame for use in acute medical or surgical hospital wards. It estimated the net monetary benefit of generic groups of features that could potentially reduce incident rates (falls,

entrapments, infections, pressure injuries and user injuries). In its base-case analysis, a 10% reduction in each incident was assumed for groups of features that did not have evidence of an impact on incident rates. The feasibility of observing a 10% reduction in incidents because of bed frame features was uncertain, but the committee agreed that this was a reasonable assumption to understand the scale of the potential benefit compared across incidents. Bed exit alarms were the only feature to have evidence of impact, with 1 study (Seow et al., 2022) suggesting a reduction in falls by approximately 50%.

3.6 A reduction in user injuries was estimated to have the largest benefit, with a maximum net monetary benefit of £640 per bed frame per year when assuming a 10% reduction. A 10% reduction in infections was estimated to have a net monetary benefit of £503 per bed frame per year. A 10% reduction in falls was estimated to have a net monetary benefit of £487 per bed frame per year. Smaller benefits were estimated for reductions in pressure ulcers and entrapments, with net monetary benefits of £51 and £0.20 per bed per year, respectively, when assuming a 10% reduction in these incidents.

3.7 In the EAG's exploratory analysis, features were grouped based on the incident rate they were likely to affect. All features potentially reducing user injuries were assumed to do so by 10% in the base-case model, to help understand the scale of the potential benefit. The model did not account for additive effects from more than 1 feature. This was because of a lack of evidence on the impact of features on incidents for all features except for bed exit alarms, and a lack of evidence on how the interaction of multiple features would affect incidents. The committee discussed that, in practice, some features may affect 1 type of incident more than other features. But because of the lack of published evidence, it agreed this was a reasonable assumption. So, the net monetary benefit observed from a feature may be different from the benefit assumed in the exploratory analysis.

Repair costs

3.8 The committee discussed the cost and resource needed to repair bed frames and their features. It noted that damage to bed frames is often accidental rather than being caused by faults in the bed frame. A small amount of data from 1 NHS trust suggested that repairs were needed infrequently and the time taken to perform

repairs was often minimal (30 minutes), with many repairs covered by a warranty. The bed frame itself, not related to a specific feature, was the only exception where a large repair cost was reported because the bed frame needed to be replaced. The turnaround time (from identifying the need for repair to having the bed frame available for use) was an important consideration. If the turnaround time is significant and the bed frame is out of service then there will be 1 less bed available for use. The committee noted that repair time for features is not likely to be a key driver of cost.

Some features may drive bed frame cost

3.9 The EAG did a statistical analysis to determine which features may be driving bed frame costs. Bed frame costs were provided by NHS Supply Chain as commercial in confidence. The EAG concluded that 3 groups of features are likely to affect the cost of bed frames:

- bed exit alarms
- in-built weighing scales
- features enabling connectivity (including Bluetooth connectivity, patient assistance features and e-medical records).

The EAG calculated the difference between the average costs of bed frames for use in acute medical or surgical hospital wards with a feature and bed frames without the feature. The committee noted there were other differences in features between bed frames in this analysis, so the incremental cost differences reported cannot be solely attributed to a single feature. A range of other confounding factors are likely to affect the bed frame cost, including profit margins, production costs and other unseen factors.

Economic evaluation limitations

3.10 There was a limited amount of robust evidence on the impact of bed frame features on incident rates or technical outcomes to inform economic modelling.

The committee noted that the results of the economic model should be interpreted with caution. There was no evidence on the potential benefits of connectivity features, such as reduced staff time. Connectivity features were not included in the economic model, and potential cost or time savings associated with these features are not known. Some costs, including for training, repair or cleaning, were not included in the model. This may mean the potential cost savings from bed frame features are overestimated.

Individual feature considerations

Features to prevent migration

3.11 Bed frames may have features that are designed to prevent a person sliding down the bed, which could reduce the occurrence of pressure ulcers sustained from shear forces. Five laboratory studies on features to prevent migration all reported technical outcomes. The EAG considered all studies to have an unclear risk of bias. The EAG concluded that sliding and elongating pivot head sections may reduce patient migration. But the impact of these features on pressure ulcers has not been demonstrated. In the user preference assessment features to prevent migration were ranked most important. The committee noted that this feature is available on most of the bed frames in scope, and was not identified as a driver of bed frame cost. In its exploratory analysis, the EAG reported that if these features could reduce pressure ulcer formation by 10%, there would be a potential net monetary benefit of £51 per bed frame per year. The committee highlighted the importance of features to prevent migration and concluded that these should be considered standard on bed frames for use in acute medical or surgical hospital wards.

Low bed height position

3.12 Beds that can be adjusted to a low height could reduce patient falls. One study did not report a significant reduction in the number of falls from a bed in a low height position. The EAG noted the risk of bias and poor generalisability in this study, and concluded that it is unclear whether beds with a low height position

can improve this outcome. The committee acknowledged that there is no evidence on the optimal low bed height for reducing patient falls. In the user preference assessment, low height position was ranked as the second most important feature and was also ranked highly by patients. The committee noted that a low height position is available on most of the beds in the scope of this assessment, and was not identified as a driver of bed frame cost. In its exploratory analysis, the EAG reported that if a low bed height could reduce patient falls by 10%, there would be a potential net monetary benefit of £487 per bed frame per year. The committee agreed that adjustment to a low height position should be a standard feature on bed frames for use in acute medical or surgical hospital wards.

Ergonomic brake system

3.13 Bed frames may have brakes that are designed to be easy to use, potentially reducing user musculoskeletal injuries. One laboratory study was identified that reported technical outcomes. The EAG concluded that this study had an unclear risk of bias, but brake pedal location may have some impact on force requirements. The impact of an ergonomic brake location on user musculoskeletal injuries is unknown. In the user preference assessment, ergonomic brake location was ranked as the third most important feature. Results of a porter preference survey suggest that this feature is important. The committee noted that ergonomic brake systems are not estimated to be a driver of bed frame cost. In its exploratory analysis, the EAG reported that if ergonomic brake systems could reduce user musculoskeletal injuries by 10%, there would be a potential net monetary benefit of £640 per bed frame per year. The committee concluded that ergonomic brake systems should be a standard feature on bed frames for use in acute medical or surgical hospital wards.

Steering assistance

3.14 Bed frames can have features, such as a fifth wheel or double-bogie castor configuration, to help steer the bed more easily. These could reduce the incidence of user musculoskeletal injuries. Two laboratory studies on steering assistance features reported technical outcomes. The EAG considered both

studies to have an unclear risk of bias, and concluded that it is unclear whether adding a fifth wheel affects the risk factors for lower back disorders or work efficiency. The EAG also concluded that it is not clear from the available evidence whether a double-bogie castor design consistently affects force requirements. In the user preference assessment, steering assistance was ranked as the fifth most important feature in the user preference assessment and the most important feature in the porter survey. The committee noted that steering assistance is available on most of the beds in the scope of this assessment. The EAG reported that steering assistance is not estimated to be a driver of bed frame cost. In its exploratory analysis, the EAG reported that if steering assistance features could reduce user musculoskeletal injuries by 10%, there would be a potential net monetary benefit of £640 per bed frame per year. The committee agreed that some users will find steering assistance very important. It concluded that steering assistance should be a standard feature on bed frames for use in acute medical or surgical hospital wards.

Turn assistance

3.15 Turn assistance on a bed could help users to turn and reposition patients, potentially reducing the incidence of user musculoskeletal injuries. Four laboratory studies on turn assistance reported technical outcomes. The EAG considered all studies to have an unclear risk of bias, and concluded that turn assistance may reduce physical stresses on users, but the benefit for patient-related outcomes is limited. The impact of turn assistance on incidents such as user musculoskeletal injuries has yet to be demonstrated. In the user preference assessment, turn assistance was ranked as the fourth most important feature. Turn assistance was available on only 1 of the beds in the scope of this assessment. But the committee noted that some mattresses have a similar function. In its exploratory analysis, the EAG reported that if turn assistance could reduce user musculoskeletal injuries by 10%, there would be a potential net monetary benefit of £640 per bed frame per year. The committee concluded that there is not enough evidence to determine whether price variation is justified between bed frames because of turn assistance.

Power drive

3.16 Some bed frames may be motorised to reduce the risk of user musculoskeletal injuries sustained during patient transportation or portering. Two laboratory studies on power drive reported technical outcomes. The EAG considered 1 study to have a low risk of bias and the other to have an unclear risk of bias. The EAG concluded that, as proof of principle, power drive is likely to reduce spine loading during patient transportation or bed moving. In the user preference assessment, power drive was ranked as the seventh most important feature, and it was a less important feature in the porter survey. The committee noted that this feature is not widely available on bed frames. In its exploratory analysis, the EAG reported that if power-drive features could reduce user musculoskeletal injuries by 10%, there would be a potential net monetary benefit of £640 per bed frame per year. There is currently no evidence to show the effectiveness of power drive for reducing user musculoskeletal injuries. The committee concluded that there is not enough evidence to determine whether price variation is justified between bed frames because of power drive.

Connectivity features

3.17 Some bed frames have features to enable connectivity between the bed and other systems or appliances. There is no evidence to show how connectivity features affect safety, effectiveness or resource use. In the user preference assessment, the average importance scores for connectivity features were lower than the average importance scores for other features. Experts noted that successful implementation of connectivity features may need reliable IT services, so some NHS trusts may find connectivity features difficult to implement. The committee heard that connectivity features are relatively new features on bed frames, so in practice users may not yet have experienced these features. The committee noted that connectivity features of bed frames are likely to be used more widely by NHS trusts in the future. The EAG identified connectivity features as a potential driver of bed frame cost. The EAG reported estimated incremental cost differences of:

- £3,437 between beds with and without features enabling connectivity between patients and other users

- £6,447 between beds with and without Bluetooth connectivity
- £7,492 between beds with and without electronic medical records.

The committee discussed that connectivity features of bed frames may be less important to users than other features at present, and some NHS trusts may not yet be able to properly implement them. But it was acknowledged that connectivity features may become more important as the NHS moves towards being more digitally integrated. The committee concluded that currently there is not enough evidence to determine whether price variation is justified between bed frames because of connectivity features.

Bed exit alarms

3.18 Bed exit alarms may be able to reduce patient falls by indicating when someone has left the bed. The committee acknowledged that bed exit alarms were the only feature that had evidence on the impact on incident rates that was relevant to the decision problem in terms of clinical setting. One study (Seow et al., 2022) reported a reduction in falls by approximately 50% with bed exit alarms. The EAG considered this study to have a high risk of bias because many people were excluded, and concluded that the benefit of bed exit alarms is unclear. The committee noted that bed exit alarms are a potential driver of bed frame cost, with an estimated incremental cost difference of £3,831 between beds with and without bed exit alarms. The EAG reported that if bed exit alarms were to reduce patient falls by 50%, there would be a potential net monetary benefit of £2,433 per bed frame per year. In the user preference assessment, bed exit alarms were ranked as the sixth most important feature, suggesting that they are less of a priority to users than other features. The committee discussed that some patient groups may benefit more from bed exit alarms, such as people who have dementia and may try to get out of bed frequently. There is currently no evidence on the effectiveness of bed exit alarms in this population. The committee concluded that there is not enough evidence to determine whether price variation is justified between bed frames because of bed exit alarms.

In-built weighing scales

3.19 In-built weighing scales on bed frames may reduce the need to remove people from their bed to measure their weight. This could reduce the incidence of user musculoskeletal injuries. Two laboratory studies set in intensive care units reported on in-built weighing scales. The EAG considered both studies to have a low risk of bias and concluded that the in-built weighing scales assessed in these studies do not give accurate measurements. In the user preference assessment, this feature was ranked least important. The committee noted that the accuracy of weight measurements taken using in-built weighing scales is more likely to be affected by user error than technical error. It also noted that in-built weighing scales are a potential driver of bed frame cost, with an estimated incremental cost difference of £5,914 between beds with and without this feature. In its exploratory analysis, the EAG reported that if in-built weighing scales could reduce user musculoskeletal injuries by 10%, there would be a potential net monetary benefit of £640 per bed frame per year. The committee discussed that some groups of patients could benefit from in-built weighing scales, such as people with cognitive impairment, who may not understand why they need to have their weight measured frequently. There is currently no evidence on the effectiveness of in-built weighing scales in this population. The committee concluded that there is not enough evidence to determine whether price variation is justified between bed frames because of in-built weighing scales.

Features without evidence identified in the evidence review

3.20 Some bed frame features were identified as important in the user preference assessment, but there was no evidence of their impact on incident rates or technical outcomes. These were:

- robust and durable frame construction
- side rails that are flush to the bed when folded down
- a frame structure that improves compatibility with accessories (such as hoists).

There is no evidence to determine whether price variation is justified

between bed frames for these features.

Equality considerations

3.21 People with a physical health condition may also have a mental health condition or be experiencing a mental health-related issue. There may be additional considerations for these people to ensure their needs are met in acute medical or surgical wards. People who are admitted to hospital because of a mental health condition may stay in a mental health unit. The beds in these units may have specially designed features for patient safety, but may not be suitable to use on other wards where people are having treatment for a physical health condition. Wards for acute inpatient mental health care are outside the scope of this assessment.

3.22 The committee acknowledged that the effectiveness and suitability of some bed frame features may vary among specific patient groups. For example, bed exit alarms may be more effective at reducing the incidence of falls in people who have dementia, but an audible warning tone may cause distress to some people. Other features, such as integrated lighting or features that can cause sudden movements to the bed frame, may be unsuitable for some groups of people. Written and pictorial instructions on the frame may make it easier for patients and visitors to use bed features. The committee concluded that more evidence is needed on the impact of bed frame features on patient populations who may be affected differently.

4 Committee members and NICE project team

This topic was considered by NICE's medical technologies advisory committee. Committee members are asked to declare any interests in the technology to be evaluated. If it is considered there is a conflict of interest, the member is excluded from participating further in that evaluation.

The minutes of each committee meeting, which include the names of the members who attended and their declarations of interests, are posted on the NICE website.

NICE also recruited specialist committee members for this topic.

Chairs

Jacob Brown
Chair, medical technologies advisory committee

Thomas Clutton-Brock
Chair, interventional procedures advisory committee

NICE project team

Each evaluation is assigned to a team consisting of 1 or more health technology analysts (who act as technical leads for the evaluation), a technical adviser, a project manager and an associate director.

Sophie Harrison
Technical lead

Frances Nixon
Technical adviser

Toni Gasse
Project manager

Lizzy Latimer
Associate director

Update information

Minor changes since publication

December 2025: Health technology evaluation 33 has been migrated to HealthTech guidance 759. The recommendations and accompanying content remain unchanged.

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