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Development of a log-rolling device for patient care in healthcare settings

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Introduction - Manual log-rolling is critical for spinal injury and immobile patients in hospital wards. In Sri Lanka, constrained resources, staff shortages, and absence of ergonomic equipment frequently led to suboptimal patient handling with risk of spinal misalignment and caregiver injury. An affordable, mechanically simple solution is needed for safe patient transfers in these settings. Therefore, this research was conducted to conceptualize a log-rolling device suitable for local hospitals lacking access to motorized aids.

Materials and Methods - The methodology included a systematic literature review, clinical workflow observation, and stakeholder interviews that included healthcare workers. When analyzing, the key user requirements were prioritized. In order to address the prioritized user requirements, a device was designed using CAD modelling and mechanical analysis. Finally, feedback on the design was obtained from healthcare professionals.

Results - Spinal alignment, minimal physical strain, and adaptability to standard hospital beds were identified as three key user requirements. The resulting conceptual design to address these user requirements was a manually operated transfer device. This included a roller conveyor-based trolley equipped with a manual belt-driven transfer system, bed latching mechanisms, and a height-adjustable platform to ensure spinal alignment of the patient and eliminate undue musculoskeletal loading in healthcare workers while handling the patients.The design demonstrated technical feasibility within the limitations of local hospital resources and did not require electricity, making it practical for wide adoption. Stakeholder feedback on the design confirmed patient comfort, improved ergonomics, and operational simplicity compared to conventional manual techniques.

Discussion - This study tackles the critical need for cost effective options for safer patient handling in Sri Lankan hospitals by designing a log-rolling device tailored to local constraints. Grounded in rigorous research and stakeholder input, the device prioritizes patient safety, caregiver ergonomics, affordability, and ease of maintenance. Future piloting and testing with working prototypes will be essential to refine its functionality and ensure effective clinical integration, ultimately improving patient transfers and staff well-being in resource-limited settings.