

Background:

Musculoskeletal (MSK) injuries are a global health priority with 1.71 billion people living with chronic disability due to MSK injuries. This burden is exaggerated in low to middle income countries (LMICs) with limited educated personnel and scarce resources for treating these injuries. Standard treatment for MSK injuries includes stabilizing the limb in a splint, historically made of Plaster of Paris or fiberglass. There is a paucity of research which evaluates the feasibility of splinting materials for use in LMICs. In this study we sought to evaluate plaster, silicone rubber, fiberglass, polyester-PU resin, thermoplastics, Woodcast and aluminum moldable splinting materials through a cost-benefit analysis specific for the needs of LMICs.

Methods:

Manual literature reviews on PubMed were completed using the following keywords: low-resource, low to middle income, orthopedic splinting in Africa, orthopedic splinting in Nigeria, fracture immobilization materials, alternative splinting materials, moldable splint materials. The following criteria was then examined for each material: intrinsic strength, moldability, setting time, ease of application, and cost/availability.

Results:

Of the materials reviewed, plaster was found to be cost effective, however, is brittle, non-waterproof and can be technically challenging to apply correctly. Fiberglass has improved strength compared to plaster and is slightly easier to apply but is less cost effective. Likewise, silicon rubber, polyester-PU resin, thermoplastics and Woodcast are less cost effective for use in LMICs or have major challenges in the ease of application. Aluminum moldable splints do not require activation time and are the most cost effective, but data on durability is limited.

Conclusions:

Among the splinting materials reviewed, there is a lack of a clearly superior splinting material suitable for use in LMICs. While all the available materials have strengths and limitations for use in LMICs, plaster is the most widely utilized but may have limitations to widespread use for personnel with limited formal training. Aluminum moldable splints are a newer, less-studied material that may solve some issues related to ease of application and cost-effectiveness however, further research is needed to assess these factors and the strength limitations of aluminum moldable splints.