Redesigning the Medical Examination Table for Improved Accessibility

"Necessary and Appropriate": The Inaccessibility of Accessible Medical Diagnostic Equipment

A Thesis Prospectus

In STS 4500

Presented to

The Faculty of the

School of Engineering and Applied Science

University of Virginia

In Partial Fulfillment of the Requirements for the Degree Bachelor of Science in Biomedical Engineering

By

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December 5, 2024

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

Imagine a doctor's office. You may check in at the receptionist's desk, wait as a nurse takes your weight on a scale, and sit quietly in an exam room upon the delicate paper covering the exam table. Or, if you are one of the 12.2% of U.S. adults with a mobility disability, you may not have gotten that far (CDC, 2024). You may be waiting outside the building because there was no ramp or making eye contact with the counter instead of a receptionist. You could be led all the way to the scale until you realize it cannot accommodate your mobility aid. You may be sitting alone in the exam room, because the table requires you to step up and turn around to sit. Even if you can, there are no supporting rails, so you risk falling. It's an ironic thing, to be in a place of support and healing to instead find barriers to your well-being.

Though there are many designs for accessible examination tables and chairs, they are not as widespread as fixed-height tables. Though scholars cite varying factors, significant reasons I've been told are the cost difference between fixed and accessible, and ease of use from a provider's perspective. My technical project aims to redesign the medical examination table, one with a chair-like form that can raise, lower, and fold out into a flat table. The design will feature limited electronics, which drive up the cost of exam chairs on the market today, making it cost competitive with the standard fixed-height tables.

For my STS research paper, I will examine factors preventing the widespread availability of accessible medical diagnostic equipment, particularly examination tables, despite the high number of U.S. adults with mobility disabilities. In addition, I will propose methods of improvement so not only would more equipment be accessible, but more providers would be prepared to support patients. These topics are directly related, as the redesign of the table would reduce costs and promote ease of use.

Redesigning the Medical Examination Table for Improved Accessibility

The medical examination table is a staple of doctors' offices, an essential piece of medical furniture for nearly every specialty. The primary function of an exam table is to provide an elevated surface to support patients during diagnostic tests. In general practices, the patient may be positioned laying on their back, stomach, or side. The patient may also need to be put in a more specialized position, most commonly a low-lithotomy or semi-sitting position for pelvic exams (Armstrong & Moore, 2024). A basic examination table should be capable of supporting an average patient in all these positionings. The most common style of medical examination table is a manual table with an adjustable backrest, set at a fixed height between 32 and 34 inches. This design is meant to accommodate most patients and has therefore become the most standard style for most primary care clinics.

A fixed height table is an acceptable design for most patients, but for others it can be difficult to use. Getting onto a table of such height requires a patient to either step up and turn around or take a backwards step up to ascend. Many models also do not have handrails for support. For the elderly population and people with disabilities, getting onto the table independently can range from difficult to impossible (*Accessible Medical Examination Tables and Chairs* | *ADA National Network*, n.d.). This inaccessibility could be addressed through transfer aids such as transfer boards, Hoyer lifts, or assistance from providers. However, an alternative to these methods that wouldn't involve additional pieces of equipment and reduce the risk of harm to providers would be a change to the exam table itself.

Alternative designs to the manual fixed-height table exist but are less seen in clinical settings. Tables with adjustable capability (called high-low tables) and powered procedure chairs are used in specialized practices. However, these models are more expensive due to the electrical and hydraulic components that assist with the height change and other adjustments. For these reasons, it's believed that hospitals and clinics choose this model over more accessible examination tables. A way to reduce costs would be to remove the electric and hydraulic components to make it competitive with more popular box-type tables.

A pilot study was conducted at UVA's Primary Care Center this past summer, surveying patient preference of being examined on a standard box-type table or an electric procedure chair. Many of the participants, including more elderly patients with limited mobility, preferred the procedure chair for its increased range of motion and greater adjustability. These findings led our advisor to propose a redesign of the examination table, one that focused on manual movement mechanisms, in hopes of reducing the cost of a more accessible and accommodating design.

This project is a continuation of a previous capstone group, which had styled the core parts that more closely resemble a procedure chair to promote patient dignity and increased patient comfort. They also identified the necessary height range to make the device conform to federal accessibility standards, highlighted necessary configurations, and determined surface dimensions. Our team was tasked with designing connecting mechanisms for movement including back reclining, leg raising, and chair height adjustment.

Our goal is to create a functional 3D model of a novel high-low examination chair designed to recline into a flat examination table. The planned mechanisms to be used are a scissor lift for overall height adjustment and a linear rail for both the reclining backrest and leg lift. We will also determine the ideal material for the seating, including upholstery that can withstand frequent decontamination and padding chosen for its performance in medical settings (D, n.d.; *The Complete Guide to Healthcare Seating Textiles* | *NBF*, n.d.).

The deliverables for this project will include a 3D assembly of the examination chair in Autodesk Fusion 360 with a survey of providers conducted for future refinement and prototyping. By building on the previous chair design by creating mechanical hinges and movement mechanism, we can create a more affordable alternative to powered medical examination tables.

The Inaccessibility of Accessible Medical Diagnostic Equipment

The Americans with Disabilities Act (ADA) of 1990 requires healthcare providers to give full and equal access to their health care services and facilities (*Americans with Disabilities Act of 1990, As Amended*, n.d.). Despite this requirement by law, individuals with mobility impairments or disabilities often receive fewer examinations, less preventative care, and generally experience substandard medical care compared to able-bodied patients (Lagu et al., 2013). One significant accessibility issue within doctor offices is the popularity of fixed-height examination tables, which are difficult for people with limited mobility to transfer onto. Not only do these tables lack support for transfer, but they also cannot be lowered to an accessible height and require additional equipment, such as patient lifts, for safe assisted transfer.

Considering the ADA was originally passed over 30 years ago, it would be expected that many of these barriers would have been removed. However, this is not the case as the inaccessibility of provider offices and spaces are still a contributing factor to the healthcare disparities experienced by people with disabilities (*Increasing the Physical Accessibility of Health Care Facilities*, n.d.). In addition, medical diagnostic equipment (MDE) within clinics may be inaccessible, which prevents an equitable level of care from being provided. For people with disabilities actively asking if provider offices are accessible to them, they may be told that the facility is, when it is not. Providers may have a different perception of accessibility; for example, considering lifting wheelchair-bound patients up to diagnostic equipment as providing equitable care (Iezzoni, 2008). Though it is federally mandated that equitable care be provided to all, there are still many barriers in place, though less visible.

There are many MDE designs – specifically, medical examination tables – that have accessibility features recommended by the U.S. Access Board, who proposed standards for MDE. Until recently, however, these standards were not enforceable as federal regulations and only served as "best practice guidelines" for MDE (*Accessible Medical Examination Tables and Chairs* | *ADA National Network*, n.d.). In May 2024, the Department of Health and Human Services finalized a ruling formally adopting the Board's standards, requiring most healthcare providers to have an accessible exam table and weight scale in their practice within two years of the decision. This is a significant step, but is considered long overdue by many health policy researchers (Iezzoni & Stein, 2024). The ruling also (correctly) implies that recommended standards were not heeded and only through federal mandate could accessible MDE be ensured.

Though the ADA intends to create standards for accessibility, there are many cases of healthcare practice and societal norms still standing as barriers to equitable care. This begs the question, what are the major factors that prevent accessible medical examination tables from being widely implemented? In addition, what changes can be made to improve the availability of accessible MDE in healthcare settings? Discourse from contemporary medical researchers suggest one major reason is healthcare provider ignorance of ADA regulations, patient experiences, and how their perceptions of disability lead to substandard medical care.

In this prospectus, I propose a research study into how current healthcare practices for people with disabilities are substandard and the factors preventing equitable care from being provided, which can inform what changes are necessary to ensure ADA regulations are followed and requirements surpassed. For my research paper, I will conduct a meta-review of peer-reviewed research papers and non-refereed publications by healthcare policy researchers focusing on current primary care practices and training, provider perceptions of disability, perspectives from people with disabilities on medical access, cost differences, and enforcement for regulations. I will use sources published between 2010 and 2024 and from medical or healthcare policy journals, primarily found through the Health Affairs website.

Conclusion

More than 12% of adults in the U.S. have a mobility disability, a figure that will continue to grow as more people with disabilities are born and as generations grow older (CDC, 2024; Iezzoni, 2011). Until recently, healthcare facilities were not required to provide accessible examination tables for those with mobility issues if they could still receive "equitable care," though what they were given rarely was. Even now, with acceptance of MDE recommended guidelines as law, it cannot be guaranteed that people with disabilities will experience equitable care in primary care facilities since the attitude of providers and their perception of disability are largely unchanged since the inception of ADA in 1990.

Since accessible examination tables weren't widely seen before the requirement, it leads us to wonder what factors prevented them from being used in most primary care facilities. Many scholars cite provider ignorance, particularly providing care for and ADA regulations protecting patients with disabilities. Other suspected reasons are the higher cost and training required to operate accessible examinations tables. I plan to address both points by performing a research study on the substandard healthcare practices patients experience as well as designing a manual accessible exam chair that would be comparable in cost to the standard inaccessible fixed-height table. Through my research paper and technical project, I will be informed of the changes necessary to ensure accessibility standards are not only followed, but surpassed. Improved access to medical care cannot be brought through products alone; an integration of accessible diagnostic equipment must be coupled with the awareness that those who need it are inherently deserving.

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