

Mobilizing slit lamp to the field: A new affordable solution

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We are describing a simple and affordable design to pack and carry the slit lamp to the field. Orbis staff working on the Flying Eye Hospital (FEH) developed this design to facilitate mobilization of the slit lamp to the field during various FEH programs. The solution involves using a big toolbox, a central plywood apparatus, and foam. These supplies were cut to measure and used to support the slit lamp after being fitted snugly in the box. This design allows easy and safe mobilization of the slit lamp to remote places. It was developed with the efficient use of space in mind and it can be easily reproduced in developing countries using same or similar supplies. Mobilizing slit lamp will be of great help for staff and institutes doing regular outreach clinical work.

Key words: Community eye health, eye camp, outreach, slit lamp, technology

Access to affordable health care is one of the priorities identified by the World Health Organization for Universal Health Coverage.^[1,2] Providing access to affordable eye care and tackling national blindness priorities, such as cataract, was successful in some countries.^[3] In countries like India, good results have been achieved in the fight against blindness due to increase in the cataract surgical rate and more importantly delivering care where it is mostly needed. This was achieved through conducting regular outreach activities and developing systems of eye care that cover big catchment areas.^[4-6] Mobilizing ophthalmic equipment to the field is an essential part of providing affordable eye care to local communities in remote places and outside big cities. Orbis is one of the pioneers in international ophthalmology and with operating the only Flying Eye Hospital (FEH), finding practical innovative solutions for protection and mobilization of ophthalmic equipment became an essential part of everyday job. We are describing a new solution using affordable supplies and parts that can help in mobilizing essential equipment such as the slit lamp to the field. Richard Jorgenson, a senior flight

mechanic, who has been working on the FEH for more than 13 years, developed this design. It was made using simple available resources to maximize use of the space available while achieving portability and protection.

Technique

A big toolbox is used to store and transfer the slit lamp [Fig. 1a and b]. This toolbox is made of resin and the latch material is made of metal. It is water resistant and provides an airtight compartment. Pieces of plywood are custom tailored to line the box and when assembled, hold the slit lamp in place [Fig. 2a and b]. Total weight of the box with pieces of plywood is 20 kg. The assembled height of the toolbox is 23.985 inch and the assembled depth is 23.01 inch. Its width is 38.22 inch and the handle length is 13.5 inch. The central plywood housing is built with a piece of foam glued at the bottom to support the illumination head of the slit lamp [Fig. 3a]. The central apparatus is designed to fit in the middle of the box with good support on both sides [Fig. 3b]. The maximum diameter of the central plywood apparatus was kept at 7.25 inches to host a slit lamp with a maximum width of 7 inches, Haag-Streit (BQ 900®), Switzerland. The plywood has been cut and fitted with the Haag-Streit slit lamp in mind. The flight mechanic, who had initially come up with the idea of mobilizing the slit lamp, cut the plywood. Adjustments can be made to in a way fit other slit lamps according to their measurements. During transport, the slit lamp sits in the middle of the plywood, supported by a custom made piece fitting snugly around the middle, designed carefully to fit around the microscope and illumination arms to stop their movement [Fig. 4] while



Figure 1: (a) Toolbox - closed view, (b) open view

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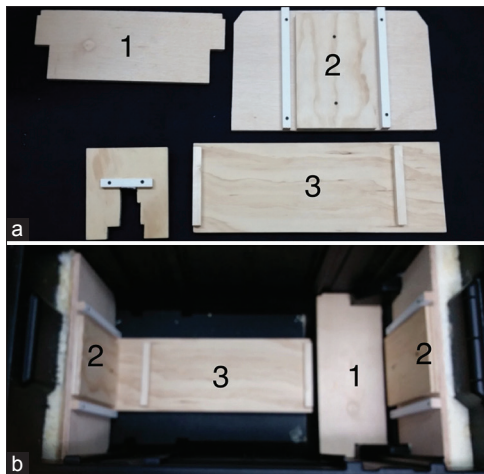


Figure 2: (a) Pieces of plywood before they are assembled (b) pieces of plywood to line the toolbox



Figure 3: (a) Central unit on which the slit lamp would lay down, (b) central unit after being fitted into the toolbox

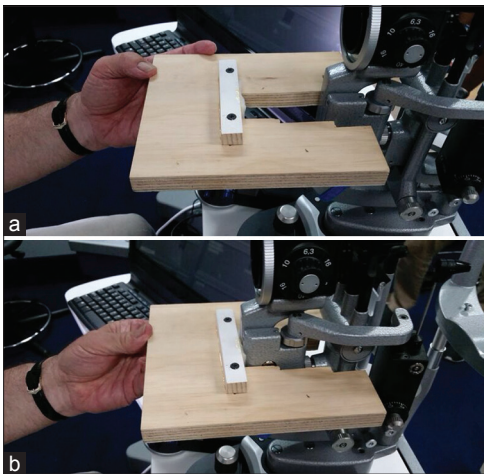


Figure 4: (a and b) Custom made piece of plywood being placed around the microscope and illumination arms

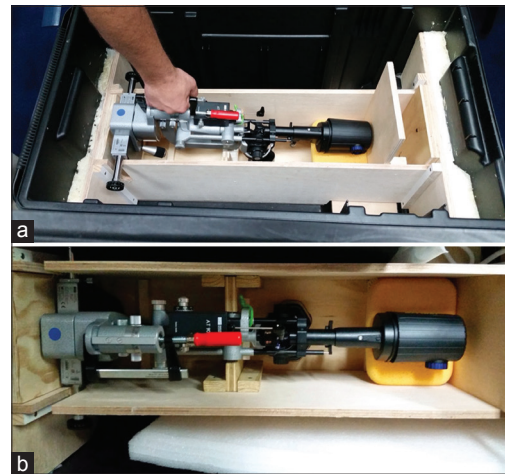


Figure 5: (a) Slit lamp being placed in the central apparatus, (b) slit lamp in the toolbox ready to be transported

keeping good clearance from the bottom of the box. Two sidetracks are carved on the sideboards, one on each side to host the slit lamp rod and the two geared wheels [Fig. 5a and b]. Before moving the slit lamp to be stored, the microscope and illumination arms are locked together with a “wire - tie” to stop swiveling and unnecessary damage [Fig. 6a and b]. It is also recommended to remove the mirror and store it separately in a small box. To easily transfer the slit lamp, a “four inch-clamp” is screwed on both sides of the pivot base [Fig. 7a and b]. The space around the central plywood apparatus can be used to store other accessories like a computer screen, small storage boxes and a keyboard [Fig. 8]. Once secured in the box, it safe to move the slit lamp to the field [Fig. 9]. The design took into account the safety needed for transport while air bound as well as on the ground while transferred to partner hospitals and remote units. As with other medical instruments, handling should be done with care. It requires two persons for loading and one for assembly. The total cost of the supplies used to develop this solution does not exceed 160 USD. The toolbox was purchased from DeWalt®, which produces boxes commercially. It comes

in various sizes and shapes; ophthalmologist can purchase it according to his/her requirements. It is being manufactured in the USA and China. This product is available in the Indian market as in many parts of the world; it can also be ordered online. Details of how to cut the plywood to fit the slit lamp can be discussed with the corresponding author over E-mail. Despite this, one of the main objectives of this paper is to inspire ophthalmologists and program managers to use alternative and similar products which are readily available and can be easily purchased or locally manufactured as needed.

Discussion

Ophthalmic equipment is a big investment for any health care facility that needs protection and regular maintenance.^[7] The total cost of the solution we are describing is 160 USD, which makes it affordable in low to middle income countries. Outreach camps, which became common part of everyday ophthalmic practice in some regions like the Indian subcontinent^[8] and Africa,^[9] could benefit from this cost-effective technique. This model for packing the slit lamp

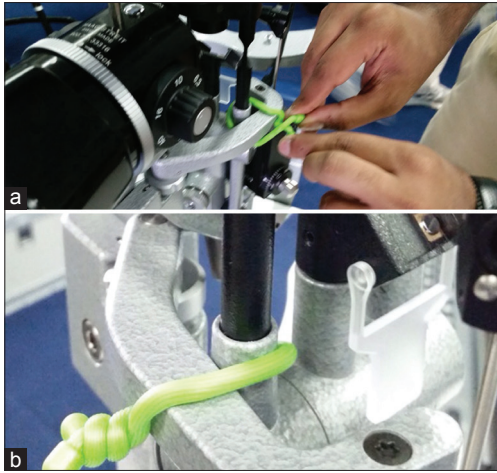


Figure 6: (a) Wire - tie being used to lock the arms of the slit lamp, (b) wire - tie in place



Figure 7: (a) "Four inch clamp" used to hold the slit lamp, (b) slit lamp being carried using the clamp

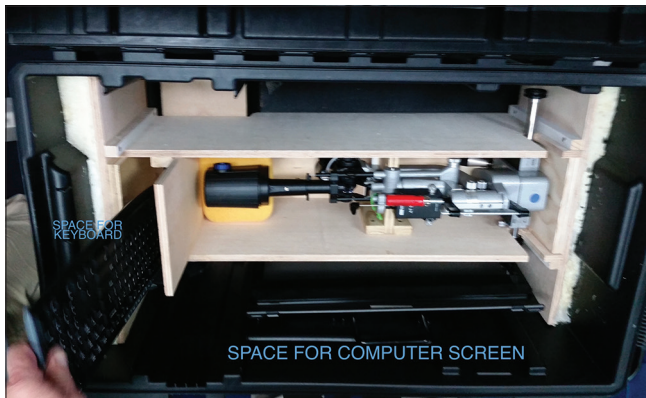


Figure 8: Compartments in the toolbox for accessories

can be incorporated in the biomedical training curriculum of eye hospitals. Contrary to the portable slit lamp, which might be more convenient for screening purposes, using a fully assembled slit lamp enables ophthalmologists of accurately detecting and managing ocular comorbidities which improve safety and quality of the surgery with better outcomes. Designing a table, which can be folded and kept on top of the slit lamp housing, can further modify this idea; as there is enough space within the box to accommodate more accessories.

Conclusion

Delivering eye care through eye camps and outreach programs has been the backbone of ophthalmology in some developing countries. Most of the available literature focuses on slit lamp safety and maintenance,^[10] but to the best of our knowledge, there has not been any published article on means to transport the slit lamp to the field. Use of the slit lamp in the camp area needs electricity, which makes it more convenient when camp activities involve doing surgery on site. Making the organizers aware of this requirement beforehand ensures this. This affordable method, developed by Orbis International staff, to pack the slit lamp in one box can be used efficiently to transport it to the field.



Figure 9: The slit lamp being transported in the box to the field

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Conflicts of interest

There are no conflicts of interest.

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