

Designing and Developing Automatic Trolley for Washing and Dressing the Wounds

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ABSTRACT

Introduction: Many items are needed for dressing including sterile dressing set, antiseptic and washing solutions, leucoplast tape, waste bin for infectious garbage, waste bin for noninfectious garbage, safe disposal trash for sharp cutting instruments, bedpan and sometimes drugs. All the items are laid out on a simple wheeled trolley. The multiplicity of items together with problems in placing tools on trolley, forgetting some items, disturbing sterile condition, falling and damaging equipment and the need for at least two people for each procedure, all are the reasons to design and develop Automatic Trolley for Washing and Dressing the Wounds.

Material and Method: To develop a mobile unit which meets our needs for dressing, the trolley patents registered in America and different companies were evaluated as well as the materials and methods used while dressing were considered.

Results: Automatic Trolley for Washing and Dressing the Wounds was designed and developed. It comprises the followings: drawer, waste bin for infectious garbage, waste bin for noninfectious garbage, shelves for serum and betadine solution, serum stand, peristaltic pump, flexible tube for connecting serum, a place for bedpan, foot pedal for serum flow, two eye-sensor chambers for solution betadine and scrub, an auxiliary work surface.

Conclusion: Due to the usual requirements for dressing, we have designed an equipped mobile unit which covers all the objectives of dressing and increases the speed of procedure. Moreover, due to the contrived equipment on the trolley, procedures are done quickly and second person is not required to assist. Automatic Trolley for Washing and Dressing the Wounds is made up of stainless steel which could be mass housing and commercializing which would play a deserving role in improving the fundamentals of health care and wound treatment.

Keywords

Automatic Trolley, Dressing, Wound

Introduction

Wounds are parts of important and common injuries in which the quality of wound care and proper treatment affect the result [1]. Among the variety of treatment methods, dressing is always the main part of wound repairing process. Dressing-related factors such as type of dressing, time, applying technique and sterility condition are directly interconnected to wound repairing [1, 2]. Definitely, it is not possible to ignore the role of equipment conditions in achieving a

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desirable result in wound recuperation. Many items are needed for dressing including sterile dressing set, antiseptic and cleaning solutions, leucoplast tape, waste bin for infectious and non-infectious garbage, safe disposal waste bin for sharp cutting instruments, bedpan and sometimes drugs. All the items will be laid out on a simple wheeled trolley. This multiplicity of items may cause restrictions and mistakes such as problems in placing tools on trolley, forgetting some items, disturbing sterile condition, falling and damaging instruments and the need of at least two persons for dressing [1-3]. Such problems are in fact a reflection of present condition in most hospitals which result in increased nursing workload, reduction in quickness and carefulness, increasing the costs resulted from equipment damage and finally providing low quality services [4]. Wound infection is a complication that affects the quality of life, as well as increasing the patient's costs. The complication width of wound infection could be different resulting in mild pain in site of injury to septicemia or even death. In order to properly dress, an injury history and examination should be taken, and then cleaning the wound is necessary. Normal Saline Solution is an alternative solution for wound washing. Povidone Iodine is a wide spectrum anti-bacterial antiseptic which is an alternative solution to treat infected wounds. Cleaning process is performed using a solution-smear pad, and care should be taken to avoid remaining cotton fibers and other materials in the wound to prevent the spread of infection to other sites. Nowadays, acute traumatic wounds must be washed by Normal Saline pressure so that the wound is debrided which is done by a drainage syringe, but sometimes it is done by surgical method where the wound is eroded and scrubbed using a Povidone Iodine-smear pad. In order to dress, we need dressing equipment including: sterile dressing set, a table, antiseptic and washing solution, leucoplast tape, safety box, infectious and non-infectious garbage waste

bins, and bedpan. Due to the requirement for dressing in hospitals and to increase the speed of process, two persons are required for each procedure in such a way that the first person does the procedure and the second is an assistant.

Materials and Methods

Automatic trolley for dressing and washing the wounds is designed and developed for the first time. This trolley comprises of two drawers for pads and bandages, shelves for serum and Povidone Iodine solution, and two waste bins which separate infectious and non-infectious garbage. Two sterile bedpans formed the trolley. The height of the trolley is adjusted with attention to the wound site using a dynamo and 12 volt electricity supply. Serum stand is placed at the top of the trolley, washing solution lies on and is mounted on the flexible tube after crossing the peristaltic pump throughout the serum set. Peristaltic pump increases the speed of serum fellow and when there is no more need of serum flow, it stops the flowing only by stop-pressing the foot pedal. In addition, an eye-sensor chamber is provided for antiseptic solution, and scrub enables the user to use them by him/herself without touching anything and remaining sterile. This trolley provides an auxiliary work surface to put more equipment on when it is needed. Flexible tube is used to connect washing serum set. To design a mobile unit which meets our needs while dressing, trolley patents registered in America and different companies were evaluated, and based on the materials and methods, designing project is started.

Automatic trolley for dressing and washing the wounds consists of Figure 1.

Results and Discussion

Conventional dressing trolley, as we can see in Figure 2 [5-26], is wheel tables providing maximum two shelves and sometimes drawers, waste bin and bedpan. Nurses can only put the necessary equipment on it and use them

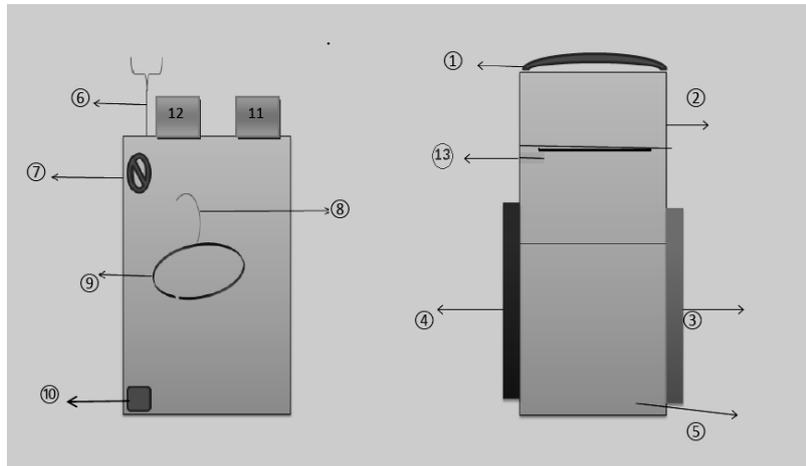


Figure 1: Schematic Automatic Trolley for Dressing and Washing the Wounds

1. Handle
2. Drawer
3. Yellow waste bin for infectious garbage
4. Black waste nib for non-infectious garbage
5. Shelves for serum and antiseptic solution
6. Serum stand
7. Peristaltic pump
8. Flexible tube to connect serum set
9. A place to put bedpan on it
10. Foot pedal for serum flow
11. Eye-sensor for scrub solution
12. Eye-sensor for Povidone Iodine
13. Auxiliary work surface



Figure 2: Dressing trolley has two shelves, waste bin and bedpan.

beside patients.

Royse et al. (1993) registered Medical in the Patent Registry Office of Australia. This trolley consists of drawers, shelves and a work surface [27]. Inderbitzin (2011) registered Medical Care Trolley which consisted of drawers, monitor and a work surface [28]. Chang et al. (2013) registered Medical trolley which provides a table to lay equipment and several shelves [29]. Shenzhen (2012) registered Trolley for Medical Equipment in the Patent Registry Office of America, which designed to install medical equipment [30]. Mr. Liang (2011) had registered Medical Equipment trolley consisting of drawers, shelves and a wide work surface which is similar to conventional emergency trolleys [31]. Due to many requirements for dressing, we have designed an equipped mobile unit to cover all the objectives of dressing and to increase the speed of doing procedure. In addition, because required equipment are comprised in the trolley, procedure is done quickly and the second

person is not required to assist.

Advantages of Automatic Trolley for Washing and Dressing the Wounds:

- Providing two waste bins for infectious and non-infectious garbage
- Comprised of electric height adjustable bedpan
- Peristaltic pump for washing
- Provided eye-sensor for scrub and antiseptic solution
- Need for small space
- Sterility condition is maintained
- Easily transportable
- Lack of need for the second person to assist
- Rechargeable
- Economical

Automatic trolley for dressing and washing the wounds is made up of stainless steel which is washable and sterilizeable. By the way, we have designed a fiber glass specimen which can be mass housing and commercializing (Figure 3).

This devise can be used at all hospital wards



Figure 3: Automatic trolley for dressing and washing the wounds which we have made of fiber glass

and clinics. Automatic trolley for dressing and washing the wounds has no counterpart and could be considered as a mass housing service. The system is not invasive without ethical considerations.

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Conflict of Interest

None

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