CASCADES

Environmentally Sustainable Opportunities for Health Systems

Primers

Clinical Ward Waste

Issue

Hospital inpatient units provide a continuum of care to patients who require hospitalization overnight or longer to stabilize symptoms and/or support recovery. Patients can receive this level of care in subspecialty units, intensive care units, as well as the emergency department. Collectively, these units can contribute to a significant portion of a hospital's carbon footprint due to a large consumption of resources (1). Beyond the environmental impacts associated with the production of these resources, the waste they generate upon disposal poses health risks indirectly through the release of toxic pollutants and pathogens into the environment (2).

Clinical waste and its by-products cover a wide range of materials. These can be divided into the following categories: infectious waste, pathological waste, biohazardous waste (sharps, chemicals), pharmaceutical waste, cytotoxic waste, radioactive waste, and general non-hazardous waste (3). The production of waste on clinical wards is inevitable in healthcare settings due to the sheer number of patients requiring inpatient hospital treatment (4); in Canada, there are approximately 57,000 inpatient beds on clinical wards, excluding Quebec (5). Individual patient needs are unique, and the care provided by the interprofessional healthcare team and the medical/non-medical supplies needed depend on the patient's presentation, acuity, and overall treatment plan.

Day-to-day activities for individual patients vary between clinical wards, but some common practices that may generate excess waste include – but are not limited to – the following:

- personal care/hygiene (soap, wipes, incontinent napkins, cleansing spray, briefs, lotion, tissues)
- use of personal protective equipment (PPE) (masks, face shields, disposable gowns, gloves)
- use of everyday items (Styrofoam cups, Styrofoam plates, straws, plastic cutlery napkins)
- medical procedures (syringes, needles, intravenous lines, intravenous bags, saline flushes, oxygen tubing, oxygen masks, foley catheters, foley kit, suction tubing, yankauers, blood collection tubes)
- wound dressing procedures (saline, gauze, dressing trays)
- administrative tasks (paper, ink, pens)

There is an imperative to better address the production and management of all of these forms of clinical ward waste. Education frameworks for environmental stewardship aimed at frontline healthcare staff have emerged; these can enable engagement in sustainable practices in healthcare settings (6), and also translate into broader advocacy work on behalf of healthcare professionals aimed at mitigating the climate crisis (7). However, while broad implications and solutions have been identified and suggested, there is little literature and evidence available regarding how clinical wards specifically contribute to the overall climate crisis. As a result, clinical ward waste across healthcare organizations continues to be of concern in efforts to build sustainable health systems.

This snapshot provides an analysis of clinical ward waste and what can be done at various system levels to mitigate and manage it effectively; this discussion is also relevant to other forms of healthcare waste. Key stakeholders can utilize the options detailed below to improve environmental sustainability across clinical wards and healthcare systems.

Stakeholders

Key stakeholders with a critical role in the reduction and management of clinical ward waste include clinicians, environmental staff, and organizational administrators. As nurses spend the greatest number of hours at the patient's bedside, they are uniquely positioned to identify, guide, and/or lead environmentally sustainable practice changes on clinical wards. However, all stakeholders must work collaboratively to facilitate and promote environmental stewardship in clinical wards through change initiatives. Creating effective and sustainable practice changes at the organizational and ward level requires strong support from these stakeholders, who can lead change by building awareness of how healthcare waste impacts the natural environment and communities, developing appropriate organizational policies, and establishing sustainable practice and process changes (4).

Options

Below is a snapshot of several strategies that may be used to decrease clinical ward waste and mitigate its broader impacts on the environment and communities. It is strongly recommended to have leadership support when pursuing these interventions to ensure success.

1. Questioning the culture of over-preparedness
2. Choosing isolation practices wisely
3. Managing single-use products
4. Segregating waste properly

Questioning the culture of over-preparedness

Healthcare's carbon emissions and other environmental impacts are often the cumulative result of deeply rooted practices that originated in patient's best interest. For example, a culture of over-preparedness, although well intentioned, can be a large contributor to waste. (8). Over-preparedness occurs because healthcare professionals such as nurses, physicians, and respiratory therapists are often trained and expected to be prepared in case of an emergency. This is apparent in high acuity settings, such as Intensive Care Units (ICUs) and Emergency Departments (EDs), where most decisions are anticipatory, and supplies and equipment must be readily available in the event of a deteriorating patient (8). Some practitioners may adopt the habit of opening supplies at the bedside to have easy access. However, this over-preparative practice comes at a cost: the infection control regulations from Infection Prevention and Control Canada state that all opened items—even those that have gone unused—must be disposed of when the patient is discharged or transferred and before a new patient enters the room (8)(9). These regulations, which are aligned with other international regulations, help to inform hospital policies and can further drive needless waste production (10).

There is a delicate balance between providing safe care for the critically ill patient and having too many medical supplies at the bedside, that often go unused. The following case example demonstrates the experiences of healthcare professionals who work in a Pediatric Intensive Care Unit (PICU) in Massachusetts, United States and their efforts to limit unnecessary supply waste.

CASE EXAMPLE

The Pediatric Intensive Care Unit (PICU) at Massachusetts General Hospital for children is a 14-bed medical/surgical ICU with approximately 1200 admissions per year. In order to address excessive waste on the unit and promote environmental stewardship and practice changes, a "Green Team" was created. The team included members of the interdisciplinary healthcare team, such as physicians, nurses, and respiratory therapists. In the formation of the green team, key partnerships were established with environmental services, infection control, and administrative staff. Over a three-week period, over 76 kg of unused medical waste was collected. Interestingly, 75% of waste collected came from isolation rooms. A Waste Limiting Checklist was developed to limit the number of supplies stocked in each room and motivate staff to be environmentally conscious (8).

2. Choosing isolation practices wisely

Patients who are admitted to inpatient clinical wards may be placed in an isolation room, depending on their presenting symptoms. Isolation precautions can include contact, droplet, and/or airborne precautions which require healthcare staff to utilize various forms of personal protective equipment (PPE) (i.e. gloves, gowns, masks) (8). As discussed above, nurses often bring excess supplies into patient rooms for providing basic care and when completing procedures such as intravenous therapy, respiratory therapy, and/or wound care due time/convenience (11). This practice is found to be more prevalent when patients are isolated due to the inconvenience of donning/doffing repeatedly if an item is forgotten (11). In such circumstances, the issue of excess supplies is exacerbated (11). As in the case example above, situating checklists outside of an isolation room where nurses can keep track of what items are in the room and what needs to be brought in could help address this issue. At a deeper level, however, the worsening wasteful practices of placing patients on isolation precautions merits consideration of the necessity of those precautions. Hospitals should review guidelines and policies around isolation such that only patients who present with high clinical suspicion of having a communicable illness are placed on isolation precautions (12). This would decrease the number of patients placed in isolation unnecessarily, thereby decreasing associated wasteful practices (12). Healthcare systems can consider this strategy to minimize their carbon footprint while still providing safe care to patients.

3. Managing single-use products

Single-use products in healthcare are seen as a necessity for infection control practices, yet these products have negative impacts in terms of both costs and waste (1). Opting for reusable products wherever appropriate has the potential to reduce cost, waste, and environmental impact and should be considered when greening hospitals. However, in instances in which a reusable alternative is not readily available, the sustainability of single-use products can still be improved (1).

According to the Healthcare Plastics Recycling Council (13), it is estimated that 20-25% of healthcare waste is plastic. A waste audit completed by Hsu et al. (9), found that the single largest category of waste in the ED was soft plastic, which is used in the packaging of products. Ordering items that require less packaging or purchasing common items separately from kits is an upstream approach which has potential for high waste reduction (9).

From a downstream perspective, healthcare institutions can adopt sustainable waste programs for single-use products. The case example below demonstrates a Canadian effort to address some of the most common single-use products on clinical wards: vinyl products such as oxygen tubing and masks, intravenous (IV) lines, and IV bags.

CASE EXAMPLE

The Vinyl Institute of Canada (VIC) (14), in partnership with Climate Change Canada, is funding a pilot recycling program called PVC 123 throughout the country that aims to divert products from landfills and encourage the recycling of polyvinyl chloride (PVC) medical products in hospitals (i.e., oxygen tubing and masks, intravenous (IV) lines and IV bags) (15). This program was first implemented in the operating room of a Toronto hospital, and due to the success of the initial pilot (during which over 80,000 pounds of recyclable PVC were expected to be diverted from landfills), VIC and Climate Change Canada are expanding the program to other hospitals and units (15).

COVID-19 has heightened the importance of this effort as a greater number of patients requiring oxygen therapy and intravenous treatment has increased the use of these products.

4. Waste segregation

Improper segregation of waste in healthcare settings can have environmental consequences as some forms of waste, such as sharps and biomedical waste, require more stringent forms of disposal. In Canada, current segregation of waste in hospitals is regulated by federal and provincial legislation, such as the Environmental Protection Act. While policy action can both incentivize and penalize improper waste segregation, there are many opportunities to improve segregation practices on hospital wards that can be implemented with relative ease. The proper segregation of clinical ward waste can reduce pollution, excessive use of supplies, and costs (9)(16).

Colour-coded waste segregation matrixes are used in hospitals and clinical wards to indicate the correct containers for proper disposal of all streams of biomedical and non-biomedical waste. Below is an image demonstrating a waste segregation matrix from Daniels Health (19).

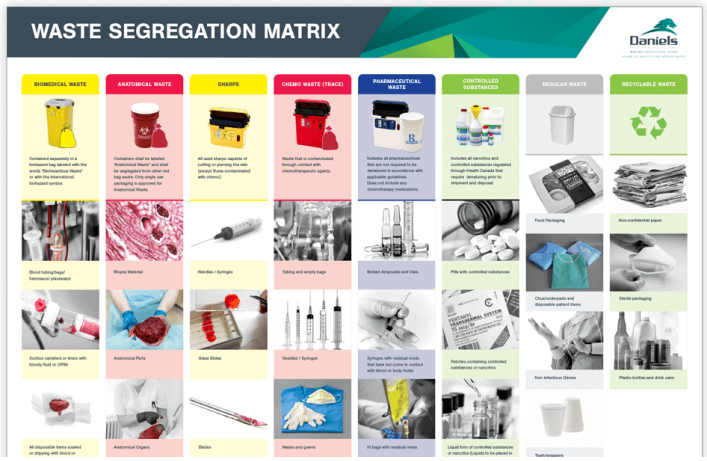

Figure 1. Example of colour-coded waste segregation matrix.

In theory, waste segregation matrixes in hospitals offer a systematic way to ensure waste is being properly managed. However, a waste audit done by University Health Network in Ontario in 2011 demonstrated that it is not standard practice to have recycling bins available in inpatient rooms (20). Thus, potentially recyclable items end up in landfills. In addition, the literature demonstrates that locations with high patient turnover and poor processes for segregating waste ultimately results in improper waste disposal. The geography of wards is therefor an important consideration to ensure proper waste segregation (21)(22)(9).

Even when matrixes are present, there must be accountability from organization leaders to evaluate these processes. Completing waste audits on individual clinical wards, as in the case example below, is an opportunity to assess the supply and source of waste, and to find opportunities to facilitate change toward more sustainable practices (9).

CASE EXAMPLE

Toronto Western Hospital is a teaching hospital that is part of University Health Network (UHN). A waste audit was completed in 2011 on two inpatient medicine units with a combined total of 60 beds. Recyclable materials and general garbage were found to be segregated in accordance with government regulation and the organization's policy, which states that UHN staff are responsible for preparing and disposing of recyclable materials and general waste. All non-hazardous waste is disposed into regular garbage, and recycling is sorted into paper products and metal/glass/plastic products. Through the completion of a waste audit, it was made evident that recycling bins were not available to healthcare staff in inpatient rooms, resulting in these products being placed in garbage. If proper recycling took place on inpatient wards, the projected total waste diverted from landfill would be approximately 1.832 tonnes/year for these two inpatient units alone. Recommendations at the time included ensuring optimal arrangement of waste segregation bins and signage in order to allow for easier access and proper recycling of products. (20)

In addition to tools like waste matrices and waste audits, an important component of proper waste segregation is the education of frontline staff who are present on clinical wards on a daily basis (17)(9). Providing education and creating a culture on clinical wards where waste segregation is seen as a priority can help develop sustainable practices (9)(11). Education on clinical wards can take place through daily huddles, in-services, emails, and through daily informal communication.

Although education is an important component, it is insufficient if providers lack the bandwidth to implement what they have learned. In 2019, a pilot program to reduce waste in an emergency department in Australia found that efforts to improve waste segregation were met with poor compliance as healthcare staff found these practices time consuming when faced with a high acuity patient workload and environmental staff were mixing different waste bins together to shorten the process (18).

Nurses specifically are in a unique role to mitigate ward waste as they spend the greatest number of hours on clinical wards when compared to other healthcare professions (17). However, the average nurse-patient ratio on clinical wards is 4-6 patients to one nurse. Patient workloads in conjunction with competing priorities and staffing shortages often leads to burnout among nurses, leaving little opportunity to prioritize environmentally sustainable practices. Thus, in addition to educational efforts, healthcare leaders should look at prioritizing appropriate provider-patient ratios to promote environmental stewardship and support the providers' ability to participate in sustainable practices.(16).

METHODS STATEMENT

This series provides snapshots on key areas in sustainable healthcare. These snapshots are the result of rapid literature reviews and related desk research with review by content experts where possible. Snapshots are not intended to be comprehensive nor exhaustive. Updates to this document and any comprehensive reviews will be posted on the CASCADES website.

VERSION HISTORY

Version No.	Date	Contributors
1	November 2022	Research and writing: Navisha Weerasinghe, RN, CASCADES Research Assistant Clinical review: Eryn Vandepoele, RN, BSc, BScN

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