



Green Purchasing at Family Health Centers

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EXECUTIVE SUMMARY

This report is designed as a guiding document for Family Health Centers (FHC) to increase its sustainability through the application of green purchasing strategies. These strategies can be broken up into two subcategories: the documentation and management of expired medical waste and considerations for adopting a centralized purchasing system. In this report, we provide research collected from a literature review of sustainable healthcare purchasing and waste tracking systems and interviews conducted with different stakeholders in a green purchasing transition at FHC. Based on our research, we have recommended strategies to implement a new system to document and reduce unused expired medical products as well as a centralized purchasing system which includes an updated inventory management software, a central warehouse with the ability to receive supplies for all FHC clinics, and a more efficient transportation system to distribute supplies. These recommended strategies are focused on fitting the needs and available resources of Family Health Centers.

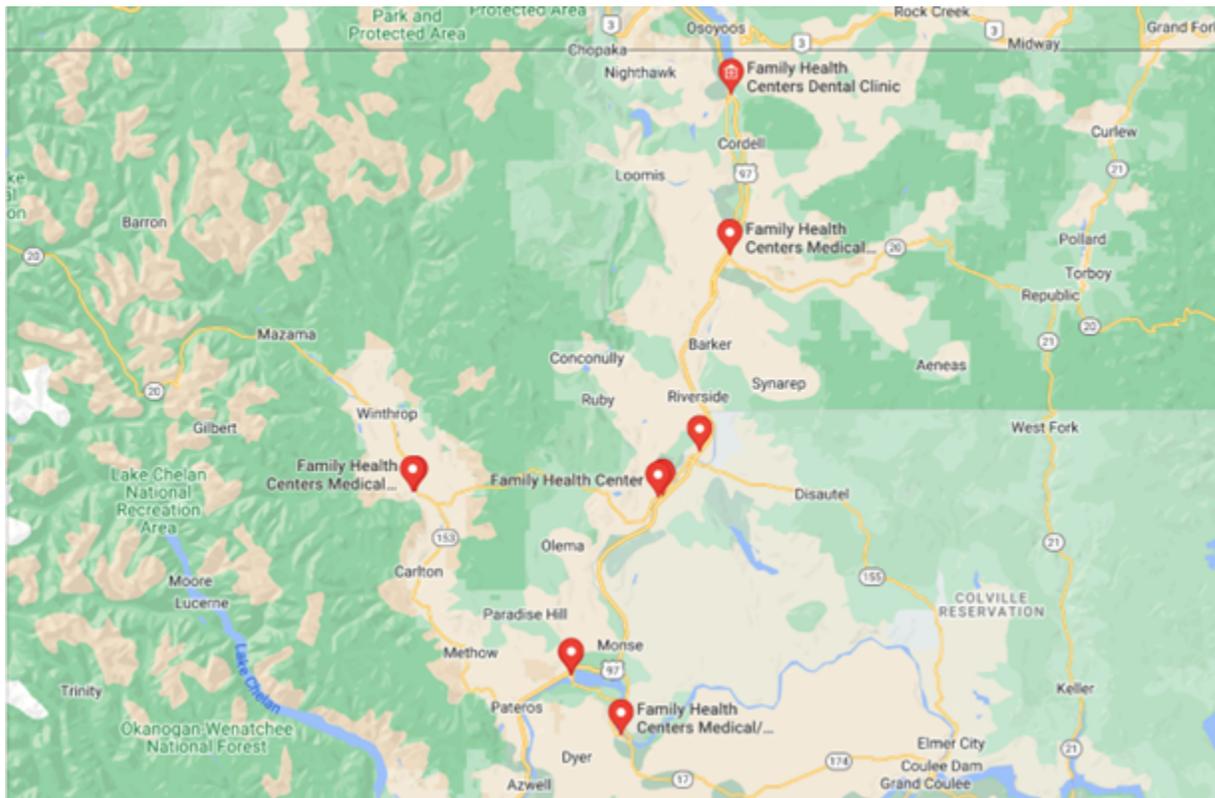
Family Health Centers do not currently have a way to track used and expired goods and thus cannot effectively determine the effect of the medical supplies being wasted due to expiration. Tracking these supplies before they expire and once they become waste is the next step toward a more sustainable FHC. Additionally, each clinic is currently ordering products separately which creates more transportation emissions waste, packing waste, expired product waste, and financial waste. Without sustainable purchasing at FHC, the waste generated and the extra cost is passed onto FHC patients. With a move to sustainable purchasing, Family Health Centers could increase their efficiency and financial savings, reduce their environmental impact, and expand their ability to provide essential services to a larger number of people, furthering the immense effect that they already have on the communities of North Central Washington.

INTRODUCTION

Sustainable development, as defined by the Brundtland Commission, is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (United Nations, 1987). It is often represented by the three-pillar framework that places sustainability at the intersection between social, economic, and environmental goals (Purvis et al., 2019). Healthcare is an important piece of this as it is essential for the overall social and economic well-being of a society. However, healthcare has often been left out of the environmental conversation despite it being estimated to cause up to five percent of carbon emissions globally (Leiva, 2023). To effectively combat climate change, all sectors need to examine their environmental impact and implement more sustainable practices, including and especially the healthcare industry.

This report takes a deeper look into expanding the sustainable practices of Family Health Centers (FHC), a nonprofit 501(c)3 organization that offers health services to residents of rural Okanogan County and parts of Douglas County in Washington State. FHC was incorporated in

1985 and has expanded to six medical sites, four dental clinics, and two mobile units that serve a population of around 44,000 people. FHC also has a highly committed staff dedicated to serving their communities. Despite their small size, these health clinics fill a critical need in North Central Washington and provide so many rural residents with essential health services. Additionally, FHC offers resources and programs for low-income patients without the ability to pay for care. One of these programs is FHC's mobile clinics that they use to reach patients that reside in very rural parts of the county and don't have a method of transportation to get to a clinic. However, operating in a rural space and a persistent poverty county presents challenges in providing health care. Some of these include a lack of funding, a shortage of staff, limited time and resources available, and a significant distance between clinics and patients who require care.



Map of Family Health Centers' medical and dental locations

Family Health Centers has expressed an interest in implementing more sustainable practices into their operations, despite their lack of time and resources relative to some more urban clinic systems. They have created a Green Team made up of staff from a variety of backgrounds including behavioral health, IT, and clinic leadership to introduce solutions that address the degradation that results from current unsustainable operations systems. They have identified inefficiencies around expiration date management and the current purchasing system. For example, each Family Health Center clinic currently orders all their medical and office supplies separately by submitting an Excel spreadsheet to a central purchasing staff with their supply needs for the week. Issues from this current system include unnecessary medical supplies expiring and being thrown away because a single clinic cannot use the entire order in time, an

excess amount of packaging wastes, an unnecessary amount of carbon released from the transportation of each order to the individual clinics, and a higher cost associated with not ordering supplies in bulk and throwing away the expired material. FHC's current procurement methods are also unorganized making it hard to find data, creating a reliance on individual staff members' learned knowledge (presenting problems when staff go on vacation or leave FHC), and increasing the likelihood of a purchasing mistake that could have a significant impact on patients who require health services.

These observed inefficiencies provide the perfect opportunity to implement a more comprehensive plan for tracking and managing expiration date waste and a more organized centralized order system that combines all clinics. This would increase sustainability efforts in the individual communities as well as more broadly as more and more healthcare facilities look to lessen their environmental impact. Additionally, a more comprehensive system will make staff members' already difficult jobs a little easier and provide FHC with a cost savings benefit that could ultimately trickle down to customers.

This study will examine the environmental impacts associated with Family Health Center's current method of procurement and provide recommendations for a tracking system to monitor medical supplies wasted due to expiration and a new centralized purchasing system for the network of clinics in order to maximize efficiencies and reduce waste.

In 2015, all United Nation Member States adopted the 2030 Agenda for Sustainable Development which outlined 17 goals known as the Sustainable Development Goals (SDGs). These goals aim to tackle some of the world's biggest problems in all three of the sustainable development pillars: social, economic, and environmental (The 17 Goals, n.d.). Of these goals, this project is best represented by goal 3 (good health and wellbeing), goal 9 (industry, innovation, and infrastructure), goal 11 (sustainable cities and communities), and goal 12 (responsible production and consumption). These SDGs help guide the sustainable solutions for Family Health Centers that are proposed in this report. Following the framework provided by the SDGs demonstrates the connection between local sustainability and the overall health of our communities, society, and world.

METHODOLOGY

The creation of a new centralized ordering and waste tracking system aims to reduce the financial burden Family Health Centers face, as well as increase efficiency of clinic communication and in turn reduce waste produced by clinics. To collect data and insight to create these systems, several methodologies were utilized. Interviews and in-depth research of case studies were conducted to provide qualitative data for the evidence-based approach of formulating a centralized purchasing and waste tracking system.

Scheduled by the administration assistant, several interviews were conducted to collect primary data regarding current centralized purchasing and inventory tracking methods utilized by the clinics. Informational interviews took place in person and online via Microsoft Teams. Regarding the in-person interview, the research team partook in a tour of the Twisp Family Health Center Clinic, where in-depth conversations concerning current system usage took place and observations of inventory location, storage, and waste methods were collected. The goal of this interview was to gain insight into the effectiveness of current systems and commonalities with other clinics, as well as propose new ideas to individuals who use the current systems with explanations of why these systems are important in terms of environmental impact and cost savings. Additional interviews took place to collect insight from the individuals that utilize the current purchasing and ordering system. These interviews were conducted with the purchasing team of Family Health Centers who provided information relating to the effectiveness of purchasing processes, challenges of current methods, affordability, and feasibility of new methods.

Secondary data was collected via research of case studies to ensure an evidence-based approach to the recommendations of new system usage. The purpose of the case study research was to determine how medical facilities address the process of centralized ordering and compare it to the current systems utilized by Family Health Centers. Information regarding the effectiveness of centralized purchasing systems employed by health clinics across the United States was collected. Data from case studies was gathered through the lens of applicability to Family Health Centers, due to the rural aspect of the clinics that sets them apart from their metropolitan counterparts, which most case studies are centered around.

RESULTS

To research centralized purchasing and medical waste, we began by finding information on the scale of medical waste in the United States. We also looked at several case studies of medical establishments that had multiple centers and transitioned from a system of purchasing separately to one that was more centralized. Finally, we interviewed several employees from FHC to determine what the need was for waste tracking and centralized purchasing systems. These interviews also provided us with the opportunity to run some of our ideas by people working in the clinics to assess the feasibility of our recommendations.

Medical Waste

The accumulation of medical waste in the United States and globally remain to be a major contributor to pollutant exposure in the environment, and consequently, harm to public health. It is estimated that annually, the United States generates over 3.5 million tons of medical waste (Attrah et al., 2022). While proper disposal and swift increase in quantity of medical waste has been a problem for decades, the COVID-19 pandemic has been observed to increase the amount of waste at unprecedented rates (WHO, 2022). According to the World Health

Organization (WHO), 87,000 tons of personal protective equipment (PPE) were distributed globally between March 2020 and November 2021, most of which was estimated to end up as waste (WHO, 2022). WHO additionally reported the distribution of 140 million test kits, which create 731,000 liters of chemical waste and 2,600 metric tons of non-infectious waste. Globally, 144,000 tons of excess waste from the COVID-19 vaccine has been produced since the release of the vaccine (WHO, 2022). While these metrics reflect the impacts of COVID-19 alone, it displays the increasing need for proper waste management and action to reduce the impacts on the environment and public health.

The disposal of waste in the medical and health care sector contributes to elevated levels of greenhouse gas emissions through the most commonly used practice of waste disposal, incineration (Attrah et al., 2022). Incineration of medical waste produces toxic emissions such as Polychlorinated Dibenzo-Dioxin/Furan (PCDD/Fs) and Polycyclic Aromatic Hydrocarbons (PAHs) that are considered carcinogenic and contribute to the earth's carbon footprint (Taghilou et al., 2022). Aside from gas release, the incineration process also produces ash containing heavy metals that seep into the soil, contaminating plants and wildlife (Attrah et al., 2022). The vast quantity of waste produced in the medical and health care sector presents an alarming display of the impacts humanity has on the environment and calls for attention to reducing levels of waste as well as alternative methods for waste disposal.

The financial cost of current mismanaged waste systems in healthcare also provides a strong argument for implementing strategies to assess and reduce waste. For example, a survey conducted by Cardinal Health and SERMO Intelligence in 2015 found that supply chain management was the second largest expense for healthcare facilities nationally (Cardinal Health, 2015). Based on the information collected in the survey, Cardinal Health noted, "The current approach to supply chain management at most hospitals requires intensive staffing to handle multiple, often redundant systems that lack data sharing and transparency needed to prevent waste" (Cardinal Health, 2015). This description largely fits FHC's procurement and inventory tracking system, emphasizing the need for a more data-focused and transparent system. Further, a 2019 study found that "the estimated cost of waste in the US health care system ranged from \$760 billion to \$935 billion, accounting for approximately 25% of total health care spending" (Shrank et al., 2019). Waste in health care doesn't just have a significant environmental impact, but also a large cost that only increases the cost of providing health care in a country where countless people struggle to afford care in the first place.

Waste from healthcare facilities can come in many different forms including used medical devices, single-use items, paper, and even food waste. Family Health Centers is not currently tracking waste in clinics and health care facilities. It was brought to our attention that this may be a contributor to increased waste quantity and create an expanded financial burden for Family Health Centers. However, based on our interviews, we have concluded that FHC does not have the capacity currently to track all forms of waste. Given that and our limited timeline for this report, we will just be focusing on the medical supplies that is thrown away due to it passing its expiration date. In the usage of an inventory and waste tracking system, clinics can monitor products entering and leaving the facility via waste disposal, which can be quantified and therefore, areas of improvement displayed.

Centralized Ordering (Case Studies)

University of Missouri Health Care (MU)

The University of Missouri Health Care system, based out of Columbia, Missouri is an example of a system of medical establishments that switched over to a system of centralized ordering after starting out with each individual center making purchases for themselves. The system consists of four campuses spread throughout the state of Missouri. With a focus on supply chain efficiency, MU decided that, in addition to centralizing purchasing for all of their medical centers, they would integrate their university supply chains with the medical centers as well, given their close ties as medical education facilities.

Annually, this switch to a more centralized purchasing system has been predicted to save MU's healthcare facilities and campuses around \$20-25 million annually. Additional cited benefits of the centralized healthcare system include reduced expenses, shared competitive bidding events, better ability to handle contracts, and reduced distribution costs (GHMarketing, 2019).

New York City Health and Hospitals Corporation (HHC)

Composed of eleven hospitals, five long-term care facilities, and numerous community healthcare centers, HHC is another example of a healthcare system that made a switch to centralized purchasing. Previously, 40% of purchasing was done locally and was based on the needs of individual facilities rather than considering the entire system. The switch to centralized purchasing included standardizing the list of products that were able to be ordered from within the system in order to reduce waste and duplication.

Reported benefits from this switch included \$50 million in savings in the first year following implementation as well as a maximization of bargaining power and an increased ability to negotiate with supply companies (*New Centralized Procurement Process Will Cut Costs and Bring Long-Term Savings to HHC*, n.d.).

Interview Results

As part of our research process, we conducted interviews with employees of Family Health Centers. Because none of the members of our team had practical experience working in healthcare settings, it was helpful to get feedback on the feasibility of the areas for improvement that we identified from people who knew about the daily operations of the clinics. Kate Posey, from Behavioral Health Outreach served as our sponsor and also gave us insights regarding FHC's Green Team group and sustainable actions that were already being taken by the clinics.

We also met with Kevan Coffee, Delaney Strutzel, Kelly Lazelle, Kristin Hosler, and Marcie Howell. From these interviews, we were able to deepen our understanding of suppliers of medical products, the way that the purchasing department operates, how expiration dates on medical supplies are managed, and possibilities for storage space and transportation related to medical supplies.

Suppliers

Medline is the main supplier for FHC. While much of the ordering used to come from Henry Schein, Medline offers free shipping with order minimums, giving FHC a greater incentive to order from them. However, supplies that are needed and are not available through Medline are still purchased through Henry Schein. While representatives from FHC thought that it would be too complex to order from multiple suppliers in the hopes of sourcing more eco-friendly products, if there was a single supplier that was able to provide more sustainable options, looking into switching would be a possible alternative (D. Strutzel, Personal Communication, 2023, July 28).

Purchasing Systems

During our visit to the Twisp Clinic, we brought up the idea for one spreadsheet to share between all clinics rather than having separate purchasing spreadsheets for each clinic. Those we talked to thought the idea was feasible. This would be a good “middle ground” way to begin to centralize the ordering system without the need to purchase software. (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21).

In a meeting with our project sponsor, she brought up a purchasing software that FHC had previously tried to implement called Hybrent. Although it was almost approved, it was found to be not compatible with FHC’s accounts payable software. With the implementation of FHC’s current accounts payable software (Sage) Hybrent would now be compatible. However, the funding that was secured to purchase Hybrent has since been allocated to other areas. (K. Posey, Personal Communication, 2023, July 14). Additionally, another barrier that was identified in the implementation of Hybrent was that someone would need to take the time to manually enter all of the medical supply information into the software which was not something that any of the employees at the time had the capacity to do. In another interview, it was mentioned that looking into any recent changes that may have been made to Hybrent to make this process easier would be a good idea. Additionally, it was recommended that we look into the compatibility of Hybrent with the electronic medical record system “Athena” if we have the time (M. Howell and D. Strutzel, Personal Communication, 2023, July 28).

Expiration Dates

During our clinic visit, we also discussed the potential of having a shared document where excess supplies could be listed when they are nearing their expiration date. This idea was also received well by those talked to at the clinic. We also discussed how the recent switch from

Henry Schein to Medline (both companies from which medical supplies are purchased from) eliminated some of the expiration date waste as Medline prints expiration dates on fewer products than Henry Schein. This is significant for products such as tongue depressors or cotton swabs, which have a shelf life that does not warrant the need for an expiration date. One idea we had that was deemed unrealistic in the experience of those we talked to at the clinic was having medical providers track and log supplies that they used during appointments to better understand what is being thrown out. However, those at the clinic informed us that with limited time to see patients and busy schedules, this would not be an efficient use of their time and would probably not get done. However, they thought a more reasonable way to track waste would be keeping track of things that are thrown out outside of appointment times (for example, in inspections for expired products) (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21).

One thing we talked about that was already being done regarding expiration dates was having clinics talk between themselves when a set of medical supplies was about to expire. If one clinic had too many of a particular supply and another clinic needed some, small quantities of these could be shipped in personal vehicles already traveling to another clinic or through the courier service totes. When we brought up the idea of expanding this system to be digitized into a spreadsheet that all of the clinics had access to, this was received well. Additionally, we learned that the clinics utilize a “first in, first out” method of inventory, allowing for products that will expire sooner to be used first (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21).



Inventory space at Omak Family Health Center Clinic

Storage Space

In our tour of the clinic, we identified that medical supplies were stored in the back of the clinic on shelves. Although the building itself is climate-controlled so nothing will freeze or melt, some of the only medical supplies at the Twisp Clinic that required refrigeration or special storage were vaccines and some lab tests (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21). In terms of a location for a centralized storage space, those that we talked to shared that Omak would be best because it is the most central of the clinics. However, because storage space in the clinics is already limited, they thought that an auxiliary storage space would be necessary. We also learned that other medical establishments that have a warehouse as a part of their centralized purchasing system have a warehouse manager to run things. It was also brought up that FHC could hire an outside group to transition to the new system rather than having employees already short on time trying to do it (M. Howell and D. Strutzel, Personal Communication, 2023, July 28).

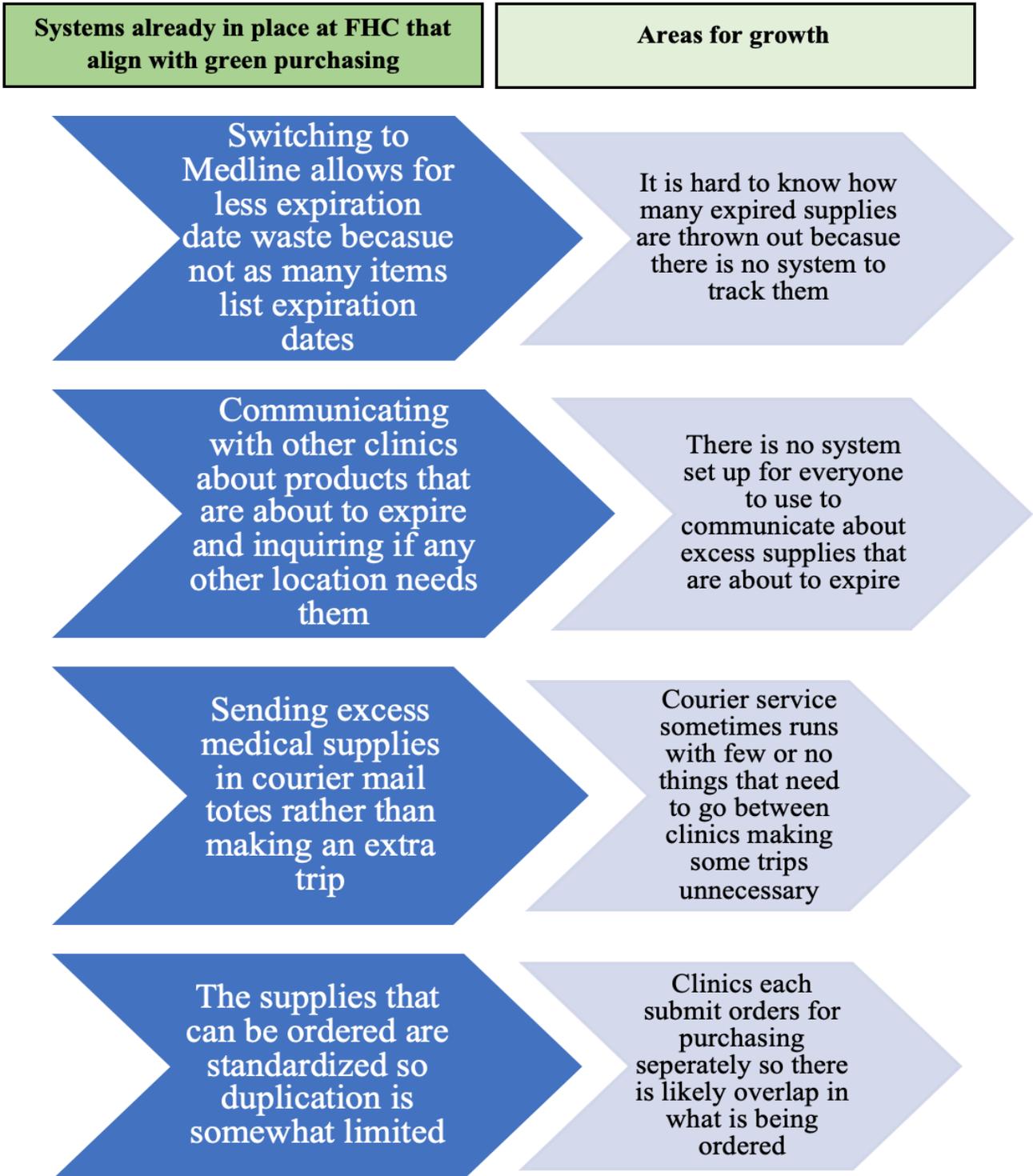
Transportation

During our clinic tour, we learned about a courier service (Brent and Sons) that runs daily between clinics and drops off totes of mail. Occasionally, a limited number of medical supplies can be shipped through the totes as well (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21). However, when we inquired in another interview if this was a way to distribute the volume of medical supplies that would be required should a centralized ordering system be implemented, they did not think that this would be realistic. Additionally, FHC is charged by the weight of the totes, so adding more weight into them would cost more. Because the service FHC is paying for is a mail one, a service more aimed towards bigger deliveries (either through Brent and Sons or another company) would need to be investigated. We learned that, more often, employees are aware of where people are driving in their daily commutes and have found it more efficient to ask them to take things with them that need to go between clinics (M. Howell and D. Strutzel, Personal Communication, 2023, July 28).



Key Interview Takeaways

Based on these interviews, we came up with areas of the FHC system that we identified as being aligned with green purchasing and potential areas for growth to explore:



RECOMMENDATIONS

Expiration Date Tracking and Management

Improper management of supply chains and purchasing can result in excess products and excess waste, creating environmental degradation as well as a significant cost burden for Family Health Centers. Since FHC does not currently have a system for tracking what is thrown away due to expiration, there is no way to provide an accurate measure of cost, either environmental or financial. This means developing and implementing a system to track what is wasted is even more pertinent, both for enhancing understanding around what is actually wasted, and for creating a safer, more organized system that makes it easier for healthcare providers to do their jobs.

Name	Date	Expired Item	Quantity	Disposal Method	Notes

Example expiration date waste tracking chart

The first step to reducing cost and increasing sustainability relating to expiration date supplies loss, is tracking it. There is a range of tracking systems from highly optimized digital systems to simple manual ways of tracking waste. For FHC, simple is likely the most realistic option. Managing expiration date waste does not have to be expensive, complicated, or a significant time requirement. The most important thing is that every time an expired item is thrown away, it is put into writing. A simple chart in a strategically located area, like the inventory supply room, would serve as a great option for tracking this waste. Possible columns could include name of witness, date, item thrown away, amount, and disposal method (DateCheck Pro, n.d.).

The most important step in implementing any kind of expiration date management system is getting all staff on board with the new process. This is crucial for preventing inaccurate data which can lead to swayed decisions and ultimately potentially impact the health of patients. For this to happen there needs to be adequate training of employees on new systems as well as leadership that is committed to the cause and ready to follow through (DateCheck Pro, n.d.).

Once FHC begins tracking expired medical waste, they can gain a better understanding of what is wasted, and the cost associated with that. From there FHC can begin to take steps to reduce this waste and set future goals given the newly acquired data. One simple strategy to reduce expired medical supplies is rotating items that are close to expiration to the front of the shelf, following a First in First Out (FIFO) strategy often used in restaurants. Our tour of the

Twisp Medical Clinic revealed that they already use this waste mitigation technique, other FHC clinics may as well. Another waste reduction strategy is labeling products that are close to expiration, this encourages the items to be used first and alerts staff to be extra cautious with the labeled supplies to ensure that it has not passed its expiration date. Lastly, communicating with other clinics when there is an excess of supplies that are close to expiring so those supplies can be distributed to clinics that will use them can significantly reduce the number of medical supplies wasted. Family Health Centers already do this on an informal level, but continuing this practice and streamlining the process with a centralized ordering system would help to further increase the benefit.

The above strategies all address reducing the number of expired products that need to be thrown away, but there are ways to reduce environmental impact even after a product has expired. For example, health centers should encourage medical vendors to become partners in reducing waste by negotiating which items can be returned or exchanged for credit when they are expired or close to expiring. These items should also be tracked (DateCheck Pro, n.d.). Family Health Center's primary supplier is currently Medline which does not seem to have an option for this. However, this option should be kept in mind in case an opportunity for negotiation occurs in the future. Another great option is sending waste to a reverse distributor registered with the U.S. Drug Enforcement Administration (DEA). A reverse distributor is a person or group that takes unused, expired, or damaged medical supplies and then either exchanges them back to the manufacturer for credit (Practice Greenhealth, 2019). This is a simple way to foster a more circular economy and ensure that the value of unused medical supplies is still being extracted rather than just thrown away where there is a greater potential for pollution.

Overall, tracking expiration date-related medical waste is a simple way to better understand FHC's impact and potential strategies for reducing waste, both in medical supplies and packaging, and saving FHC's time and resources. These expiration date tracking and management recommendations are summarized in the table below.

Expiration Date Management Recommendations

- Track supplies thrown away due to expiration
- Continue FIFO method of inventory
- Label soon to be expiring products
- Communicate with other clinics when there is a supply excess or need
- Attempt to find more sustainable solutions for expired supplies (negotiate with vendor, reverse distributor, etc.)

Centralized Purchasing

Purchasing System

Centralized ordering allows health centers to pool their purchasing power and negotiate better deals with suppliers. By consolidating orders, family health centers can take advantage of bulk discounts and reduce unit costs for essential supplies. This cost-saving measure can lead to significant financial savings, allowing the health center to allocate resources to other critical areas of healthcare, infrastructure, or patient services.

With a centralized ordering system, family health centers can streamline their procurement processes. Instead of individual departments handling their purchases separately, a centralized system ensures a more efficient and standardized approach. It reduces time spent on comparing prices, and placing orders.

A centralized ordering system can contribute to reducing the health center's environmental footprint. By optimizing orders and minimizing waste through better inventory management, the system can help prevent over-ordering and excess stockpiling. This leads to reduced resource consumption and lower waste generation, promoting sustainability and responsible consumption practices. Additionally, the potential for bulk orders can lead to reduced packaging materials and transportation-related emissions.

A well-coordinated centralized ordering system can enhance the health center's ability to respond effectively to community needs, especially during emergencies or times of increased demand. With a centralized approach, the health center can maintain adequate stock levels of critical supplies, ensuring continuity of healthcare services in challenging circumstances.

Warehouse

To optimize Family Health Center's supply chain operations, we are recommending several key aspects. Firstly, we recommend evaluating strategically located warehouses that can offer optimal convenience to all clinics while also minimizing transportation distances. Our recommendation involves the purchase or lease of a dedicated warehouse facility that would serve as a centralized supply hub for all inventory needs. This hub would streamline the procurement process, enable bulk ordering, and improve overall supply management for our individual clinics.

By having a central location for supplies, we can optimize transportation and delivery routes. This will not only reduce transportation costs but also minimize the environmental impact of our supply chain operations.

Distribution Strategy

To further enhance our distribution processes, we recommend a comprehensive distribution strategy. This strategy revolves around the development of a meticulously crafted

distribution plan, which will facilitate a seamless and efficient supply pick-up process for every individual clinic. This approach is designed to foster a smooth flow of supplies, minimizing any potential disruptions in the clinics' operations. A distribution strategy goes hand in hand with purchasing a warehouse.

Transportation

We recommend implementing a well-coordinated transportation system as part of the operational strategy. This system would prove instrumental in optimizing our delivery routes, ultimately leading to a reduction in travel time, minimized fuel consumption, and notable cost savings across our operations. By strategically planning and coordinating transportation efforts, Family health centers can significantly enhance efficiency and sustainability while ensuring timely and seamless deliveries to our intended destinations.

Inventory Management System

Additionally, we recommend exploring implementing a robust inventory management system that will revolutionize how we handle supplies. This advanced system will empower real-time tracking, automated reorder points, and proactive alerts for items that fall below specified stock levels. By embracing this technology, clinics will be less likely to face shortages and can continue providing uninterrupted care to patients. This software can be combined with the centralized purchasing system.

Software System: Hybrent vs Google Sheets

Hybrent and Google Sheets offer distinct advantages and drawbacks for managing supply chain operations within family health centers. Hybrent's specialized software is tailored to healthcare needs, providing real-time tracking, automated reorder points, and compliance assurance. Its integration with centralized purchasing ensures optimal stock levels and efficient supplier communication, promoting cost savings, operational efficiency, and regulatory adherence. Additionally, Hybrent's reporting, and analytics tools enable informed decision-making and continuous improvement. However, Hybrent's implementation may require initial investment and staff training, and its complexity could lead to a learning curve (K. Hosler and K. Lazelle, Personal Communication, 2023, July 21).

In contrast, Google Sheets provides a simpler and more accessible option. It allows for basic inventory management, collaboration, and data entry, suitable for the smaller size of family health centers with fewer supply needs. Yet, it lacks the advanced features and tailored healthcare capabilities of Hybrent, potentially leading to suboptimal inventory control and regulatory compliance. Moreover, Google Sheets may become unwieldy as supply chain operations grow, and its limitations in automation and real-time tracking could hinder efficiency gains. In conclusion, while Hybrent offers comprehensive and specialized solutions, Google

Sheets provides a basic alternative that may suit smaller health centers, though with potential limitations as operations expand.

As an illustrative example, we have developed a practical solution using Google Sheets to enhance supply chain management within our family health centers. In this system, we have established two distinct spreadsheets to address specific needs. The first spreadsheet serves as a centralized platform where each clinic can efficiently upload information about their soon-to-expire items. This sheet fosters seamless coordination among clinics, enabling them to collaboratively manage and address items nearing expiration. This proactive approach ensures timely action and minimizes waste. The second spreadsheet functions as a straightforward tool for clinics to track their purchasing activities. This basic yet effective sheet allows clinics to monitor their procurement processes, helping them maintain a clear overview of their inventory and expenditures. While providing a user-friendly interface, these Google Sheets exemplify an accessible approach to supply chain management, promoting enhanced communication, coordination, and efficient tracking for the overall improvement of our healthcare operations.

Here is a link to the live spreadsheet:

https://docs.google.com/spreadsheets/d/e/2PACX-1vT2CZ8b9H-6SdaOdEqgr-zJXrDJgF_R2ouqlX9WGP_E9ffwC-LnOLF5AHb5ZEMLeuLhSw5csKKkQTmX/pubhtml#

Omak	Twisp	Brewster	Bridgeport	Tonasket	Excess Supplies	Instructions	Notes/Questions
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Spreadsheet tabs for each clinic

Items	Quantity	Quantity type	Exp date	Clinic	Available	Requested by	Notes
Masks	3	Individual	8/24/23	Brewster	NO	Brewster	
Vaccine	1	Case	8/9/2023	Twisp	NO	Omak	
Stethoscope	4	Box	8/31/2023	Bridgeport	YES	Brewster	
Gloves	20	Individual	9/6/2023	Brewster	NO	Tonasket	
pencils	21	Box	11/2/2023	Omak	YES	Brewster	
Paper	2	Case	10/2/2023	Twisp	YES	Omak	
Masks	3	Individual	8/16/2023	Brewster	YES	Twisp	
Vaccine	1	Box	9/6/2023	Bridgeport	YES	Tonasket	
Stethoscope	4	Case	11/2/2023	Tonasket	YES	Omak	
Gloves	20	Box	10/2/2023	Omak	NO	Twisp	
pencils	20	Individual	8/16/2023	Twisp	NO	Brewster	
Masks	20	Box	8/24/23	Brewster	YES	Tonasket	
Vaccine	20	Individual	8/9/2023	Omak	YES	Brewster	
Stethoscope	20	Box	8/31/2023	Twisp	YES	Omak	
Gloves	20	Case	9/6/2023	Brewster	YES	Twisp	

Spreadsheet tab sharing for excess items

Staff Training

Recognizing the importance of a smooth transition, we recommend providing comprehensive training to clinic staff. This training will not only introduce the new supply ordering and pick-up processes but will also equip the staff with the necessary skills to navigate the centralized system effectively. By investing in proper training and support, this would help ensure that the transition to the centralized supply system is seamless and well-received by all clinics involved.

Centralized Purchasing Recommendations

- Consolidate orders in a centralized purchasing system through a combined Google Sheets or a software program such as Hybrent
- Order from suppliers in bulk to maximize discounts and minimize unnecessary duplications of orders
- Store inventory in a central warehouse and distribute supplies to clinics
- Digitize inventory tracking system
- Train staff in any new centralized ordering or inventory practices

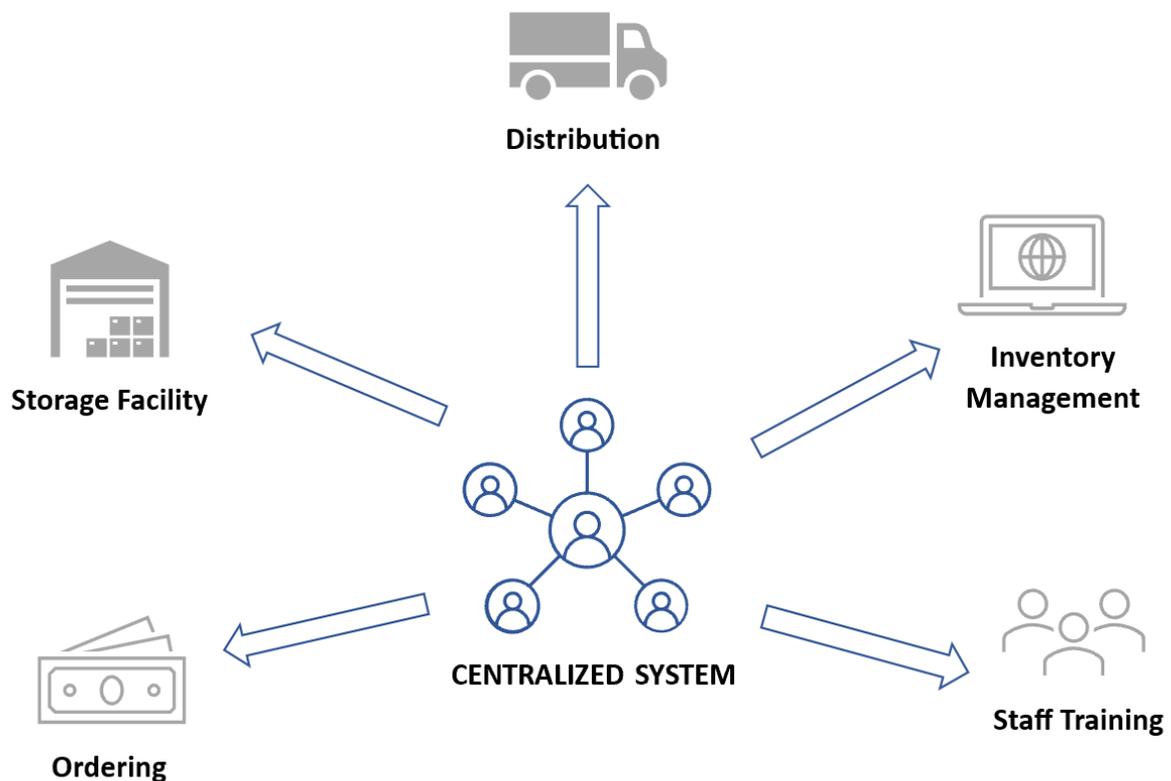
Further Research Needed

We propose that further research be conducted to investigate other healthcare wastes. From our research and interviews, we observed a need for a reduction in especially single-use wastes like gloves, gowns, plastic equipment, and paper. Another unnecessarily large amount of waste observed was from packaging. When Family Health Clinics receive an order, it often comes with an unnecessary amount of packaging in the form of cardboard boxes, plastic wrapping, and Styrofoam coolers. During the COVID-19 pandemic, programs were in place to collect these packaging “wastes” and reuse the material. This no longer exists for FHC, but further research into implementing more circular economy principles related to packaging wastes would be very impactful. While healthcare facilities have a difficult task in balancing patient health and safety with other sustainability-related goals, there are further opportunities available if more research was dedicated to it.

MONITORING AND EVALUATION

To evaluate successful implementation, spreadsheet data displaying costs, expiration date monitoring, and waste tracking can be compared one year after initial usage of the centralized procurement system to data acquired after the first month of usage. Finances and inventory from the Omak Family Health Centers clinic will be used as the baseline data for comparison due to its facility size and number of patient visits per month. At one-year evaluators will conduct a financial review by cross-comparing costs of medical and office supplies previous to implementation with amount spent on these items after one year of implementation. Evaluators will additionally analyze stock and inventory at this time, with careful attention to waste due to expiration.

One year after implementation of the new systems, a survey inquiring staff members about opinions of the centralized purchasing and waste tracking system will be sent to all clinics via email. An in-depth survey regarding the logistics of the centralized purchasing system will be sent specifically to the purchasing team. Questions regarding the user-friendly interface will be asked as well, to ensure that the system is making the staff's jobs more efficient and reducing complications. This will ensure adaptability of the system moving forward, and guarantee that all experiences are being taken into account.



BUDGET

The budget table provides a rough overview of the potential costs associated with different recommendations included in the report. Although no specific prices are included, this can be used as a starting point to compare the cost-effectiveness of different ways to address waste tracking and centralized purchasing.

Recommendation	Funding Required
Transportation of medical supplies from centralized storage facility to clinics	This would cost more than the current mail courier service. Transportation services provided by the same courier company or the purchase of a truck that could be based out of the Omak area (most central for clinics) could be investigated.
Auxiliary centralized storage facility in Omak	More research would be needed to determine if a building that fits the storage needs of FHC already exists or if a new one would need to be constructed. It would also need to be determined if FHC has land that could accommodate this or if property would need to be acquired.
Hybrent purchasing software or similar	Software to regulate purchasing would likely come with significant costs. The software company would need to be contacted by someone with more information about what FHC is looking for in order to get an estimate.
Centralized Google Sheets document that all clinics have access to	Almost no budget is required for this—someone would need to take the time to create it but because the FHC workers are already familiar with Google Sheets, this is a very low-cost option that would likely not take as long to implement as some of our other recommendations.
Hired staff to manage organization of different medical supplies and transportation to each clinic	This would require paying salaries (and possibly benefits) to newly hired staff.

CONCLUSION

Family health centers of Okanogan County provide quality health care and services to the vast rural communities of the county. Being the largest county by land mass in Washington state, the professionals at Family Health Center work tirelessly to ensure all residents are supported and cared for. Regardless of distance between clinics, workload of staff, or availability of resources, Family Health Centers make certain each patient is treated and their needs are met with diligence, determination, and compassion.

Despite the intense hard work the staff members and health care professionals put into Family Health Centers, these individuals also strive for a smoother, more efficient system that not only improves the organization of Family Health Centers, but the sustainability of the environment. When evaluating the current purchasing system on cost, staff workload, and medical waste production, thoughts of a new centralized procurement and waste tracking system arose to increase efficiency while minimizing waste. This report includes an analysis of current methods used by Family Health Centers, research on existing systems utilized by other health clinics in the United States, and recommendations for new centralized purchasing and waste tracking management systems to provide Family Health Centers with evidence-based guidance to their problems at hand.

To collect data on existing systems utilized by Family Health Centers, interviews with the project sponsor, purchasing team, and health professionals at the Twisp clinic were conducted, as well as a tour of the Twisp clinic facility to gain an understanding of current methods first-hand. Secondary data was collected via research of case studies of successful implementation of centralized procurement systems outside of Family Health Centers as well as data regarding the implications of medical waste on the environment. The purpose of the secondary data collection was to ensure all recommendations offered in the report were evidence-based.

The implementation of a centralized ordering system for family health centers brings efficient and standardized procurement processes, reducing time spent on comparisons and orders. This fosters environmental sustainability through optimized orders, better inventory management, and potential reductions in packaging and transportation emissions. Strategically located warehouses minimize transportation distances, lower costs, and promote eco-friendly practices. A well-designed distribution strategy ensures seamless supply pick-up, while coordinated transportation efforts enhance efficiency and sustainability. An advanced inventory management system like Hybrent, tailored for healthcare, ensures real-time tracking, automated reordering, compliance adherence, and efficient supplier communication. Comprehensive staff training ensures smooth system utilization, fostering integration and improved operations. In summary, this integrated approach enhances cost savings, operational efficiency, environmental responsibility, and overall healthcare quality at family health centers.

Each recommendation is formed using substantial research and analysis with consideration to larger sustainability systems thinking. The UN Sustainable Development Goals (SDGs) reflect different areas of sustainability that every country strives to achieve. Three goals, in particular, align with the recommendations produced in this report. SDG 9: Industry, Innovation, and Infrastructure is achieved by the implementation of a centralized ordering system for temperature-sensitive paper products with the aim to enhance efficiency and

streamline the procurement process. This leads to better infrastructure and innovations in the healthcare center's supply chain, contributing to economic growth and improved access to essential goods. Additionally, SDG 11: Sustainable Cities and Communities is met by expanding the transportation system and optimizing delivery routes which lead to reduced costs, less congestion, and lower carbon emissions. By promoting sustainable urban development, this recommendation contributes to creating more livable and resilient cities. Finally, SDG 12: Responsible Consumption and Production is accomplished through a new purchasing system that focuses on efficient inventory management and ordering processes which leads to reduced waste, better resource utilization, and responsible consumption practices. With each recommendation aligned with an SDG, it is ensured that the sustainability of Family Health Centers in tandem with the sustainability of the environment is achieved.



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