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Leaving Tray Line Behind: A Proposal For Hybrid Hospital Foodservice

By

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of the requirements for the

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PART ONE

Introduction

At Valley Hospital in Las Vegas, Nevada, the economic recession is as visible as anywhere else in the United States. A lack of paying patients equates to forced reductions in labor and increased productivity metric mandates. In the foodservice area, antiquated technology limits productivity in conducting tray line food service delivery. A new tray line system would need to be considerably faster while using less employees and moving parts to maximize efficiency, effectively doing much more with far less. There are two main systems of food service as part of the patient experience; tray line and room service. Both systems have their benefits and individual costs coupled with necessary labor. Room service is much more labor and cost intensive but typically yields the all important higher patient satisfaction scores while the majority of hospitals employ the tray line system. Using empirical research, this paper will explore variations to tray line setup, personnel and equipment usage to find a better way to conduct business at Valley Hospital. This paper will investigate comparable undertakings through trade journals and peer reviewed papers along with information from interviews with peer contacts in health care food service to aide in the creation of this new method.

Statement of Purpose

The purpose of this paper is to develop a business proposal for the new tray line system to present to regional management for implementation. The goal is to create a 30% improvement in efficiency in tray line while also cutting back 30% on labor. By using comparative time studies, proper utilization of new and existing equipment, creating new standardized processes and retraining staff this proposal will fundamentally change the way Valley Hospital conducts

food service production to meet the changing demands of the locality and potentially transform standard operating procedures for similar accounts on a national level.

Statement of the Problem

This paper will serve to solve the problem of Valley Hospital using antiquated technology and the limitations brought from it. For 30 years the process that puts food on a tray and delivers it to the patients has remained unchanged. New developments and understanding in equipment usage, kitchen layout and staffing have been stifled to keep the status quo. The reach of collective bargaining agreements have not been tested thoroughly enough to fully utilize employees to their potential in harmony with outside of the box thinking and creativity by the managers and administration residing in leadership roles.

Justification

Simply put, the system in place is just not good enough. Demanding clients require increased productivity while cutting back work forces. In the past eight months, administration has cut over 25% of full and part time kitchen staff. To remain competitive in the health care foodservice industry companies will have to adapt to changing work conditions. A proactive approach to cost cutting and increased efficiency is not popular among a reluctant and ageing work force but serves as a necessary evil for those willing to push the envelope of progress. Having an action plan ready to put to use can potentially limit future hardship on the department.

Constraints

Limitations over the processes and configuration of work duties will be imposed by a labor union environment and third party proprietary information. This paper will need to stay within these confines from start to finish. Understanding how both play a factor in daily business will limit their ability to stifle creativity while also giving credit where credit is due.

The author will require buy in from employees to aid process and not over step set boundaries that are both clearly and less clearly identified.

Glossary

Tray line - The lineup of trays on which all the food for hospital patients is placed. (Pearson, 2010)

Room service – Service provided to hotel guests in their rooms. (Merriam-Webster, 2012)

Labor union – An organized association of workers, often in a trade or profession, formed to protect and further their rights and interests. (Merriam-Webster, 2012)

ROI – Return on investment. (Entrepreneur, 2012)

Productivity - The quality or state of being productive. (Merriam-Webster, 2012)

Pilot program – An activity planned as a test or trial. (Dictionary.com, 2012)

PART TWO
LITERATURE REVIEW

The Tray Line

In healthcare food service there is a basic standard of tray delivery called a tray line. Tray line is a food service assembly line in which “workers in which a product is assembled by having each perform a specific, successive operation on an incomplete unit as it passes by in a series of stages organized in a direct line.” (assembly line, 2012) This system has widely been used for the past decades for hospital meal delivery. Set up as a food assembly line, there are individual stations that place required food items onto a moving tray. There is a starter, who puts the menu onto the tray and sets up the condiments, silverware and the hot pack where the plate is placed. Next step the pantry station employee places cold items such as salad, gelatin, drinks and desserts on the moving tray. The following person places the hot food on a plate, sets it on the hot pack, and puts the soup on the tray. Finally, a checker makes sure everything is on the tray as required, covers the food with a dome cover, and places the tray in a cart to be delivered to the patients. (Connolly, 2012) Figure One shows an example of this tray line system based on an assembly line system (parts are the components of a tray):

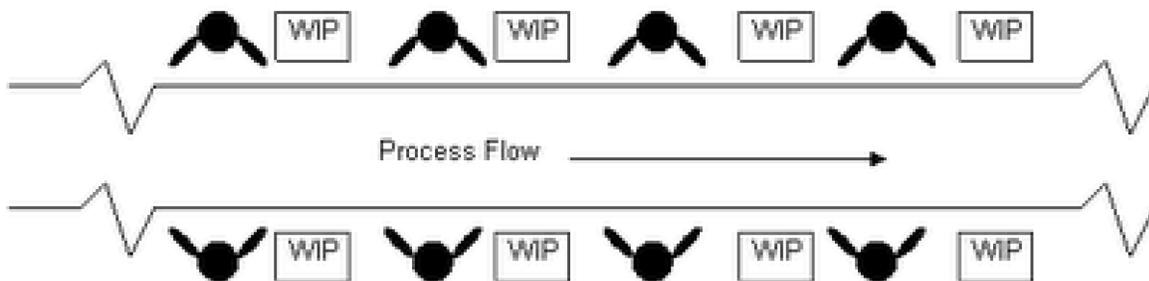


Figure One. Assembly Line (6sigmaforum, 2007)

In the past assembly lines were the accepted ways to mass produce items in a timely manner. For instance, Ford Motor Company revolutionized auto manufacturing with the assembly line to mass produce automobiles which lowered their cost and increased availability to the public. The implementation of the tray assembly line to hospital food service had a similar effect but the fact of the matter is that times have changed. As food service researcher Sherer states, “Hospital kitchens are learning that tray line assembly systems often propagate the same problems automakers face—inflexibility and mistakes—so many are rethinking the process.” (Sherer, 2010) He continues to say, “On the old tray line, eight or nine hands touched each tray, increasing the chances for mistakes.” (Sherer, 2010)

Patient Satisfaction

Patient satisfaction numbers have come to the forefront of how a hospital food service department is judged. Capra, Wright, Sardie, Bauer, & Askew have stated that patient satisfaction in the health care industry is becoming increasingly focused on quality improvement for service excellence.” (Capra, Wright, Sardie, Bauer, & Askew, 2005) The days of giving the patient essential nutrition and nothing else are over. Capra, Wright, Sardie, Bauer & Askew put together a sample of what questions a patient is asked about the food service experience while hospitalized:

Sample Results of Foodservice Patient Satisfaction Questionnaire 1996

Food Quality

- The hospital food has been as good as I expected
- I like the way the vegetables are cooked

- The meals taste nice
- The menu has enough variety for me to choose meals that I want to eat
- The meals have excellent and distinct flavors
- The meat is tough and dry

Meal Service Quality

- The crockery and cutlery looked good
- The cold drinks are just the right temperature
- The hot drinks are just the right temperature
- Items such as serviettes, cutlery, etc. are missing from my tray
- The cold foods are the right temperature
- The meal tray looks attractive when I receive it

Staff/Service Issues

- The staff who deliver my meals are neat and clean
- I am able to choose a healthy meal in the hospital
- The staff who take away my finished meal tray are friendly and polite

- The staff who deliver my menus are helpful

Physical Environment

- The crockery and cutlery are chipped and/or stained
- The hospital smells stop me from enjoying my meals
- I am disturbed by the noise of finished meal trays being removed

Statements Analyzed Separately

- I like to be able to choose different sized meals

(Capra, Wright, Sardie, Bauer, & Askew, 2005, pp. 7-8)

Putting this sort of questionnaire into perspective, Burns & Gregory (2007) have turned their attention to how things are done. “By realizing that healthcare patients are no different than other consumers, efforts have been made to find ways to improve patient satisfaction. They continue by saying, “The goal of the healthcare food service manager is to provide good tasting meals that are enjoyed, are nourishing, and are cost effective.” (Burns & Gregory, 2007) This can be accomplished in a number of ways and the first analysis concluded these important factors:

Development of a patient satisfaction survey that provides specific information regarding patient foodservice satisfaction and also a ranking of most important service attributes.

Provide kitchen staff with continual training on cooking methods and impact on patient satisfaction.

Provide foodservice delivery staff with patient service training and impact on operating costs and patient satisfaction.

Share patient satisfaction ratings and operating costs with employees so they can track the units' progress.

Development of means for employees to provide suggestions for improving patient satisfaction and maintaining/lowering food and labor costs.

(Burns & Gregory, 2007, p. 68)

Addressing these factors takes planning and understanding of the impact each has. Companies such as Gallup have partnered with healthcare organizations to develop their own patient satisfaction questions. The individual operator should find out what these include and how they are scored. Once this has been gauged a program can be put into use to push the scores up. (Gallup, 2012) Empowering and continuously training employees goes a long way as well. As stated by Sherer, "giving teams of workers more autonomy and more responsibility reduced mistakes, improved quality and efficiency and gave employees more of a sense of ownership in their work." (Sherer, 2010) Weekly meetings at regularly scheduled times to address new training and current patient satisfaction marks keep the employees engaged in daily activities and help them feel more involved at the line level. Additionally, keeping an open line of communication with the staff will enable two way conversations that allow for them to make their feelings and suggestions heard. Putting good ideas to use, whether they come from managers or line level employees, keep things progressing in the right direction for team building and overall satisfaction. Happy cooks and staff help create happy patients.

Productivity

Hospitals have adapted to the changing complexities of the business world in recent times. Administrations are demanding higher productivity out of each department and food

service is no exception. As efficiency becomes less of a buzz word and more of a reality, new ways of thinking are becoming necessary to achieve desired results. As Woodman, Clark and Rimmington (1996) have simply stated, productivity=input/output. (Woodman, Clark, & Rimmington, 1996) There are different ways to approach the subject of productivity in the hospital kitchen; cooking process, assembly process and delivery process. Starting with the cooking process there are a multitude of ways to go about taking a raw product and turning it into a finished product. In the past hospitals used what are known as cook/serve systems. Cook/serve is the method for preparation, cooking, and serving of hot or cold food. This system is no longer considered the benchmark for institutional food service, including health care. Rodgers & Assaf (2006) have stated that “unlike cook/serve preparation used in the past, a variety of technological options are available to large scale operators in convention centers, casinos, stadiums, foodservices in health care, education and transport sectors to decouple production from consumption,” (p. 40). They continue with “These include cook-hot-holding, traditional cook/chill, modified cook/chill (sous vide or cooked in a bag), and cook/freeze systems.” (Rodgers & Assaf, 2006, p. 40) These options give a cost efficient alternative to cook/serve in a few different ways. “The strategic significance of a particular system lies in quality outcomes such as sensory characteristics of food as well as efficiency of capital investment, which includes facility and equipment cost.” (Rodgers & Assaf, 2006, p. 40) Table One lists many of the options that are available for operators.

Table One

Available Systems of Food Processing

<u>System</u>	<u>Food Handling Processes</u>
Cook/hot-hold	Cook/hot-hold/Serve/deliver
Cook/chill (bulk)	Cook/Chill/Store/Reheat/Serve/Deliver
Cook/chill (plated)	Cook/Chill/Store/Serve/Reheat/Deliver
Cook/freeze	Cook/freeze/store/reheat/serve/Deliver
<u>Cook/freeze/thaw</u>	<u>Cook/freeze/store/thaw/serve/reheat/deliver</u>

(Burns & Gregory, 2007)

These options mentioned above all offer situational systems of food production. Depending on the needs of the operation, any of these can be customized for personal preference. In a study conducted by Woodman, Clark, and Rimmington (1996) two teams were created to find the benefit or lack thereof pertaining to cook/serve against cook/chill. With twenty cooks in each group, Group One had no pre-prepped vegetables, using cook/serve; while Group Two had pre-prepped vegetables, using cook/chill technology. The study found that Group Two was three times more efficient than Group One, showing a considerable reduction in labor cost. “The use of pre-prepared vegetables coupled with cook-chill preparation resulted in substantial productivity gains—from 48 meals to 167 meals.” (Rodgers & Assaf, 2006, p. 47) The case can be made that the added expense of required technology and equipment can result in costing more than using what is currently in use but “investments are usually offset by savings in labor and food costs.” (Rodgers & Assaf, 2006, p. 41) Additional research revealed that at “the 731-bed Metro Health public hospitals in Cleveland, 70% of labor became redundant with the conversion

to the sous vide system, which saved 1.2 million dollars per year.” (Rodgers & Assaf, 2006, p. 41) Believing that kitchen expenses are made up of roughly 60% labor cost, 20% food cost, and 20% administrative cost (Woodman, Clark, & Rimmington, 1996), the long term investment of the cook/chill practice to replace the cook/serve system will eventually pay for itself while also generating an increased profit. (Connolly, Health Care Food Service: Moving Into the World of Room Service , 2010)

The assembly process also holds a great deal of importance when discussing the area of productivity. Sandra Ray, food service manager at WakeMed Health in North Carolina stated, “The hospital realized that as it had grown over the years, its tray line was taking longer to serve patients, running nearly three hours at lunch.” (Sherer, 2010) She continued by saying, “The kitchen also wanted more accountability from its employees. On the old tray line, eight or nine hands touched each tray, increasing the chances for mistakes.” (Sherer, 2010) As previously mentioned, tray line has long been the standard bearer of hospital food service assembly. Recent advancements in creative rejuvenation have found some major flaws in this old system. The general manager of Orlando Regional Medical Center in central Florida, Tony Pagliara, stated, “The foodservice staff was producing an average of 1.615 trays per minute from two traditional tray lines for a combined 3.23 trays per minute.” (Sherer, 2010) This is considered to be an acceptable amount of time for the assembly of trays but there are new ways to substantially improve this number with minimal cost and maximum improvement to patient satisfaction. The newest system available is widely known as the Pod system. This system pulls from the old tray line technology and combines it with new layouts and reductions in moving pieces and people. Figure Two illustrates an example of a Pod system.

- If you run two or three, two-sided pods, you can flexibly run anywhere from one to six stations depending on the demand. When finished, you can keep half of one pod operational to provide late trays and additional meal options for patients.
- When there is a census increase you will not have a problem because you're only adding a few trays to each pod, taking only a few minutes to produce. Adding additional trays to an already long-running tray line can dramatically extend service times. (Sherer, 2010)

Proof in action, Bill Notte, director of food service at Huntsville Hospital stated, “the change to pods was cost neutral from a labor standpoint. Both hospitals shifted personnel around to accommodate the new system.” (Sherer, 2010) At another hospital in Orlando, Florida, the same system was put into practice and saw a six month return on investment offset by labor savings. (Sherer, 2010) This Pod system “shortened tray assembly time to between 60 and 90 minutes, less than half the time of the old tray line.” (Sherer, 2010) This system can be the quickest and cheapest fix to a tray line upgrade at most hospitals since the majority of the equipment is already purchased and in place.

The last major assembly method discussed is hospital room service. This method has been the major go-to when new hospitals are being designed to maximize patient satisfaction. Borrowing heavily from hotel style room service, patients are able to order from a selective menu in their room by calling the kitchen and some offer around the clock service to meet the needs of patients. Companies like Morrison, Sodexo and others similar to their model are leading the way for hospital foodservice transitions. They place gourmet systems such as Dining on Call, At Your Request, Catering to You, and retail outlets into the horrendously stereotyped cafeteria areas. (Patient Experience-Morrison Management Specialists, 2009) When compared

to a modern hotel, the “room service” options are very similar; breakfast, lunch, dinner, daily specials, etc. This is considered very favorable to the patients, providing some kind of perceived choice while they are in an unpleasant situation. (Connolly, Health Care Food Service: Moving Into the World of Room Service , 2010) In Provo, Utah at Utah Valley Regional Medical Center, patients are told when ordering that food will be delivered within 45 minutes of placing the order and it usually takes less time than that. (Rogan, 2012) From a cost perspective, the return on investment is not as quick as the Pod system but patient satisfaction is typically higher. (Rogan, 2012) As one room service hospital director stated, “People like that they can order a little or a lot. If people aren’t feeling well, they don’t want to eat.” (Rogan, 2012) A room service setup will not be as efficient as tray line or a Pod system, losing productivity since food is cooked to order and not at specific times throughout the day. Any additional food option can potentially improve the perceived experience of a hospital stay for a patient and their families. Creating a comparison to a hotel stay could potentially enhance the whole healing process but will lose out on labor controls due to the nature of the setup.

Conclusion

There are known and effective ways to dramatically increase the efficiency of a hospital kitchen. Every system that has been utilized in health care food service mentioned in this section have had a profound and positive effect when well researched and implemented. Assembly and production standards have been advancing at a rate unseen in the past and with continued creativity and know how there is no reason to believe the advancement will not continue. The choices for potential options for implementation are numerous and the individual operator will decide which is best for their individual needs. A small hospital with a low census may find that the basic tray line and cook/serve application suits them best. A medium sized hospital with a

census of 200-300 could find that a combination of room service and cook/chill meets their needs better than others. The fact of the matter is that understanding what resources are available and what the individual business needs are will dictate the decision of how to go about business. In most cases, pulling the best methods from the different ways of food production and assembly process and creating an individualized custom application to conduct business will undoubtedly lead to a successful new standard operating procedure

PART THREE

Introduction

Seeing the confines of the Valley Hospital dietary department take shape through part one and putting a basic understanding to what currently is in place and its comparisons in part two, this section will explore a hybrid option that will come from available resources and creative manipulation of manpower. Seeing productivity measurements consistently dropping and taking into consideration the need to replace an antiquated system from decades past necessitates a new approach to business. This approach will consist of specific time studies based on individual stations and how to make them faster, using existing equipment in inventory to quicken the process and finding new equipment at the lowest possible prices to fit the design, taking human capital and maximizing their efficiency through process improvement and advanced task based standardized training and finally how to layout the new system as a whole and implement as the new operating model. Once approved for implementation as a six month pilot program this new system could be customized and standardized with measureable results from labor cost, food cost and patient satisfaction.

System Versus System Time and Labor Study

The current setup of tray line at Valley Hospital consists of four manned stations positioned around a large rectangular mechanically driven chain drive system of rotating tray holders. This mechanism has been in use for decades without potential upgrades mentioned in the literature review or significant labor changes outside of a reduction in force that created a four man team from a previous five man team by the consolidation of stations. An illustration of this specific setup is in Figure Three:

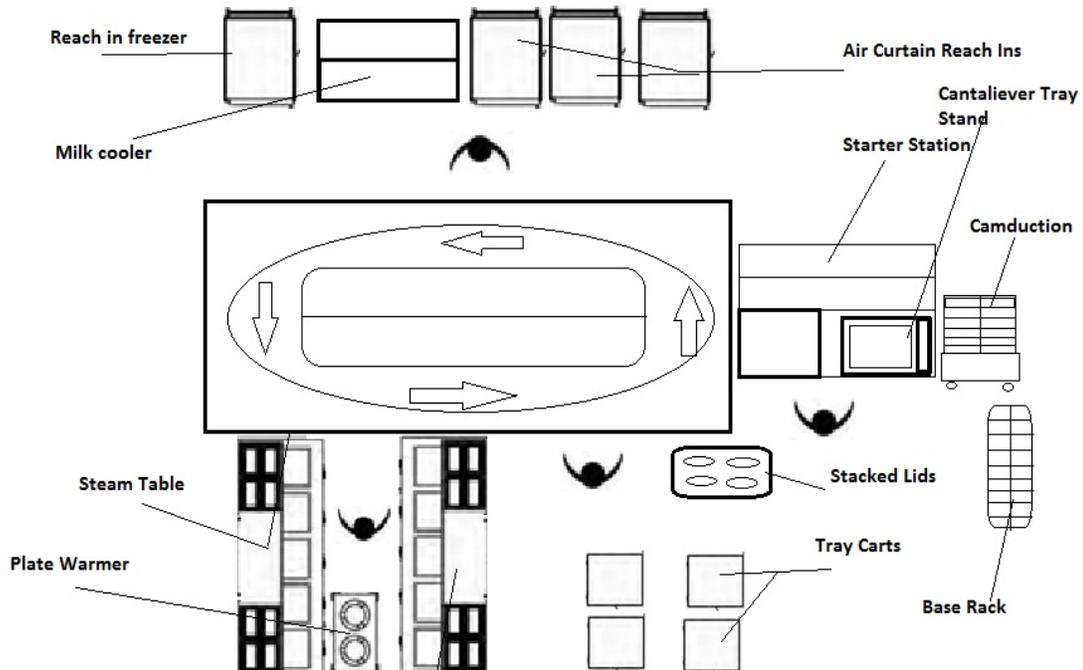


Figure Three. Valley Tray Line (Connolly, Valley Hospital Tray Line, 2012)

As you can see there are four necessary stations in this system to complete patient tray assembly. The starter begins the process by reading the menu and putting whatever seasonings and condiments are required for the diet, a camduction hot base, silverware on a napkin and ultimately placing the tray on the rotating tray holder. The next station puts all pantry or cold items on the tray such as juice, milk, salad or ice cream as prescribed by the passing menu. Hot food is then dished up from the steam table onto a warm plate and placed into the camduction hot base. The checker then makes sure everything is on the tray that is required, places a lid over the hot food and puts the tray into a waiting tray cart for delivery to the hospital unit. This process can be further broken down by each section and the amount of time each takes on average to accomplish the job. This information, seen in Table Two, was gathered by observing three

different meal periods three different times and averaging the times each station took to complete.

Table Two

Tray Line Time Study

Position	Time (seconds)
Starter	█
Pantry	█
Cook	█
Checker	█
Total Setup Handle Time	█
Total Tray Ride Time	█
Total Wasted Ride Time	█

(Connolly, Tray Line Time Study, 2012)

The total time needed for a tray to go from start to finish was always █. The only variable with this was when the tray line needed to stop and serves as an unknown intangible meal to meal that adds time to the process. This was left out of the study to allow for benchmarking optimum time calculation. █

█ Using the information from the literature review paired with the above time study to compare the Valley Hospital tray line system to other options, a hybrid system was devised to create a new way of assembling patient trays in the most efficient way possible. By pulling from room service technology and pod system labor reductions the new system will eliminate a tray line station and consolidate it between the three remaining stations as seen in Figure Four:

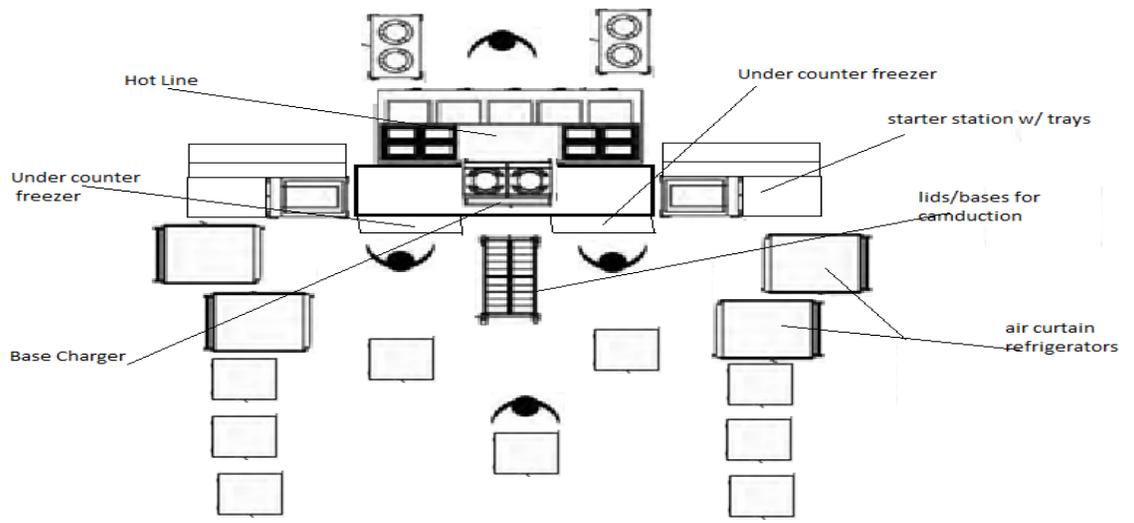


Figure Four. Valley Hybrid (Connolly, Valley Hybrid, 2012)

In a three person tray service setup, one cook and two servers, [REDACTED]

[REDACTED]

[REDACTED] The tray line system completes a tray every [REDACTED]

[REDACTED]. With the hybrid system, using the information from Figure Four, the self-contained starter/checker/server position would complete [REDACTED]

[REDACTED]. Additionally, these two servers would own meal service while being accountable for individual trays they complete and allow management the opportunity to accurately track whatever measurable parameters they want. Using the numbers from the tray service style [REDACTED]

[REDACTED]. This is because tray line [REDACTED]

[REDACTED] with fewer of the same

people, less moving parts and less waiting. Table Three compares potential time frames of food service;

Table Three

System Comparison

Current Tray Line		Hybrid Tray System	
100 trays	██████████	100 trays	██████████
150 trays	██████████	150 trays	██████████
175 trays	██████████	175 trays	██████████
200 trays	██████████	200 trays	██████████
225 trays	██████████	225 trays	██████████
250 trays	██████████	250 trays	██████████

(Connolly, Tray Line Time Study, 2012)

This table shows that on average there is over a 30% decrease in time regardless of how many trays are made in addition to the labor savings. This allows faster service to the patients, hotter/colder food and higher patient satisfaction. Additionally, as seen on the illustration of the setup, there are now only 3 required tray workers as opposed to the four needed to run our current tray line. Removing one position from this equation leaves a number of options with the newfound labor hours;

- Cut 56 hours per week all together

Cutting this position out would save ██████████ at Culinary 226 2012 rates. By year five we would see a savings of ██████████ of straight labor cost.

- Cut 16 hours from weekend tray shifts and open grill/buffet for lunch and dinner

Push retail revenues back to pre-RIF levels while fully utilizing leftover food and decreasing food cost.

- Use time savings to spend more face to face time between patients and diet office staff

Less time manning telephones and voicemail and more time spent with patients selecting menus in room combined with faster tray delivery and individual tray assembly will undoubtedly create a noticeable bump in patient satisfaction. Return on investment would be seen by month eight into the transition and reinvestment could then be made in any way deemed necessary.

Equipment

An inventory of all available equipment on site shows an extensive amount of existing functional pieces. How each piece of equipment is currently used will be broken down into new ways to achieve the highest levels of efficiency possible to work in tandem with the time studies can be seen in Table Five. By putting equipment into new configurations to best use each piece along with new, accompanying equipment to assist in the overall vision of the new system will complete this transition. Necessary new equipment would consist of a nine foot stainless steel prep table, under counter freezer, an additional starter station, one air curtain refrigerator and a stainless steel plate slide to attach to the top of the steam table. The old tray line machine would need to be disassembled and removed to make way for the new system and power needs to be rerouted to accommodate the position of the setup. Cost estimations between commercial vendors and the in house engineering department put the initial investment in the \$25,000 to \$30,000 range.

Training

Old habits die hard and with the hourly employees at Valley Hospital an entirely new system being put into place will not be easy. That being said, the past ten months of reductions in forces and increased productivity measurements seen in Appendix A requires employees to work faster and more efficiently. A proactive approach to process improvement will lead to increased job security for those willing to put in the work to streamline the patient dining experience and becoming an integral part of the process is the best option for unskilled labor. Finding key personnel to work with and maintaining open two way communication about new processes in cooperation with management will get the job done. In a union house such as Valley, if a standard can be set by an employee in a classification that new assigned tasks can be completed in an established time frame all employees will be held to that standard. (In the counseling process) Regardless, for a new system to work standardized procedures need to be implemented for everyone and that will require buy in from all employees involved. The “patients first” attitude must adhered to for them to be successful and this entire new system is based on the premise of serving patients better and faster. On the managerial side of training, once a standardized system is implemented the current tasks associated with tray line will become one position cutting necessary training time of each position by days.

Conclusion

Full Pilot Program Implementation

Putting all these different areas of the plan together into a functioning pilot program will serve as a basis of whether or not the system works. Taking 24 weeks to test, correct and measure the validity of the program would work best. The patient satisfaction measurements

through Gallup would have time to show short term gains or losses against the prior 24 weeks. A full six months of financial data comprised of labor and food costs would also be used to compare the previous six months before implementation.

Recommendations

Based upon the research the pilot program will either be successful or failure. There will be clear cut wins and losses when comparing the data before and after. If deemed successful a full scale implementation would be in order and new custom pilot programs should be designed for implementation at sister properties locally to capitalize on the cost savings and efficiency. If deemed a failure the old system can be put back into use until a new system is created that can succeed in beating the status quo.

References

- 6sigmaforum. (2007, June 4). *Work In Progress*. Retrieved from 6sigmaforum.com:
<http://6sigmaforum.wordpress.com/category/lean/>
- Alluserv. (2010, October 1). *Pods: Adding a Layer of Efficiency and Effectiveness*. Retrieved from Alluserv: <http://alluserv.com/Blog/tabid/110/EntryId/20/Pods-Adding-a-Layer-of-Efficiency-and-Effectiveness.aspx>
- Assembly Line. (2012, October 20). Retrieved from Dictionary.com:
<http://dictionary.reference.com/browse/assembly+line?s=t>
- Burns, J., & Gregory, S. (2007). Changing Foodservice Systems: A Balancing Act Between Patient Satisfaction and Cost. *Journal of Foodservice Business Research*, 63-78.
- Capra, S., Wright, O., Sardie, M., Bauer, J., & Askew, D. (2005). The Acute Hospital Foodservice Patient Satisfaction Questionnaire: The Development of a Valid and Reliable Tool To Measure Patient Satisfaction With Acute Care Hospital Foodservices. *Foodservice Research International*, 1-14.
- Connolly, C. (2010). *Health Care Food Service: Moving Into the World of Room Service*. Chicago. Unpublished manuscript, Roosevelt University.
- Connolly, C. (2012, August 15). Tray Line Time Study. Las Vegas, Nevada.
- Connolly, C. (2012, August 15). Valley Hospital Tray Line. Las Vegas, Nevada.
- Connolly, C. (2012, August 15). Valley Hybrid. Las Vegas, Nevada.
- Connolly, C. (2012, October 7). What Is Tray Line. (C. Connolly, Interviewer)
- Dictionary.com. (2012). *Pilot Program*. Retrieved from Dictionary.com:
<http://dictionary.reference.com/browse/pilot+program?s=t>

- Entrepreneur. (n.d.). *Return On Investment (ROI)*. Retrieved from Entrepreneur.com:
<http://www.entrepreneur.com/encyclopedia/term/82570.html#>
- Gallup. (2012, October 12). *Gallup Poll*. Retrieved from Gallup.com:
<http://www.gallup.com/poll/101905/gallup-poll.aspx>
- Merriam-Webster. (2012, December 7). *Labor Union*. Retrieved from Merriam-Webster:
<http://www.merriam-webster.com/dictionary/labor%20union>
- Merriam-Webster. (2012, December 8). *Productivity*. Retrieved from Merriam-Webster:
<http://www.merriam-webster.com/dictionary/productivity>
- Merriam-Webster. (2012, December 8). *Room Service*. Retrieved from Merriam-Webster:
<http://www.merriam-webster.com/dictionary/room+service?show=0&t=1354992442>
- Patient Experience-Morrison Management Specialists*. (2009, April 25). Retrieved from Morrison: <http://www.iammorrison.com/PatientExperience.aspx>
- Pearson. (2010). *Glossary*. Retrieved from Pearson:
http://wps.prenhall.com/chet_walker_exploringhos_1/69/17847/4568834.cw/index.html
- Rodgers, S., & Assaf, A. (2006). Quantitative Methods in Measuring Productivity of Foodservice Systems. *Journal of Foodservice Business Research*, 39-51.
- Rogan, E. (2012, October 9). Foodservice Changes Equals Satisfied Patients. Retrieved from <http://www.foodservicedirector.com/operations/articles/technology/foodservice-changes-equals-satisfied-patients#1>
- Sherer, M. (2010, September 1). Anatomy Of A Pod. Retrieved from <http://www.fermag.com/features/healthcare/single-article/anatomy-of-a-pod/0e08d5666a.html>

Woodman, J. S., Clark, J., & Rimmington, M. (1996). Productivity in Hospital Kitchens. *The Service Industries Journal*, 368-378.