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Creating and Implementing a Capital Replacement Planning Initiative

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Poll Question 1

Do you have a 5 year capital replacement plan?

- Yes
- No
- Unsure

Poll Question 2

Do you evaluate your medical equipment for replacement in capital?

- Never
- Annually
- Greater than Annually

Poll Question 3

Do you have a standard process for prioritizing replacement of equipment?

- Yes
- No
- Unsure

Middlesex Health is dedicated to providing patients a high quality of care.

The Health System is a Mayo Clinic Care Network Member and consists of:

- 229 Bed Hospital
  - Magnet designation five times in a row
- 3 Urgent Care Offices
- 3 Family Practice Offices
- 9 Primary Care Offices
- 2 Offsite Emergency Departments with lab and radiology services
- 2 Cancer Centers
- Outpatient Radiology and Surgery Center
- 7 Physical Rehabilitation Offices
- Nearly 11,000 unique medical device assets across all facilities

Department Structure

Information Technology

Clinical Engineering

- Biomedical Engineering
- Clinical Imaging
- Radiology Engineering
- Vendor Management
- Sterilizer Engineering
- An Employee of the Year!

Summary

- Why it is important to plan replacement
  - Research and examples found
- What we previously did
- Why it was changed
- What had to be done to change it
- Details on our new process
- Hurdles that were faced
  - How they were overcome
- Unintended benefits
- Next steps

Why is it Important to Plan Replacement

- Meet hospital clinical needs [1]
  - Adapt with changes in standards of care
  - Improve quality of medical therapeutics, diagnostics, and interventions
  - Adapt with changes in patient care volume

Why is it Important to Plan Replacement

- Meet hospital managerial needs [1]
  - Increase operational efficiency with improved technology uptime
  - Remain or improve compliance with regulations
  - Increase ROI
  - Improve staff morale and retention rates

Why is it Important to Plan Replacement

- These common problems define the need for planned replacement:
  - Underutilized new equipment [1]
  - Large number of equipment failures and required repairs [1]
  - Clinical use errors [1]
  - Repair challenges associated with non-standardized groups of equipment [1]
  - Cybersecurity concerns

Resources Needed

- Technology assessment involves collaboration from a multi-disciplinary team [3]
  - Nursing management, supply chain, clinical staff, clinical engineering, and executive management
- Process of data collection can take months to complete
  - This can vary based on the size of the hospital
- Most organizations reassess capital replacement annually [3]

Capital Replacement Example Methodology

- Chose three main data elements to prioritize replacement by [2]
  - Failure rate, cumulative cost of repairs, and age of the equipment
- Used weighted factors to achieve normalized data [2]

New Evaluation Factors with Weighting

Factor	Source	How Determined	Theoretical Range	Practical Range	Weight
Age Factor	Simple Methodology	Age ÷ Life expectancy	0 - ∞	0.3 – 2	1.0
Repair Workorders	Maint mgt database	Number directly from database	0 - ∞	0 – 70	0.5
Repair Cost Factor	Maint mgt database	Cum repair cost ÷ Equip cost	0 - ∞	0 – 2	2.0
Advancement in Technology	Evaluation of replacement item	Subjective evaluation	1 – 7	1 – 7	0.5
Fit into Five-Year Plan	Evaluation of Five-Year Plan	Subjective evaluation	1 – 7	1 – 7	0.75

Capital Replacement Example Methodology

- Formed replacement planning database and created replacement rules that were programmed in order to complete evaluation [2]
  - Algorithm generates Relative Replacement Number (RRN)
  - List of descending RRNs dictated order of replacement
- Replacement rules
  - Consisted of factors related to technical, safety, and financial implications [2]

Capital Replacement Example Methodology

- Replacement rules
  - Product support status, age of device relative to useful life, failure rate, clinical obsolescence, usability, physical conditions, device malfunction risk, incident history, use errors, recalls and alerts, cost of ownership, availability of backup, standardization [2]

Example of scoring for a device

Rule #	Raw value (x)	Normalization equation	Normalized value	Weight %	RRN
1	1 (No support)	(x * 100)	100	90	90
2	1.5	(x –1) * 100	50	80	40
3	2.2	(x – 1) * 50	60	50	30
4	0 (Not obsolete)	(x * 100)	0	55	0
			Device RRN=	Mean =	40

Medical Replacement Score System

- Three primary components:
  - Technical - repair costs, work order history [4]
  - Device Safety - physical risk, technology-related incident [4]
  - Mission Critical [4]

Medical Replacement Score System

MERS = technical + device safety + mission-critical [4]

- Total Technical Component Score = (condition + life span) Discontinuation
- Total Device Safety Component Score = Physical x TRI
- Total Mission Critical Component Score = Mission x backup

Previously What Was Done

- Used a consultant
  - Analyzed inventory to determine age and inclusion criteria
  - Provided average costs of replacement
  - Looked for supportability, recalls, and safety issues
  - Met and discussed findings with department leaders
  - Planned a 5 year replacement plan

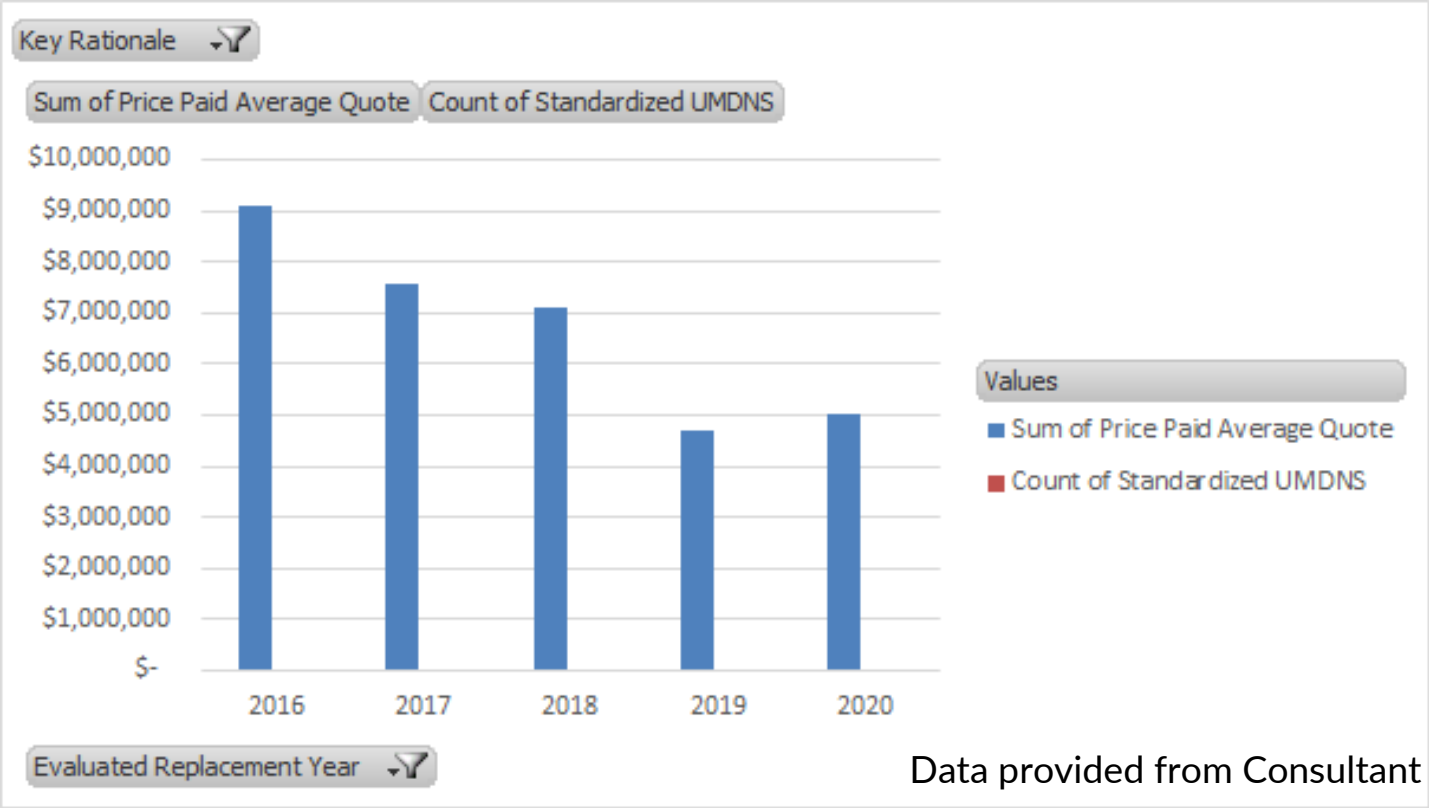
Previously What Was Done

- Inventory Inclusion Criteria
  - Any device with an average replacement cost of $3,000
  - Life expectancy was determined from Consultant's database for useful life.
- Average replacement cost was determined from historical quotes for like products in Consultant's database

Previously What Was Done

- Supportability, recalls, and safety issues was based off information contained in the Consultant's database
- Discussion with department leaders
  - Reliability concerns the staff had
  - Current or upcoming clinical needs
  - Replacement plan previously determined based off facilities strategic plan

Previously What Was Done



Data provided from Consultant

Why Was It Changed

- Data Reliability
  - Consultant average cost not always correct
    - Could be based off older technology
  - Not all devices captured by consultant based off dirty data
    - Ex: ENT Fusion System - labeled as a computer outside of the scope of the analysis
- Timing
  - Only as good as the information that was available at the time of the analysis
  - Age based

Why Was It Changed

- Assumed all equipment to be replaced
  - Pending analysis at time of funding
- Improve cost allocation
  - Could reduce replacement costs by reducing excess unnecessary equipment
- Improve capital planning
  - Prioritize
    - Determine needs based on up to date facts

What Has to be Done for the Change

- Develop an annual process
  - Assess existing technology
  - Develop an agreed upon methodology for prioritization
  - Identify potential capital costs of replacement of equipment
  - Discuss technology with leadership
- Be prepared to spend time doing this each year
- Create a common location for replacement information to be maintained

What Has to be Done for the Change

- Assess existing technology on an annual basis
  - Service histories and costs
  - Age
  - Recalls
  - Supportability
  - Capabilities
  - Software versions
  - Cybersecurity

What Has to be Done for the Change

- Develop an agreed upon methodology for prioritization
  - Meet with leadership and discuss important categories
    - Come with ideas
    - Try to keep it as simple and straightforward as possible
- Identify potential capital costs of replacement for equipment
  - Third-party market analysis
  - Group purchasing organization rate
  - Existing vendor budgetary quote
- Review inventory and costs with leadership

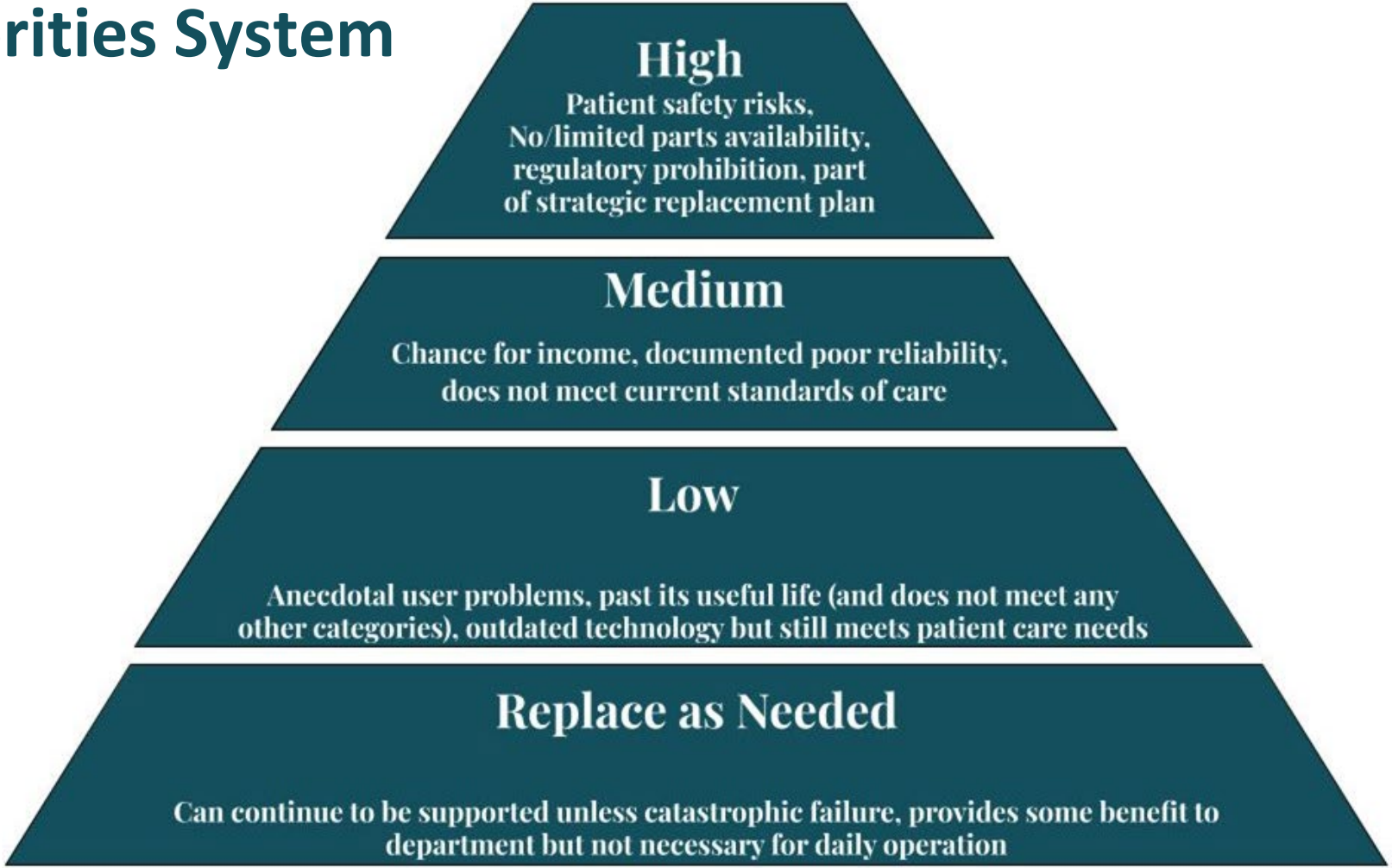
What Has to be Done for the Change

- Be prepared to spend time doing this each year
  - Scheduling meetings
  - Database analysis
  - Budgetary Quotes
- Create a common location for replacement information to be maintained
  - Allows for ongoing updates to carryover year after year
  - Reduces work for future years

Goal of New Process

The goal of the new process was to provide a prioritized list of replacement equipment with realistic budget numbers through a committee based approach. That can be sustained for future years aiding in building a 5 year projection of capital replacement.

Priorities System



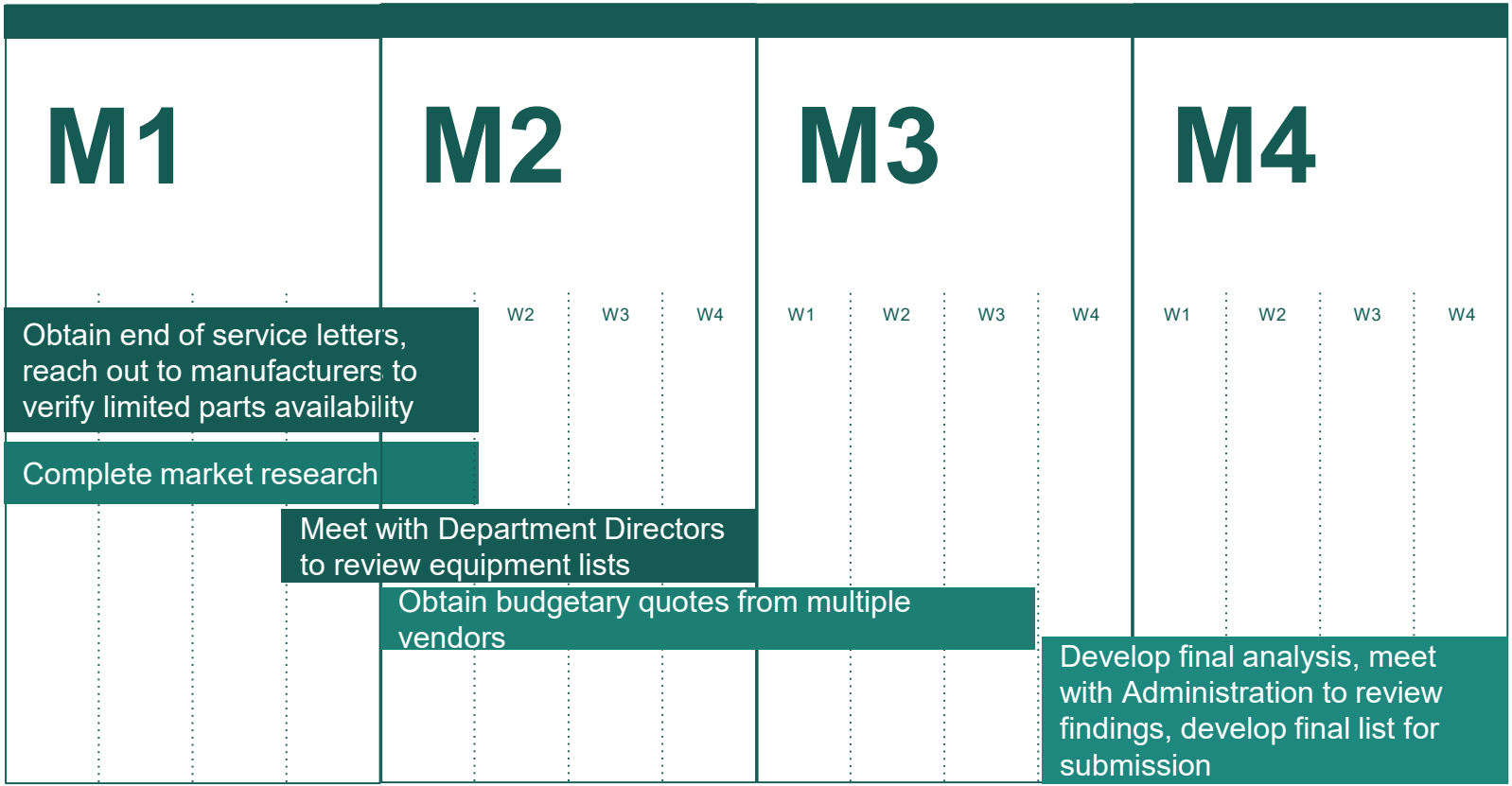
Priorities System

As soon as one criteria is met within the high category, the replacement priority for that device becomes a high.

Maintenance of Spreadsheet

- It is important to keep the spreadsheet up to date
  - Helps streamline the preliminary work
- Some tips for doing this:
  - Throughout the year
  - During emergency capital requests
  - Post standard capital approval process
- Quote and market research
- Time and resource commitment

Process Duration



Final Product

This document contains all of the Replacement Planning data for the medical equipment assets up until 2020. Each Director's areas are separated in the sheets below. Please see your respective lists to help determine the prioritizations for equipment replacement planning.

See priority descriptions below:

High - This would be equipment that are a current patient safety risk, there are no or limited parts availability, regulatory prohibition, or part of a strategic replacement plan.

Medium - This would be equipment that have a chance for income (this could be high dependent on the ROI), documented poor reliability, or does not meet the current standards of care.

Low - This would be equipment that have anecdotal user problems, is only past its useful life (and does not meet any of the other categories), or is just simply outdated technology (but still meeting the needs of patient care).

Replace as Needed - This would be equipment that can continue to be supported unless catastrophic failure requiring full replacement, or provides some benefit to the department but not necessary for daily operation and replacement can be evaluated at time of failure.

Final Product

- The inventory is broken down by director in seperate sheets
- Each line item is reviewed based on evaluated replacement year from the consultant
- Provide the name of equipment with a picture for ease of identification
- Review by location of equipment

Asset Descripton and Label	Evaluated Replacem	Building Name	Site Name	Director	Quantity
Stereotactic Systems, Image-Guided, Surgical, Otorhinolaryngology - Fusion ENT Sinus Navigation System	2020	SurgiCenter	Surgery Center	Surgical Services	1
Sterilization Process Indicators - Sterrad Spore Incubator	2020	Central Sterile Services	Main Hospital	Surgical Services	2
Sterilizing Units, Germicidal Gas, Gaseous Plasma - Sterrad Plasma Sterilizer	2018	Central Sterile Services	Main Hospital	Surgical Services	1
Sterilizing Units, Steam - Vacuum Sterilizer	Post 2020	Central Sterile Services	Main Hospital	Surgical Services	2
Sterilizing Units, Steam - Vacuum Sterilizer	Post 2020	Surgical Suite	Main Hospital	Surgical Services	2
Sterilizing Units, Steam - Vacuum Sterilizer	Post 2020	SurgiCenter	Surgery Center	Surgical Services	2
Sterilizing Units, Steam, Bulk - Vacuum Sterilizer	Post 2020	Central Sterile Services	Main Hospital	Surgical Services	2
Tables, Examination/Treatment - Examination Table	Post 2020	Same Day Surgery	Main Hospital	Surgical Services	1
Tables, operating - Operating table	2020	Surgery	Main Hospital	Surgical Services	2
Tables, operating - Operating table	Post 2020	Surgery	Main Hospital	Surgical Services	10
Da Vinci	Post 2020	Surgical Suite	Main Hospital	Surgical Services	1
Training Aids - IABP Trainer	Post 2020	Cardiac Cath Lab	Main Hospital	Surgical Services	1
Ultrasound Surgical Units - Ethicon Harmonic Scalpel	2018	Same Day Surgery	Main Hospital	Surgical Services	2
Ultrasound Surgical Units - SonoSurg Harmonic Hand Piece	2018	Surgical Suite	Main Hospital	Surgical Services	2
Ultrasound Surgical Units - SonoSurge Electrosurgical System Footswitch	2018	Surgical Suite	Main Hospital	Surgical Services	1
Warming Units, Blood/Intravenous Solution - Pressurized IV Fluid Warmer	2016	Anesthesiology	Main Hospital	Surgical Services	1
Warming Units, Multipurpose - Warming Cabinet	Post 2020	Surgical Suite	Main Hospital	Surgical Services	2

Cover Page | Presentation For Capital 2019 | Presentation For Capital 2020 | Surgical Services | Emergency Services | Rehab Services

Final Product

- Priorities are assigned accordingly
- Year last reviewed is added for consistency
  - This is important to keep track of what remains to be reviewed for the current year
- Notes are added detailing why that priority was chosen

Priority	Year Reviewed/Recommende	Notes
Low	2020	
Low	2020	
Low	2020	dave?
-		
-		
-		
-		
-		
Low	2020	
-		
High	2020	Attachments going unsupported
Low	2020	unsupported as of jan 2025
Replace as Needed	2020	
Replace as Needed	2020	
Replace as Needed	2020	not needed
Medium	2020	Age based still meets needs
Low	2020	

Final Product

- Each priority is aggregated and costs gathered to show the costs contained within each priority

	Low	Medium	High	Replace As Needed
Rehab Services	$135,344.00	$177,398.00	$9,418.00	$53,423.00
Emergency Services	$178,375.00	$0.00	$42,431.00	$171,965.00
Nursing Leadership	$0.00	$0.00	$13,556.00	$0.00
Inpatient Care	$0.00	$0.00	$0.00	$0.00
Specialty Services & Critical Care	$262,280.00	$91,100.00	$1,201,208.00	$551,738.00
Surgical Services	$252,274.00	$258,616.00	$986,204.00	$686,980.00
Total	$828,273.00	$527,114.00	$2,252,817.00	$1,464,106.00

Hurdles Faced

- Large amount of data
- Politics
- Looming deadline for capital requests
- Scheduling meetings

Hurdles Faced

- Large amount of data
  - Some dirty data

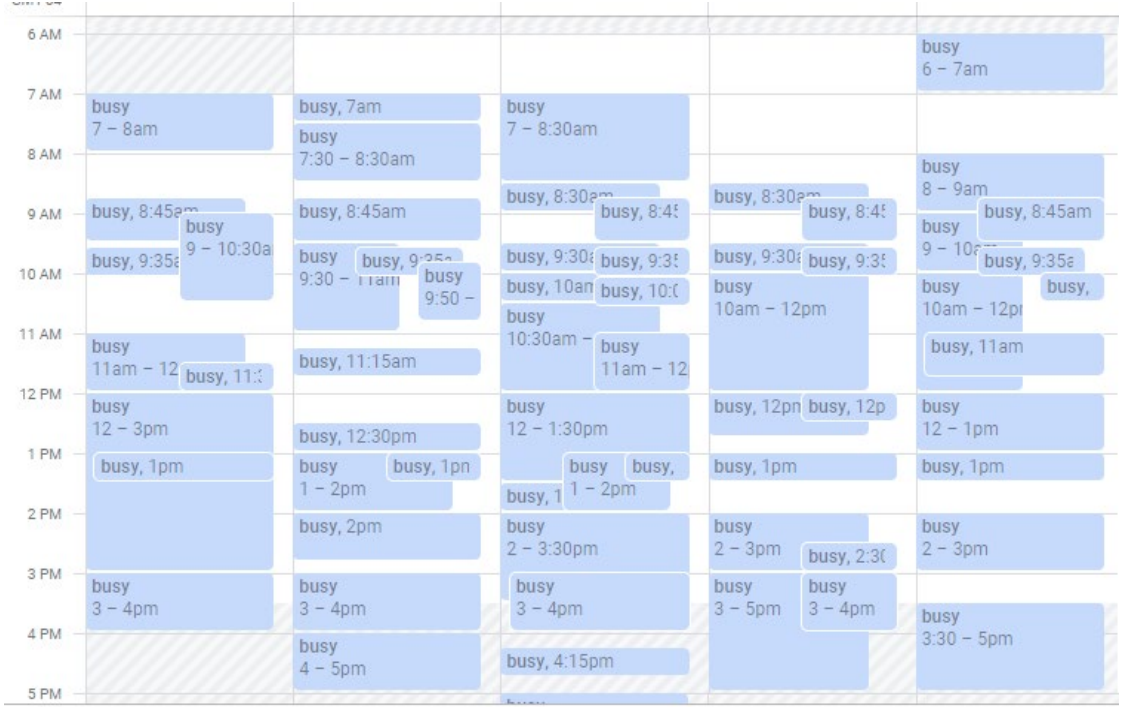
A	H	N	Y
Asset Number	Asset Description	Standardized UMDNS	Price Paid Average Quote
MH-11717B	Navigator Gamma Ray Detector	Detectors, Beta/Gamma Radiation	$18,945
MH-25696B	Navigator Gamma Ray Detector	Probes, Gamma Radiation Detection, Lymphatic Mapping	$42,594
MH-24957B	Navigator Gamma Ray Detector	Probes, Gamma Radiation Detection, Lymphatic Mapping	$42,594

Hurdles Faced

- Politics
  - Some departments or directors will take more stock in anecdotal user problems than others
  - They may not see the bigger picture and consider their equipment the most important

Hurdles Faced

- Looming deadline for capital requests
- Scheduling meetings
  - Directors are difficult to schedule



How Were They Overcome - Large Amounts of Data

- Use Consultant data as a base
- Provided an excellent starting point
- Use support letters
- Request budgetary quotes

How Were They Overcome - Meetings and Politics

- Scheduling time
  - Anticipated date of need
  - Scheduled meetings months in advance
- Politics
  - The prioritization scale helps all involved understand where their equipment falls and why

How Were They Overcome - Looming Deadline

- Obtain administrative support
  - Gather information and be ready to explain and discuss with administration
  - People will make time if administration recognizes the importance and supports this group
  - Anticipate when this needs to be done and schedule months ahead of time

How Were They Overcome - Looming Deadline

- Create a streamlined process
  - Work with department leaders on priorities
    - Use information from ACCE / AAMI as a start to the discussion
  - Limit the number of copies - use a live document
    - Aids in reducing conflicting priorities

Unintended Benefits

- Reasons why it is important to get involved with the capital process:
  - Shows relevance of the department
  - Shows the benefit of the data at your disposal and the capabilities to plan costs
  - It will give you a seat at the table when large purchases or decisions are being made as it relates to medical equipment
  - Allows you to be more prepared for the future
    - Through controlling your costs and downtime by being proactive

Unintended Benefits

- One word explains one of the most important things that can be gained from this involvement … Trust
- By performing this process in a way that is standard and prioritized more through fact and data rather than politics will earn the trust of the final decision makers

Next Steps

- Compile information into the CMMS
  - Priority, priority reasons, repair costs, end of support dates, failure rates
- Automatically report out based on priorities as agreed upon with leadership

Next Steps

- Perform this process on an annual basis
  - Reviewing past decisions to ensure nothing has changed since previous year
  - Make adjustments to data based on information gathered from preliminary work and meetings
- Perform walkthroughs in areas to identify any equipment that may be in question for no longer being used
  - This is to not immediately decide to retire it but more so to discuss it and its possible need for replacement.

Example

- If you were to be given the task of planning the replacement of your entire hospital's inventory and you were asked to determine if infusion pumps should be considered for replacement, how would you proceed?

1. _____
2. _____
3. _____
4. _____
5. _____

A. Consider the age of the device

B. Obtain the recall history of the device

C. Ask clinicians if the device still meets clinical need

D. Determine the device utilization in the hospital

E. Contact the manufacturer for end of service letters/parts availability

F. Obtain work order history and cost of repairs for that device type

Example Solution

1. E _____
2. C _____
3. B _____
4. F _____
5. A _____
6. D _____

A. Consider the age of the device

B. Obtain the recall history of the device

C. Ask clinicians if the device still meets clinical need

D. Determine the device utilization in the hospital

E. Contact the manufacturer for end of service letters/parts availability

F. Obtain work order history and cost of repairs for that device type

References

[1] David, Y., & Jahnke, E. G. (2018). Planning Medical Technology Management in a Hospital. *Global Clinical Engineering Journal*, (1), 23-32.

[2] Dondelinger, R. M. (2004). A complex method of equipment replacement planning: an advanced plan for the replacement of medical equipment. *Biomedical instrumentation & technology*, *38*(1), 26-31.

[3] Evanoo, J., & Cameron, D. (2010). The case to replace: developing a sound capital equipment strategy: by adopting capital equipment strategic planning, you can move from an opinion-based to a data-driven approach to setting priorities for the replacement of high-cost capital equipment. *Healthcare Financial Management*, *64*(2), 84-90.

[4] Taylor, K., & Jackson, S. (2005). A medical equipment replacement score system. *Journal of Clinical Engineering*, *30*(1), 37-41.

Questions