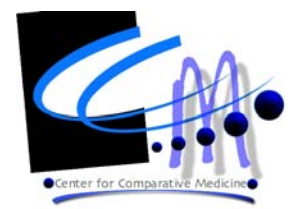


Developing an Empowered Team-Oriented Organization in Support of TPS/Lean Management Operations

**Center for Comparative Medicine
Massachusetts General Hospital
Boston, MA**

American Association for Laboratory Animal Science
59th Annual Meeting, Indianapolis, IN

November 11, 2009



Mass General Hospital



- **Biomedical research at MGH**

- Total annual research budget = \$540M
- 80,000 sq ft of animal facilities in 9 different locations
- AAALAC Accreditation since 1993
- 1000 active animal protocols; >350 PIs & 2000+ animal users
- Species: aquatics, rodents, rabbits, ferrets, canines, pigs, sheep, NHP's

- **Diverse Animal Models Used**

Alzheimer's Disease

Anesthesiology

Atherosclerosis

Behavioral Neuroscience

Bone Marrow Transplants

Burn Injury

Cancer

Congestive Heart Failure

Deafness

Diabetes Mellitus

Gene Therapy

Genomics

HIV/AIDS

Huntington's Disease

Inflammation

Laser Therapy

Limb & Nerve Regeneration

Obesity

Organ Transplants

Orthopedics

Plastic Surgery

Radiation Therapy

Renal Failure

Sepsis & Shock

Stem Cells

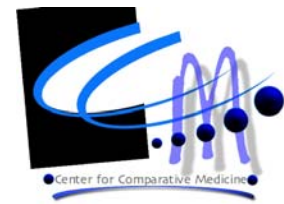
Stroke

Trauma

Ulcerative Colitis

Vaccines

Vascular Surgery



Brief History

- **1996-2002**
 - High turnover of directors, supervisors
 - Low turnover of animal care staff
 - 4 separate vivaria (silos)
 - Many rodent infections in barriers
 - Low morale, unhappy customers
- **New Leadership in July 2002 – Opportunity for Change**
 - Run department as a business
 - Leapfrog instead of catch up
- **Organizational Goals – Business-Focused**
 - Instill customer service culture
 - **Upgrade and Empower workforce – TPS/Lean Management**
 - Digitize information
 - Establish objective scorecards (\$)
 - **Continuously improve – TPS/Lean Management**

“Comparative Management”

- Dissect best practices in best companies
- Operational Advancement thru Lean Management:
 - Improving quality = lower costs



Technology Advancements



Innovation Advancements



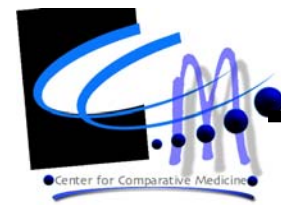
Operations Advancements
Workforce Empowerment



Organizational Branding



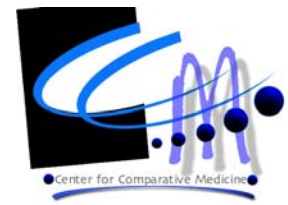
Workforce Empowerment



TPS/Lean Management - CCM



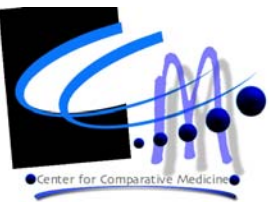
- **Senior Management Development**
 - HBS Executive Education Course in Successful Operations Strategies
- **Incorporated into Strategic Plan 2005 – Present**
 - Adapted from *The Toyota Way* by Jeffrey K. Liker, PhD to Lab Animal Environment
 - Standardization of Processes and Equipment
 - Elimination of “Waste”
 - Add Value by Developing Personnel Through Teams
 - Champion Problem Identification/Solving at all Levels
- **TPS Comprehensive In-House Training (2006 – Present)**
 - Basic Understanding of Tools and Team
 - Team Leader Development
 - Management Development



Continuous Improvement Results



- # Care-Related FTE's for 3 older mouse facilities
FY04 = 79.5 FY08 = 44.5 Reduction = 35%
- IACUC Semi-Annual Inspections Findings
Fall 04 = 140 Spring 08 = 35 Reduction = 75%
- Cagewashing Equipment Operability
FY04 < 70% FY08 = 95% Improvement = 25+%*
- Centralized, standardized supplies + RFP vendor bidding
10% savings/yr



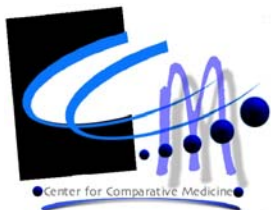
Rodent Quality Assurance



| <u>CY</u> | <u># Rooms Virus +</u> | <u># Rooms Fur Mite +</u> |
|-----------|------------------------|---------------------------|
| 2002 | ≥7 | ? |
| 2003 | 9 | ? |
| 2004 | 10 | ? |
| 2005 | 4* | 20 |
| 2006 | 0 | 0 |
| 2007 | 0 | 0 |
| 2008 | 1** | 0 |

*Average room quarantine = 164 days @ \$48K for our costs alone

** Average room quarantine - estimated 120 days (27% improvement)

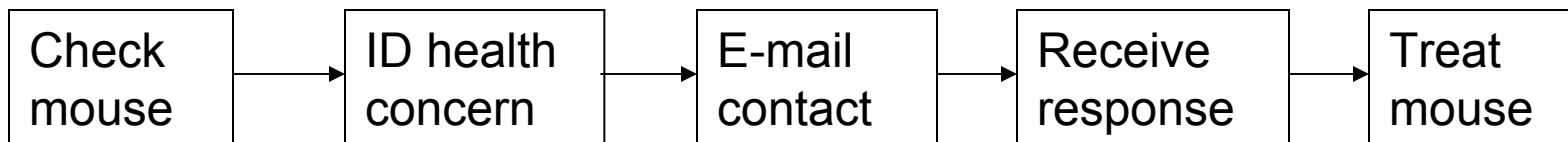




CCM TPS Workshop - 2006

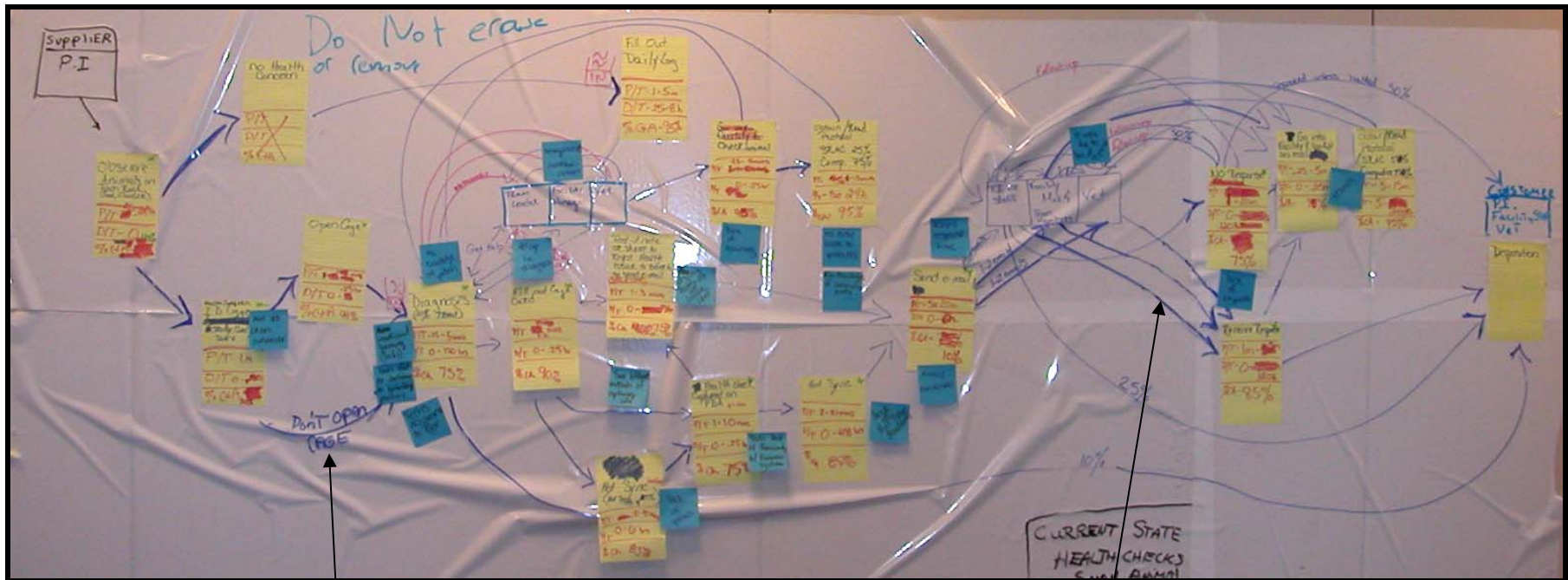
- Included care staff, facility & program managers, vets
- Tasked to evaluate a process used in all rodent facilities: rodent health case reporting
- Used value stream mapping as the initial tool

Ideal Process Flow Map:



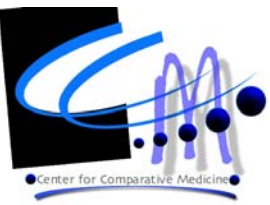
Rodent Health Alert Process

Original Value Stream Map

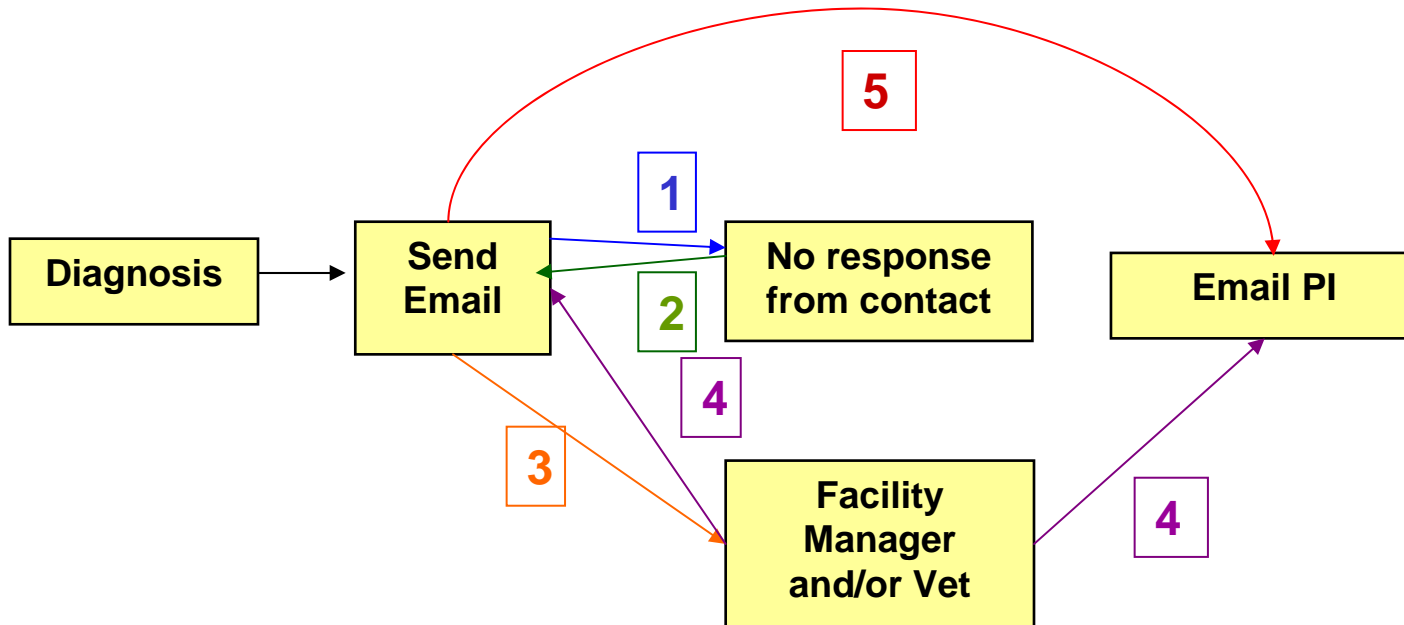


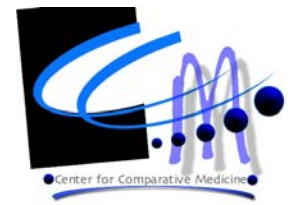
Initial diagnosis

Email communication



Rodent Health Alert Process *Schematic Value Stream Map*








Rodent Health Checks




- **Key steps were standardizing the observation/health identification process**
 - Veterinarians empowered staff to call these via poster
 - Classified as mild, moderate and severe
 - Electronical data collection customized to match the poster
 - Treatment plans defined by each classification
- **Communication Standardized**
 - Email Templates Created
 - Actions Required Were Stated
 - Staff Empowered (with SAUG concurrence) to Act
- **Metrics on Response Time & Quality**

Rodent Health Check Posters

- Developed by vets and animal care staff
- 15 most common health concerns, with standardized treatments
- Posted in all rodent rooms for immediate reference

| Digital Paradigm "Symptoms" | MILD | MODERATE | SEVERE | Email template |
|---|---|--|--|----------------------------|
| Ataxia <small>No Picture Available</small> | SIGNS/SYMTOMS Unsteady gait WHAT TO DO: Monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Unsteady gait, turning in circles WHAT TO DO: Monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Unable to right, keeps falling over, spinning WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Ataxia |
| Barbering  | SIGNS/SYMTOMS Complete hair loss with regular, smooth borders, no visible lesions WHAT TO DO: Monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Complete hair loss with regular, smooth borders, no visible lesions WHAT TO DO: Remove dominant mouse (mouse with no hair loss) Monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Complete hair loss with regular, smooth borders, lesions visible WHAT TO DO: Due to the lesions, this is now dermatitis, refer to ulcer, dermatitis for action <small>Enter in Bioware, send email</small> | Barbering |
| Conjunctivitis/Blepharitis  | SIGNS/SYMTOMS Inflammation, no discharge RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Inflammation, slight discharge, eye shut RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Inflammation, redness, discharge, lesions WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Conjunctivitis/Blepharitis |
| Poor Body Condition  | Slightly hunched posture, fur slightly ruffled, lethargic abdomen, swollen abdomen, difficulty breathing WHAT TO DO: Check teeth, check water supply, supportive care, monitor <small>Enter in Bioware, send email</small> | Thin, hunched posture, ruffled fur, dehydrated, swollen abdomen, difficulty breathing WHAT TO DO: Check teeth, check water supply, supportive care, monitor <small>Enter in Bioware, send email</small> | Emaciated, hunched posture, sunken eyes, lethargy WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Poor Body Condition |
| Diarhea  | SIGNS/SYMTOMS Sub feces WHAT TO DO: Supportive care, monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Wet feces around tail & in cage, sunken eyes, dehydration WHAT TO DO: Supportive care, monitor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Wet feces around tail & in cage, sunken eyes, thin, lethargic, hunched posture WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Diarhea |
| Dystocia  | N/A | N/A | SIGNS/SYMTOMS Pups visibly stuck in birth canal, or pregnant female lethargic, hunched, distended abdomen labored breathing WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Dystocia |
| Fighting Wounds  | SIGNS/SYMTOMS Mice observed fighting, small wounds on back, tail, forelimbs, wounds look dry in appearance WHAT TO DO: Monitor, provide additional enrichment <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Mice observed fighting, open lesions or fresh blood, scabs visible RECOMMEND TREATMENT: oral sulfation in water for 2 weeks WHAT TO DO: separate out aggressor <small>Enter in Bioware, send email</small> | SIGNS/SYMTOMS Poor body condition, infected areas, large lesions, paralysis, blood visible in cage WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | Fight Wounds |

| Conjunctivitis/blepharitis | SIGNS/SYMTOMS | SIGNS/SYMTOMS | SIGNS/SYMTOMS | Conjunctivitis/Blepharitis |
|---|--|--|---|----------------------------|
|  | Inflammation, no discharge | Inflammation, slight discharge, eye shut | Inflammation, redness, discharge, lesions | |
| | RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks <small>Enter in Bioware, send email</small> | RECOMMEND TREATMENT: Apply antibiotic eye ointment daily for 2 weeks <small>Enter in Bioware, send email</small> | WHAT TO DO: Euthanasia required within 24 hours <small>Enter in Bioware, send email</small> | |

New Email Template

Untitled - Message (Rich Text)

File Edit View Insert Format Tools Actions Help

Send Attach as Adobe PDF Arial 10 B I U

To...

Cc...

Subject:

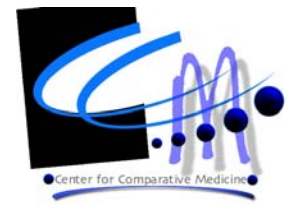
Response Required

If no response by: 8/20/07
CCM will: begin treatment

Dermatitis: inflammation of the skin

| | |
|-------------------------------|---------------|
| PI: | Kirsch |
| Protocol: | 2003N000XXX |
| Room: | 8330 |
| Rack: | A Slot: B7 |
| Health Card #: | 7792 |
| # of affected animals: | 1 of 1 |
| Severity: | Mild/moderate |

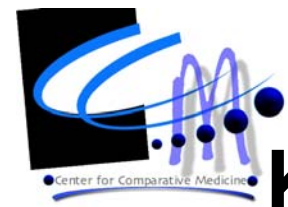
Recommended Treatment: treatment with oral Sulfatrim* (sulfamethoxazole/trimethoprim) and Benadryl - added to water bottle



Results With Standardized Alerts



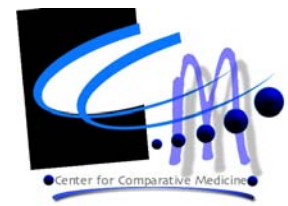
| Template type | Response rate | Average Response Time | Maximum Treatment Delay |
|--------------------------|---------------|-----------------------|-------------------------|
| Old Customized Version | 50% | 4-5 days | 12 days |
| New Standardized Version | 90% | 0-1 days | 3 days |



The Toyota Way – **Key Staff Development Principles**



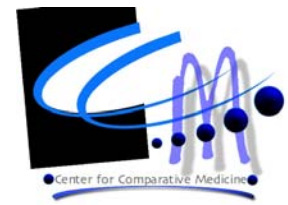
- I. Have a Long-Term Philosophy/Strategy
- II. Have Culture that supports stopping to fix problems as they happen; 1st time quality
- IX. Grow leaders/managers who know, work and live TPS
- X. Develop exceptional people & Teams who live TPS
- XII. Continuously improve through a “Go See for yourself” approach
- XIII. Make change decisions slowly with input from all stakeholders/try to reach consensus, implement quickly
- XIV. Be Relentless in your evaluations and continuous improvement



Setting A Long-Term Philosophy



- **Starts at the Top/Senior Leadership**
 - Champion an Empowered Culture
 - Continuously Communicate the Message of Continuous Improvement
 - “Walk The Walk”; “Don’t Let Business Decisions Undermine Trust and Mutual Respect”
- **Strategic Planning**
 - Create the Long-Term Path Forward
 - Develop Annual Hi-Level & Mid- Level Management Milestones/Metrics
- **Establish Metrics that Consider Quality, Cost, Efficiency and Safety**
 - CCM Balanced Score Card Created

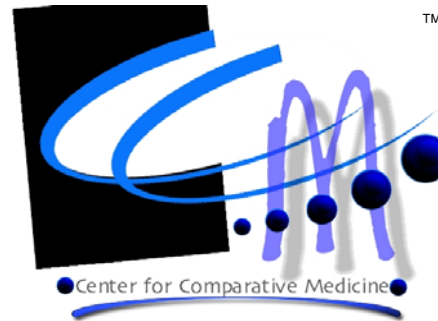


Strategic Planning



Vision of the Future

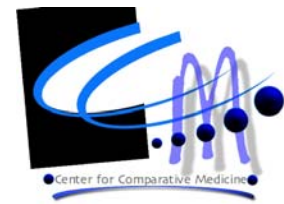
Massachusetts General Hospital
Center for Comparative Medicine



Sets Metrics for Success

FY 2007-2009
STRATEGIC PLAN
[CONFIDENTIAL]

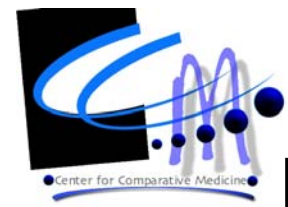
Identifies Key Initiatives



CCM Strategic Plan 2003-2005



- Enhance individual staff competencies and increase AALAS certifications
- Develop a closer interface between CCM staff in the animal rooms and research staff conducting the studies
- **Improve operations using Toyota Production Systems principles and tools**
 - Reduce Costs
 - Improve Efficiency
 - Enhance Quality
 - Increase Safety



Balanced Scorecard (BSC)

Robert Kaplan & David P. Norton



- **Helps management measure:**
 - How value is created for current and future customers
 - How internal capabilities should be enhanced
 - Where investments (people, systems and procedures) should be made for future success
- **4 Sets of Parameters (Equally Important)**
 1. The Customers Perspective
 2. The Financial Perspective
 3. The Internal Business Processes Perspective
 4. The Learning & Innovation Perspective

CCM Balanced Scorecard FY09



Financial Scorecard

- Achieve or exceed FY08 operating budget target.

Operational Scorecard

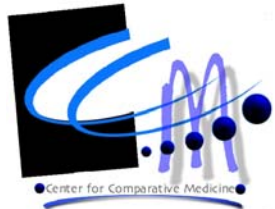
- Decrease deficiency citations to ____ at Spring 08 IACUC semi-annual inspection.
- Improve overall operability (function and acceptable quality) of sanitation equipment to __%.

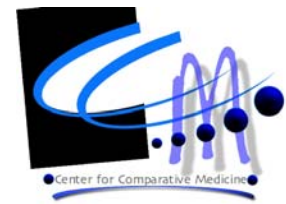
Customer Scorecard

- Reduce dissatisfaction level (occasional, often, always) of top 2 service categories to below 25% (based on 2008 Survey Results).

Learning & Innovation Scorecard

- All Research Animal Specialists hired by the beginning of Q1 complete training (with competency assessment) in approved husbandry and technical service knowledge and skills.
- Determine employee dissatisfaction level of all CCM Staff



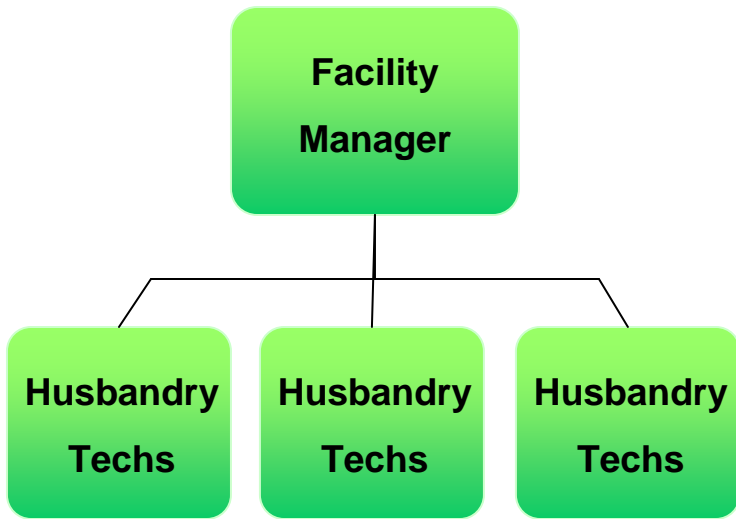


Empowerment Culture

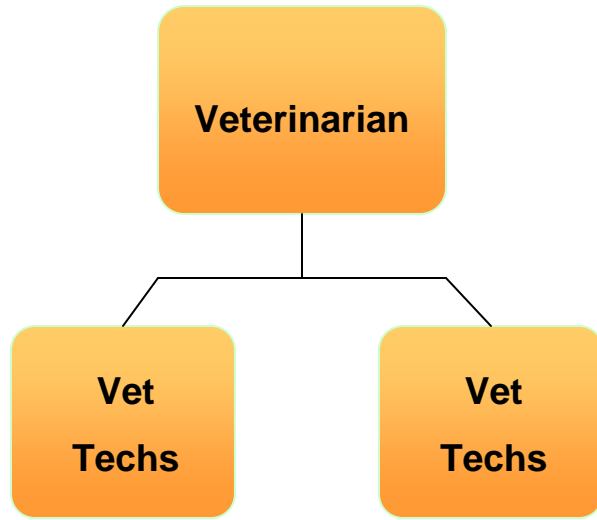


- **Mid- and High-level management mindset cannot be to “blaming” employees when problems arise**
 - Why wasn’t this employee successful in getting work done
 - Practices and workflow should be such that everyone does well
 - Lower the bar for success vs. rewarding the few who can leap high
- **Staff have to trust that they will not be penalized if they bring problems to light; help will come**
 - Immediate reactions when problems are communicated is KEY
 - Inverted Organizational Structure (management supports “folks on the floor”)
 - Add value by “Going to the floor” to see what’s working and not working on a daily basis
 - Performance evaluation should positively reward those who uncover problems
- **Continuously Support Team Concept**

Prior Organizational Structure

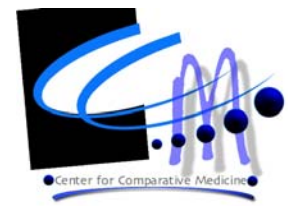


- Husbandry
- Custodial Care



- Health Checks
- Treatments

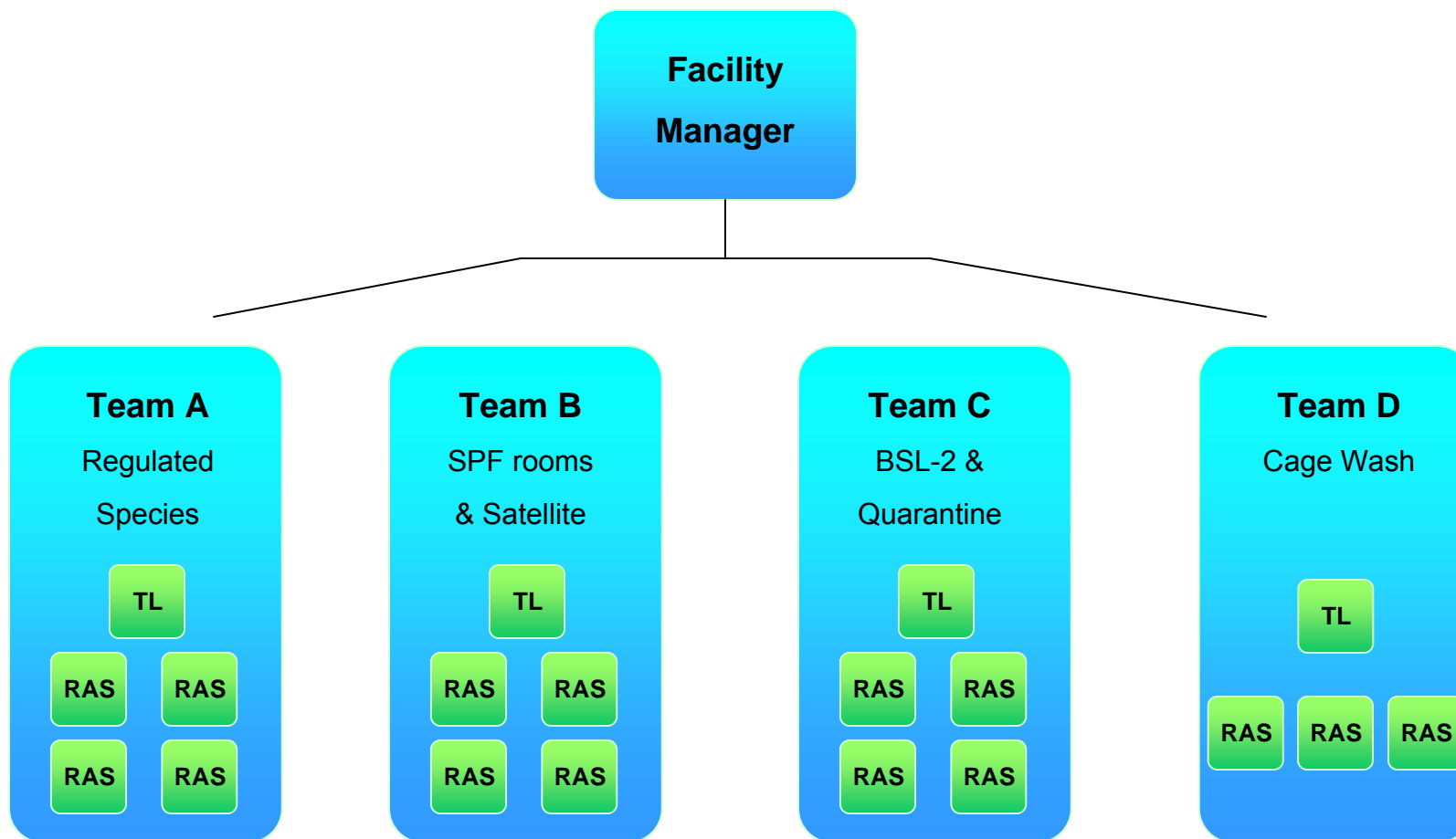


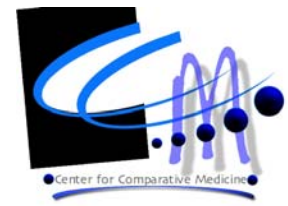


Restructuring for Success



- **Created new job description:**
Research Animal Specialist (RAS)
 - Combines husbandry *and* vet tech responsibilities
 - Career path: Levels I, II, & Team Leader
 - RAS empowered to make decisions at local level
 - Better trained staff avoid bottlenecks / gaps in care
 - Many daily responsibilities transferred from facility managers
- **Cross-functional teams created within facilities**
 - Better understanding of each other's roles (↑ task flexibility)
 - Increases personal accountability in a team setting
 - More variety = less boredom





RAS Responsibilities

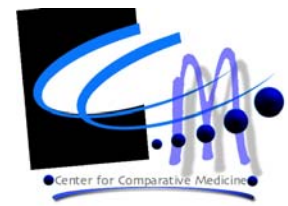


Research Animal Specialists: Combination of Animal Care and Veterinary Technical Support

RAT: husbandry, health assessments, rooms/facility maintenance, equipment maintenance, 5 S, identify problems

RAS: all listed for level I + peer training, root-cause analysis for problem solving, SOP development, pilot possible solutions to problems

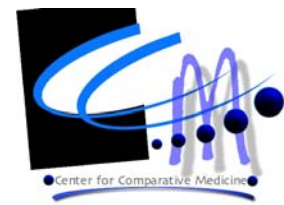
Team Leaders: fill in for absent staff, track quality metrics, look for opportunities to “build in” quality at point of action; serve as connection to researchers within designated area



Benefits of the Team Approach



- **Greater familiarity with larger scope of work**
 - All work is responsibility of the Team
 - No individual work assignments
- **Task rotation = more flexible workforce**
 - More variety in daily assignments
 - supports “thinking organization”
- **Easier identification of inconsistent practices**
 - Hidden problems & band-aided fixes identified faster
 - Quality improves because of shared responsibility and standardization



New Organizational Roles



- **Team Leads**
 - No Supervisory Responsibilities
 - Provides daily Leadership to the Team
 - Direct Interface with Researchers/Customers in their areas
- **Facility Managers**
 - Overseeing the Operations of Specific Buildings/Areas
 - Supervises all team members in Specific Areas
 - Mentors Team Leads
 - Cross-Functional Team Participation
- **Program Managers**
 - Overseeing the Operations of Specific Programs
 - Works with Team Leads to provide specific research support or regulatory requirements
- **Veterinarians**
 - Overseeing Veterinary Care for Specific Buildings/Areas
 - Works with Team Leads to provide adequate veterinary care
 - More Time to Interface with Researchers on Specific Research Needs

Team Leader

- Appointed by a facility manager to lead a facility team
- A member of the team who helps organize how to cover absences, vacations and emergencies
- Coordinates the team's assigned work
- Assures standardization, identifies areas of continuous improvement and waste

vs.

Facility Manager

- Direct supervisor of all facility staff
- Approves employee absences
- Manages all work that must be done in the entire facility
- Is not a member of a facility team, but oversees all facility teams
- Shares resources with other managers to alleviate bottlenecks, standardize practices, implement improvements

Successes:

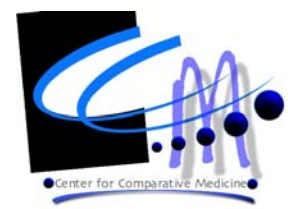
- Someone to go to for help
- Work more efficiently
- More cohesive team atmosphere
- Learn from each other
- More motivation
- Better organization to week's work
- Individual staff take more responsibility
- Clearer goals & direction
- More positive attitude
- Better quality of work



Challenges:

- Work style conflicts
- Competitiveness / Sharing resources between teams
- Too many directions
- Motivating some staff
- Too much responsibility
- Team "tunnel vision"
- Rely too much on one another



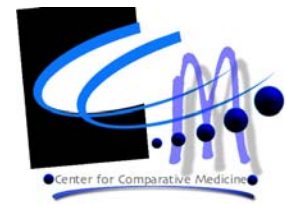


CCM's Team Organization



- 17 RAS Teams Providing Direct Service to Researchers
- Average Team Size – 3-5 people
- 17 Team Leads
- 10 Facility & Program Managers
- 4 Clinical Veterinarians
- Current Continuous Improvement Projects
20+ Cross-functional Initiatives
5-10 Initiatives/Facility focused on improved services

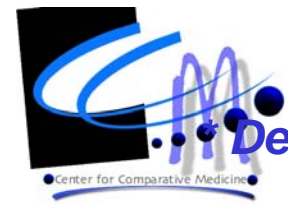
Key Requirement – TPS Training at all Levels



TPS Basic Training



- **On-Board Training**
 - Introduction to TPS Terminology
 - Reinforcement of Problem-solving & Empowerment Culture
- **Semi-Annual Training**
 - Two 2-Hr Sessions
 - Review of TPS Tools (Visual Cues, Identification of Waste, Standardization, 5 Why Analysis, VSM)
 - Benefits of Teams
 - Team Problem-solving Exercises

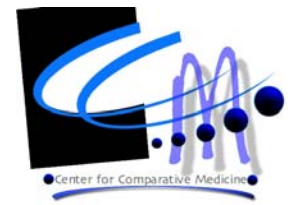


TPS Team Leader Training

Development of Team Leaders in a Team- Oriented Organization



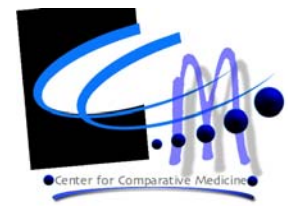
- **Team Leader training classes**
 - Classes are created and led by managers and experienced team leaders
 - Cover Lean Management principles and tools
 - Organizational, leadership, & soft skills are *learned* and honed
 - Class-related projects
- **Three-month evaluation**
 - Support and continual feedback from Facility Manger
 - Feedback from rest of team using evaluation forms
- **Continuous education**
 - Monthly department-wide meetings for all team leaders



Mid-Level Management Training



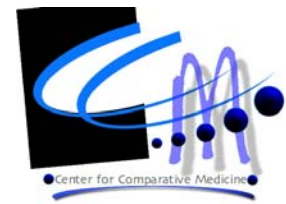
- **Taught by Senior Staff – TPS Champions**
- **2-hr Weekly Sessions for 10 weeks (annually)**
- **Curriculum**
 - Case Studies
 - Toyota Operations – TMM, Inc.
 - Toyota Staff & Management Development – Jack Smith
 - Team-Oriented Organizations – New England Patriots
 - Innovation – IDEO and 3M
 - Review of *The Toyota Way's* 14 Principles
 - Standardization & Workflow Fundamentals
 - Problem-Solving at the Different Levels (Local, Mid-, High Level)
 - Value Stream Mapping – Project Management
 - Managing and Mentoring and Empowered Staff
- **TPS Individual Project (90 days)**
- **Annual Refresher Training**



Understanding Workflow



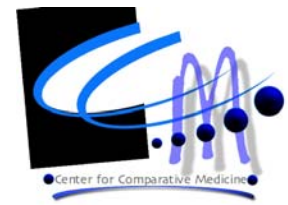
- Document connections by tracking the product from supplies to final product
- Use Process flow mapping/Value Stream mapping to visualize these connections and where poor quality, rework or excessive “work-in-process” exist
- Remove “silos” of work; work shared by all team members
- Recognize “internal customers” within department; who is going to receive your “product”, how and when
- Uncovers the “waste”
- Move towards “pulling” work through vs. “pushing”



Standardization



- Performance of all steps of the workflow should be the same for all staff involved
- Makes it easy to cover absentism; incomplete work
- Establishes consistent quality regardless of who is doing the work
- Training should focus not on what you do but HOW you do it
- Helps to estimate time regardless of who is doing the work for each component of the value stream
- Enhances concept of teamwork vs. individualism
- Sets starting line for all continuous improvement



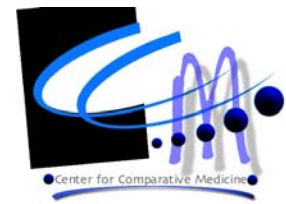
Standardization - One Page SOP



- Works best in academia & non-GLP environments
- Standardization using visual controls
- All key steps of a task identified with pictures of the tasks
- Can be posted and easily referenced at the point where the task occurs

One Page SOPs & Visual Controls





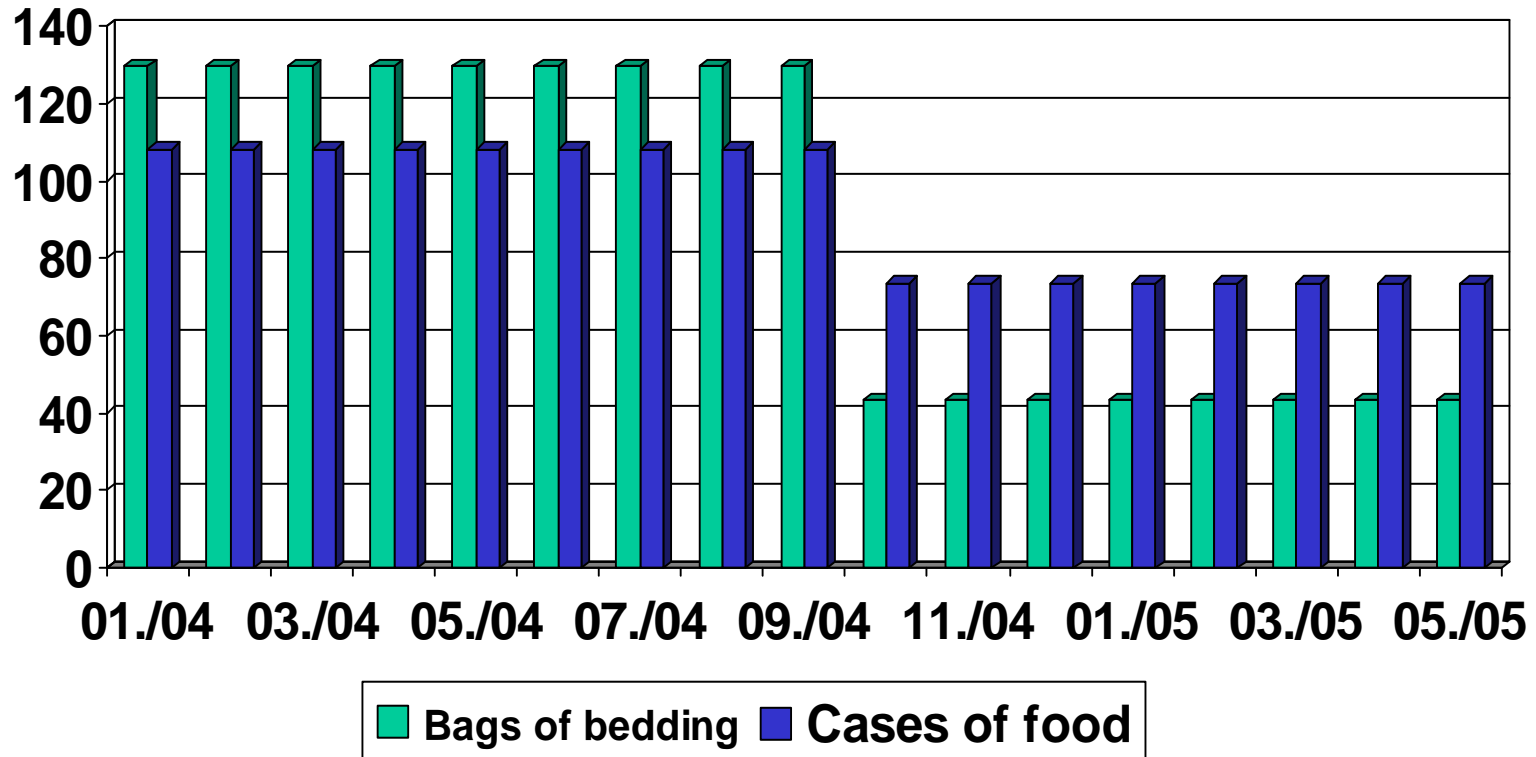
Leveling Out Work/Heijunka

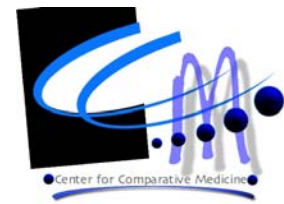


- Determine the right amount of product for the next step of the workflow at the time that it is needed
- Create work efforts/schedules that mix up processing to avoid equipment “strain” and equipment shortages
- Heijunka work schedules so that staff have mixture of tasks on daily/weekly basis to support a “thinking” work environment
- Uncovers poor quality issues when they happen before overproduction occurs
- **Example: Rodent cage changing scheduling**

Heijunka Project in 2004-2005

BEDDING AND FOOD USED IN 114 FACILITY FROM JAN. 04 TO MAY 05

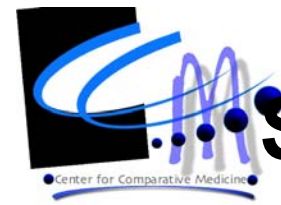




Solve Problems As they Happen



- Organizational culture has to reward staff for bringing problems to the surface; change our natural tendency “band-aid” problems when they occur
 - Emphasis should be on quality and not volume
- Empowers “people on the floor”; Invert your organization so that each level of leadership responds when problems arise/”Andon cord” is pulled
- If standardized work cannot be performed as trained then quality will be compromised repeatedly
- Use 5 Why Analysis to uncover all level of the problem
 - Surface/Low Level: “I can’t get my work done”;
 - Organizational/High Level: We need to change on a programmatic level



Solve Problems at Different Levels



Use 5 Why Analysis to uncover “problem’s root-cause”

- **First/Second Whys: Surface/Low Level**

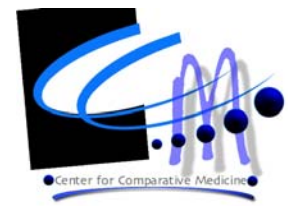
- “I can’t get my work done”; problem specific to a team member or team
- Team Leads/Managers help to resolve immediate issue quickly and get “assembly line moving”

- **Second/Third Whys: Facility & Program/Mid-Level**

- “ This problem occurs throughout my facility or program”; multi-team problems
- Uncovers process/policy inconsistencies & deficiencies
- Team Leads/Managers across multiple groups work together to determine best practice

- **Fourth/Fifth Whys: Organizational/High Level**

- “This problem exist throughout the organization”; department-wide impact
- Senior Leadership works with Managers to restructure processes



Lab Animal Lean Management 2008 Reference



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