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May 7, 2015

Re: Graduate Research and Creative Activities Symposium

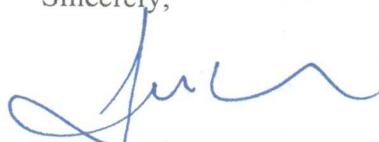
Dear Presenter,

Congratulations on being selected as a winner for your presentation during the 7th Annual Graduate Research and Creative Activities Symposium. Your research exemplifies the work that you and your peers have completed for the benefit of the university and our community. We are honored to be partners in your research and we commend your efforts.

Please stop by the Division of Graduate Studies with the included forms completed at your earliest convenience for instructions on claiming your award.

Once again, congratulations!

Sincerely,



James E. Marshall, Dean
Division of Graduate Studies

JEM: rg
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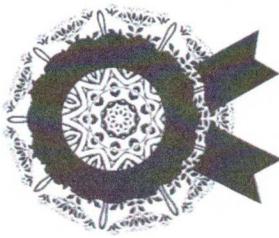
Certificate of Completion

Proudly presented to:

Sheena Keding

For successfully completing 13-hours of professional development in:

The Resilient Heart™: Trauma-Sensitive HeartMath Course



June 27, 2024

Course Completion
Date

Tricia A. Hoffman

Tricia A. Hoffman, Director Training and Licensing, HeartMath LLC

Jorina Elbers

Jorina Elbers, Director Trauma Recovery Project, HeartMath Institute

Reducing Rates of Post-Operative Pneumonia Diagnosis in a Tertiary Pediatric Care Center

- Post-operative pneumonia diagnosis rates at the Kaiser Permanente-Oakland Medical Center were in the “High Outlier” range in the “Pediatric” category for several SAR’s in a row.
- Chart review noted that most patients who met NSQIP-P criteria for pneumonia did not have a pneumonia clinically



Fig 1. Of 14 cases that met NSQIP-P criteria for pneumonia, 10 were deemed not to have pneumonia clinically

Establishing a reliable system for review of official radiology reads and consistently addressing any noted pathology in report narratives is important for both accuracy of outcomes measures for pneumonia diagnosis as well as good patient care



- July 2021: intervention aimed at minimizing inaccurate pneumonia diagnosis rates
 - Systemic education of stakeholders through staff meetings and rounds with residents about the Pediatric NSQIP program and importance of appropriate documentation to help address our “High Outlier” status
 - Socialization of the concept of Pediatric NSQIP
- We improved our post-operative pneumonia diagnosis rates and exited the “High Outlier” category before our target SAR of July 2023

Data Source/Population and Results:

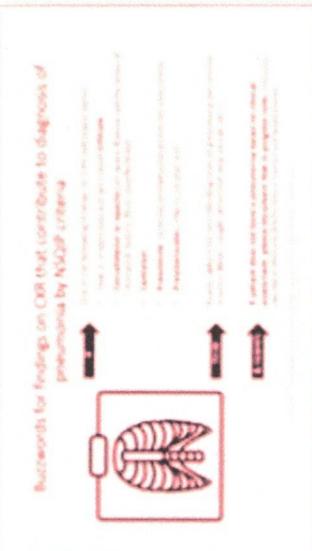
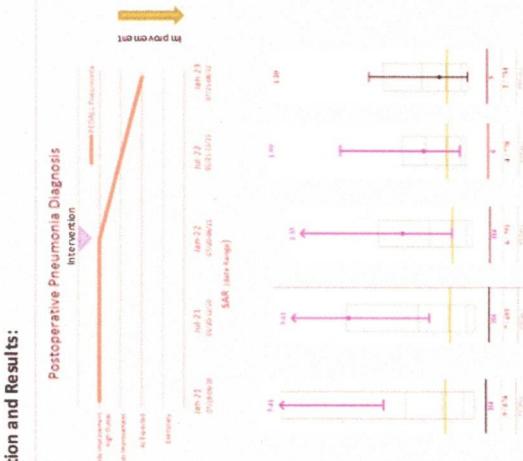


Fig. 2 Handout used to help prompt consistent documentation



Lessons Learned

- Starting small in quality improvement projects and setting reasonable goals helps optimize the chance for success by maintaining team enthusiasm and momentum.
- A systemic approach to quality improvement projects is central to success
- Solving a problem requires a clear understanding of the nature of the problem.
- Investigating a problem can lead to identification of deficits that are important though unrelated to the problem at hand

¹Pediatric Residency Program, Kaiser Permanente Oakland Medical Center

²Pediatrics, The Permanente Medical Group, Kaiser Permanente Oakland Medical Center

³Risk and Quality, Kaiser Foundations Hospitals

⁴Pediatric Surgery, The Permanente Medical Group, Kaiser Permanente Oakland Medical Center

Comprehensive Labelling of Melanopsin Expressing Retinal Ganglion Cells

And Mapping their Central Projection in Mouse.

Sheena R. Keding, Megumi Hatori, Hiep Le, Satchidananda Panda.
Salk Institute for Biological Studies, San Diego, CA, USA.

ID: 655/B602

Abstract

Melanopsin is an opsin class of photopigment exclusively expressed in a small subset of retinal ganglion cells (mRGCs) that are intrinsically photosensitive. These mRGCs project their axons to the Suprachiasmatic Nucleus (SCN) and a few other brain regions that directly or indirectly regulate all non-image forming visual processes including circadian photoinhibition, pupil constriction, pineal melatonin regulation and light regulation of activity/rest. Identifying the full complement of mRGCs and their central projection is critical to understanding the cellular basis of melanopsin function. However, the existing methods to mark melanopsin cells and map their projections are insufficient. Therefore, we have generated transgenic reporter lines to specifically label the mRGCs and comprehensively study the projections of mRGCs in adult mice.

We generated a mouse with targeted insertion of *Opm4^{Cre/+}* into the native melanopsin locus and bred it with a *ZEBG* (*laczZ*/EGFP) or *ZAP* (*laczZ*/human alkaline phosphatase) mouse. This strategy allows Cre-dependent expression of green fluorescent protein (GFP) or human placental alkaline phosphatase (AP) from a strong *β-actin* promoter. The resultant mice melanopsin cells are marked with a GFP or an AP marker which can be visualized by fluorescence or histochemical staining respectively.

In the retina of *Opm4^{Cre/+}*/*ZEBG* mice, GFP expressing cells were mostly found in the retinal ganglion cell (RGC) sub-layer, and these cells had extensive dendrite arborization characteristic of the mRGCs. An average of 131 GFP expressing cells/mm² (±25.4, SD, n = 3) were found in these retina, 42.6% of which also expressed immunologically detectable levels of melanopsin. Within *Opm4^{Cre/+}*/*ZAP* mice, the strong innervation of mRGCs in the SCN is much more apparent. Additionally, mRGCs axon termini also sparsely innervate various other hypothalamic regions. Surprisingly, the AP staining also revealed extensive projections of the mRGCs in the lateral geniculate complex which is involved in image-forming vision. This implies mRGCs may play some role in patterned vision. In summary, we found that the projection patterns of mRGCs were much more extensive than previously reported.

Introduction

The mammalian circadian clock is an endogenous oscillator that shows approximately 24 hour rhythms. Its phase can be affected by external cues, most strongly by light. The central circadian clock is located in the Suprachiasmatic Nucleus (SCN) within the hypothalamus.

The SCN clock receives external light cues that trigger entrainment to photic cycles through a set of photoreceptors in the retina referred to as melanopsin expressing Retinal Ganglion Cells (mRGCs). It was previously known that these cells project through the retinohypothalamic tract (RHT) leading to the SCN and to the Olivary Precerebellar Nucleus (OPN) which regulates pupil constriction. However, complete mRGC projection to the brain was unknown. The diagram below is a sagittal section that illustrates what was previously assumed to be the targets of the mRGCs.



Adapted from Panda et al. Nature 2002

Opm4^{Cre/+}/*ZEBG* and *Opm4^{Cre/+}*/*Z/AP* Breeding Strategy

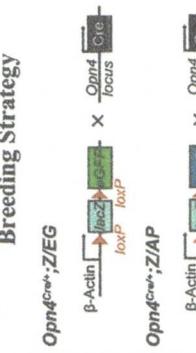


Figure 1. Strategy for Labelling Melanopsin Retinal Ganglion Cells (mRGCs).
A mouse with a *Cre* recombinase "floxed" in the melanopsin locus was bred with a *ZEBG* or *Z/AP* mouse allowing for the *Cre*-dependent expression of EGFP or Alkaline Phosphatase (AP) respectively.

Genetic and Immunohistochemical Co-labelling of mRGCs

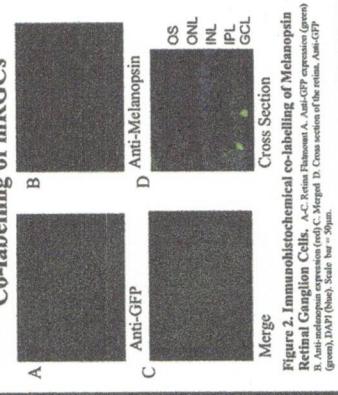


Figure 2. Immunohistochemical co-labelling of Melanopsin Retinal Ganglion Cells (mRGCs).
Anti-melanopsin expression (red). Anti-GFP expression (green). DAPI (blue). Scale bar = 50μm.

Lateral Geniculate Nucleus (LGN) and Pretectal Targets

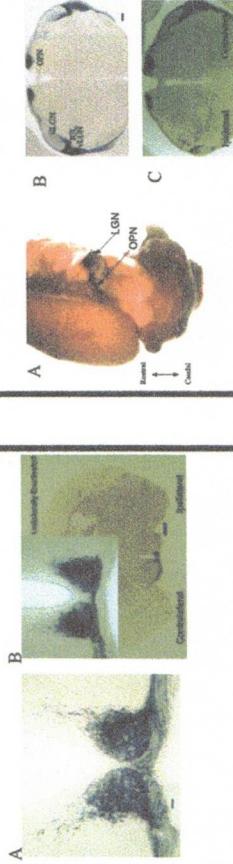


Figure 5. Genetic Labelling of mRGCs in the LGN and Pretectum.
Opm4^{Cre/+}/*Z/AP* mouse is stained with AP substrate. A: Coronal brain section showing Sagittal section of SCN. B: Coronal brain section showing SCN. C: Coronal brain section showing SCN. Labels indicate SCN, LGN, and SCN. Arrows point to SCN and LGN. Scale bars = 50μm.

Genetic Labelling of mRGCs

A

B

C

D

OS
ONL
INL
IPL
GCL

Figure 3. *Opm4^{Cre/+}*/*Z/AP* retina stained with AP substrate.
A: Uniform distribution of melanopsin expressing retinal ganglion cell axons throughout the mouse retina. Each retina contained 1500 ± 721 (average ± SD, n = 4) AP stained axons. B: Merged image of the same retina. C: Axons were restricted to the ganglion cell layer (GCL) and the innermost region of the inner nuclear layer (INL). D: Cross section of the retina. Scale bar = 50μm.

Superior Colliculus (SC) Targets

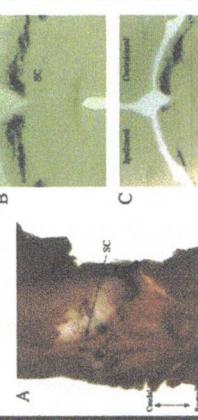


Figure 6. Genetic Labelling of mRGCs in the SC.
Opm4^{Cre/+}/*Z/AP* mouse was injected with several tracts of rat/GC projections into the SCN. A: Coronal brain section showing SCN. B: Coronal brain section showing SCN. C: Coronal brain section showing SCN. Labels indicate SCN. Arrows point to SCN. Scale bar = 50μm.

Conclusion

We created transgenic reporter mouse lines that allowed us to specifically label mRGCs and therefore comprehensively study their projections. In our *Opm4^{Cre/+}*/*Z/AP* mouse, mRGCs were evenly distributed across the retina with approximately 1500 cells per retina which is about two times more than were previously labeled in *Opm4^{Cre/+}* mouse (Hattar et al. 2006). In our mouse line, we found mRGC projections in the SCN (Figure 4A) and OPN (Figure 5A and B) and SCN (Figure 6A and B) that contributes to photoentrainment, and the Superior Colliculus (SC; Figure 6A and B) in the Tectum which contributes to rapid eye movements.

Through unilateral emasculation it appears that the SCN is innervated equally by both contralaterally and ipsilaterally projected mRGCs (Figure 5C). Further down the path the SC is also receiving projections from mRGCs contralaterally as shown through unilateral emasculation (Figure 6C).

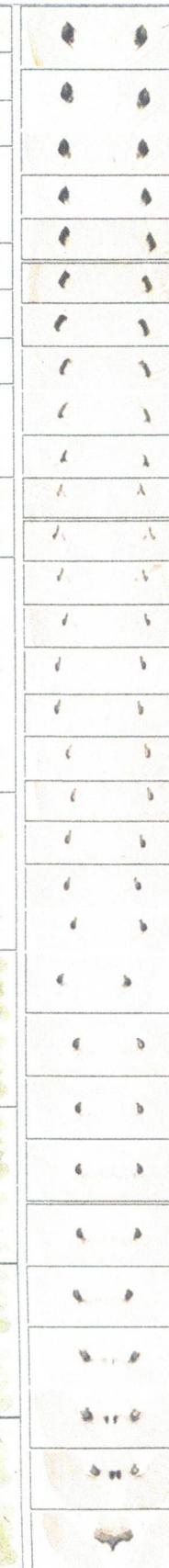
Comprehensive map of melanopsin-expressing retinal ganglion cells in mouse

Satchidananda Panda, Sheena Rachel Keding, Megumi Hatori.

Salk Institute for Biological Studies, San Diego, CA, USA.

Summary: Melanopsin is an opsin class of photopigment exclusively expressed in a small subset of retinal ganglion cells (mRGCs) that are intrinsically photosensitive. These mRGCs project their axons to the suprachiasmatic nucleus (SCN) and a few other brain regions that directly or indirectly vision-forming visual processes, including circadian photoreframing, pupil constriction, pineal melatonin regulation and light regulation of activity/rest. Identifying the full complement of mRGCs and their function is critical to understanding the cellular basis of melanopsin function. However, the existing methods to mark melanopsin cells and map their projections are insufficient. Therefore, we have generated transgenic reporter lines to specifically label the mRGCs and comprehensively study the projections of mRGCs in adult mice. We generated mRGCs with targeted insertion of Cre-recombinase into the native melanopsin locus and bred it with a ZEG or ZAP mice. This strategy allows Cre-dependent expression of green fluorescent protein (GFP) or human placental alkaline phosphatase (AP) from a strong β -actin promoter. In the resultant mice melanopsin cells are marked with a GFP or an AP marker which can be visualized by fluorescence or histochemical staining respectively. In the retina of *Opn4^{ZEG/ZEG}* mice, GFP-expressing cells were mostly found in the retinal ganglion cell (RGC) sub-layer, and these cells had extensive dendritic arborization characteristic of the mRGCs. In *Opn4^{ZAP/ZAP}* mice, the mRGCs strongly innervate the SCN. Additionally, mRGCs axon termini also sparsely innervate various other hypothalamic regions. Surprisingly, the AP staining also revealed extensive projection of the mRGCs in the lateral geniculate complex which is involved in image-forming vision. This implies mRGCs may play some role in pattern vision. In summary, we found that the projection patterns of mRGCs were much more extensive than previously reported.

Figure 4. Serial coronal brain sections of *Opn4^{ZEG/ZEG}* mice showing extensive monocular central projections of the mRGCs. Average section thickness 150 μ m.



Conclusions: (1) We found ~1500–2000 retinal ganglion cells labeled with *Opn4^{ZEG/ZEG}*. Dependent expression of AP or GFP reporter. However, significant number of cells also stained positive for GFP or melanopsin alone. Insufficient melanopsin expression might account for GFP-only cells. There are reports of silencing of ZAP and ZEG transgenes in adult neurons, which might account for GFP-only mRGCs. Therefore, we suspect the actual number of mRGCs with active melanopsin promoter might be slightly higher than detected here. (2). mRGCs from each retina project almost bilaterally to the SCN. In the SCN the mRGC projections are largely contralateral. (3). mRGCs sparsely innervate large areas of the hypothalamus. In the thalamus the mRGCs projections are found in the ventral SCN, LGN, and in the dorsomedial portion of the SCN. In summary, we found that the projection patterns of mRGCs were much more extensive than previously reported.

Acknowledgments: We acknowledge the technical help from Hop Le, and Daniel Gibbs. The work was supported by Dana Foundation grant and NIH Grant EY 16807 to SP, and JSPS fellowship to MH.

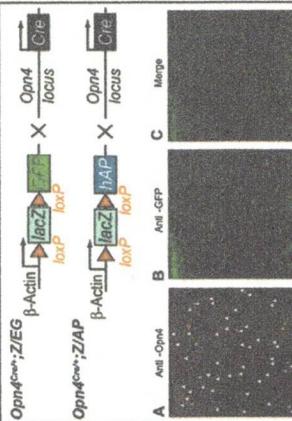
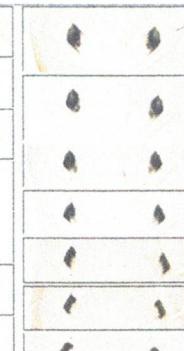
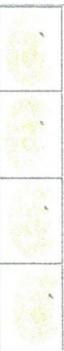


Figure 1. Strategy for Labeling Melanopsin Retinal Ganglion Cells (mRGCs). Breeding scheme for the Cre dependent expression of GFP or Alkaline Phosphatase (AP) in the mRGCs. Representative flat mount retinal sections from *Opn4^{ZEG/ZEG}* mice co-labeled with a purified rabbit polyclonal antibody raised against an N-terminal peptide of mouse melanopsin. (A) Anti-Opn4-immunofluorescence (red), (B) GFP expression (green), (C) merge. We found 110–300 GFP positive cells/mm², which amounts to <1500 cells in the adult mouse retina (based on an area of 14 mm²). Of these cells 86.4% were double labeled (white arrows in A) and 10.2% were GFP positive (green arrows) but lacked detectable melanopsin immunostaining, presumably due to a very low level of melanopsin expression undetectable by fluorescence microscopy.

Figure 2. (A) Nearly 1,566 \pm 72 AP stained RGCs are found in each retina. (B) AP labels the soma, dendrites, and axons of mRGCs. Labeled cell bodies are restricted to the ganglion cell layer (GCL). Coronal sections from unilaterally enucleated mice stained for mRGC interventions to the SCN. (C) Dorsal SCN. (D) Anterior SCN. (E) ventral SCN. (F) dorsal SCN. (G) SCN. As shown previously the SCN receives bilateral innervation of mRGCs from each retina.



Inter-Rater Reliability (IRR) Trigger Tool



Automated Data Validation Greatly Enhances Data Reliability

- Computer programming streamlines the validation process
- Enables all cases to be logically reviewed with preset checks, supporting the IRR process
- Increases data accuracy

Data reliability is imperative in determining quality improvement opportunities. The ACS defines that for participating hospitals to have reliable data, each center, if audited, should have a disagreement rate of <5% over all variables evaluated.

To streamline the IRR process and be more comprehensive in our review, we developed an automated tool that evaluates abstracted cases and flags potential errors for correction.

Sample Program Output

Case_ID	Data_Reason	Flag	Concern
1	Different Hospital_Admission_Date and Time_of_Presentation_Date	7	Potential Error Date mismatch
2	Different Hospital_Admission_Date and Time_of_Presentation_Date	8	Potential Error Date mismatch
3	CPT-24538 AND Laparoscopic_MS_Procedure not LAPAROSCOPIC/MIS ONLY	9	Error Surgical method incorrect
4	CPT-44970 AND Case_Status not Urgent	10	Potential Error Case priority incorrect
5	CPT-44970 AND Wound_Class=1	11	Error Wound Class discrepancy
6	CPT-24538 AND Laparoscopic_MS_Procedure not LAPAROSCOPIC/MIS ONLY	12	Error Surgical method incorrect
7	Different Hospital_Admission_Date and Time_of_Presentation_Date	13	Potential Error Date mismatch
8	Different Hospital_Admission_Date and Time_of_Presentation_Date	14	Potential Error Date mismatch
9	CPT-44970 AND Wound_Class=1	15	Error Wound Class discrepancy

Data Source/Population and Results

- Data Sources
 - Data Download Report (DDR)
 - Excel input files developed by our team (examples below)
 - CPT code and Wound Class discrepancy flag as error
 - Low WBC values by Age Group, with CPT code 44970, & wound class 4, but not SIRS, flag as potential error

Results/Methods

- SCR downloads the DDR from the ACS portal
- The program performs logical checks on the case data
- The output is a list of cases that are errors or potential errors and includes the reason each case is flagged
- The SCR updates the case data on the ACS portal

Lessons Learned

- Despite putting great care towards abstracting cases, errors are inevitable
- The trigger tool helps us validate our cases efficiently and identifies common types of errors
- We will add more logical checks as we enhance the tool
- The tool cannot catch all errors so we must remain vigilant in preventing errors and looking for them as we review cases

Examining the Relationship Between Circadian Temperature Rhythm and Successful Discontinuation of Mechanical Ventilation

Sheena Keding, MSN(c), RN, at the School of Nursing, California State University, Fresno

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Research Question

Does the presence of a circadian temperature rhythm have a relationship to the ability to successfully discontinue the mechanical ventilator?

Method

- Retrospective descriptive correlational study
- Mechanically ventilated for > 96 hours
- Excluded female, age > 50 years, age < 20 years, neurologic trauma, burn trauma, and patients with tracheostomy
- Cosinor Analysis done to identify circadian rhythm from temperature data with a threshold of $r^2 > 0.30$ (r^2 is higher than circadian rhythm is present)

Introduction

Every client who receives mechanical ventilation will require the weaning process and eventually discontinuation of the ventilator. However, removal of mechanical ventilation and subsequent extubation is an invasive intervention that can be extremely challenging and lead to poor outcomes if it is attempted when optimal health is not present (Drouot, Cabello, d'Ortio, & Brochard, 2008). The current protocol used to determine when a patient is ready to have the ventilator discontinued includes a Spontaneous Breathing Trial (SBT). However, the use of only the SBT to determine readiness leads to 31.2% of patients failing extubation (Boles et al., 2007). Furthermore, there is a population of patients who struggle with the removal of mechanical ventilation, and it is suggested that 10-50% of patients will experience prolonged ventilation due to difficulty with the discontinuation process (Boles et al., 2007).

Sleep and circadian researchers have suggested there is a relationship to their field of study with medical interventions such as mechanical ventilation. The expressed relationship involves improved patient outcomes if invasive interventions are performed in the presence of optimal health which is evidenced by stable circadian rhythms (Drouot et al., 2008). It has been hypothesized that the presence of circadian rhythms will allow the patient to recover from invasive interventions (Drouot et al., 2008; Hanneman, 2009).

Since additional criteria are needed to support those 31.2%, this study aims to apprehend the impact, if any, that circadian temperature rhythm might have on the process of discontinuing the ventilator.

Results

Table 1 summarizes the presence of a temperature rhythm in relation to success with ventilator discontinuation.

- A total of 29% of 31 patients exhibited a rhythm prior to extubation.
- There was an 89% chance at being successful when rhythm is present, while only a 73% chance of success when lacking a rhythm.

Table 1. Outcomes of Ventilator Discontinuation Among Patients With and Without Circadian Rhythms

Rhythm prior to Discontinuation of the Ventilator	Frequency (n)	Failed Discontinuation (n)	Successful Discontinuation (n)
No Temperature Rhythm	22	6	16
Temperature Rhythm	9	1	8
Total Cases	31	7	24

Table 2 displays the characteristics of the patients in each group. None of the differences were statistically significant.

- The average total time for all patients on a ventilator was 171 hr.
- Although not statistically significant, the average ventilator time for those with rhythm was greater than for those without by 52 hr.
- The average age for all patients was 40.23 years old. The average age for those exhibiting circadian temperature rhythm was younger than for those who did not exhibit temperature rhythm at that time, by 4.7 years.

- The average total hospitalization time was 28 days. The average hospital days for those with rhythm was almost two times more than for those without rhythm.

Table 2. Characteristics Between Patients With and Without Circadian Temperature Rhythm

Patient Characteristics	Rhythm prior to discontinuation	N	Mean	Std. Deviation	Std. Error Mean
Total time On Ventilator - (hr)	No Rhythm	21	155.64	50.229	11.005
	Rhythm	9	207.72	130.550	43.517
Age	No Rhythm	22	41.59	8.279	1.765
	Rhythm	9	36.89	10.470	3.490
Total Hospitalization (days)	No Rhythm	22	23.00	12.728	2.714
	Rhythm	9	40.22	43.425	14.475

Conclusion

This study was suggestive of the existence of a relationship between the presence of circadian temperature rhythm and successful discontinuation of the mechanical ventilator for patients on a mechanical ventilator >96 hr. There was increased success with the removal of the ventilator in the presence of a circadian temperature rhythm. It is important to note, the lack of rhythm did not indicate failure, rather only decreased chance of success.

Furthermore, for those who exhibited a rhythm at the time of extubation, it was noted their average hospital length of stay and duration of mechanical ventilation was increased. The relationship here may be related to the fact that the patients had more time to adapt to the environment and equipment to develop and display a circadian temperature rhythm. Therefore it is not the rhythm that caused the increase in duration of the discontinuation process, but possibly it was the extended time that allowed for circadian temperature rhythm to develop through adaptation.

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Contact Information

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A. Patient exhibits a circadian temperature rhythm. The corresponding $r^2 = 0.72$. B. Patient does not exhibit circadian temperature rhythm. The corresponding $r^2 = 0.02$.

Newborn Drops Prevention: State of the Science



Atrium Health Musculoskeletal Institute

Kathy Schaeffer, DNP, APRN, AGCNS-BC, C-ONQS, Atrium Health; Erin Bush, PhD, RNC-MNN, HD Nursing; Julie Hamilton, MSN, RN, CPHQ, Atrium Health Wake Forest Baptist; Jennifer Ingle, DNP, RN-BC, NEA-BC, Atrium Health Wake Forest Baptist; Sheena Keding, MSN, RN, CNS, ACCNS-P; Amy Hester, PhD, RN-BC, HD Nursing

Introduction

Newborn drops continue to occur in hospitals. A paucity of literature on the subject provides clues to potential solutions, however these studies are not generalizable due to the small number of subjects and ethical constraints that limit prospective studies. A coalition of AWHONN members from facilities across the country joined forces to:

- (1) evaluate the evidence around newborn drops prevention,
- (2) determine the gaps in this science,
- (3) identify a slate of needed research to close these gaps, and
- (4) initiate research designed to close these gaps. The first step in this process was the synthesis of literature.

Results (Cont.):

Reduction strategies included risk assessment, patient/nursing education, visual cues, patient contracts, protected maternal sleep, additional support during nighttime breastfeeding, post-event debriefs and policy development. Reported outcomes include a range of 1-2 years without falls, a 36% decrease in falls, and a consistent downward trend in falls since implementation.

Discussion/Conclusion

Risk assessments used in these studies were not validated and the debrief reported did not include all common cause contributors used in the risk assessment. Validation of a risk assessment tool is needed to correctly identify those most at risk. This synthesis of literature forms the basis of the coalition's next steps which include development and psychometric testing of a newborn drops risk assessment tool.

Methods:

PRISMA methodology guided the synthesis of literature. Mesh terms included ["Risk Factors" and "Accidental Falls" and "risk factors" and (infant, newborn)]. PubMed and CINHAL database searches returned 44 unduplicated articles. Eighteen articles were excluded due to wrong population or setting. Eighteen of 26 articles met inclusion criteria (US hospital or birthing center, inpatient newborn faller). Data extracted included problem/purpose, study design, sample size, methods, instruments with reliability and validity, findings, and implications.

Results:

Articles meeting inclusion criteria (n=18) included 4 observational, 4 retrospective review, 3 descriptive, 3 performance improvement projects, 4 editorial/expert opinion, and 1 practice brief. Study sample sizes ranged from 5-64 newborn falls and in total, the entire body of literature is based on 168 newborn falls.

1. Lipke, B., Gillbert, G., & Shimer, H. (2018). Newborn Safety Bundle to Prevent Falls and Promote Safe Sleep. *MCN American Journal of Maternal/Child Nursing*, 43(1), 32-37. doi:10.1097/NCM.0000000000000402
2. Miner, J. (2019). Implementation of a Comprehensive Safety Bundle to Support Newborn Fall/Drop Event Prevention and Response. *Nursing for Women's Health*, 23(4), 327-339. doi:10.1016/j.nwh.2019.06.002
3. Karlsson, K., Makatura, J., Mulkey, D. (2021). Implementing a Maternal Rest Bundle to Prevent Newborn Falls. *Journal of Obstetrics, Gynecology, & Neonatal Nursing*, 50(5), 621-631. doi:10.1016/j.jogn.2021.06.005
4. Association of Women's Health, Obstetric and Neonatal Nurses. (2020). Prevention of Newborn Falls/Drops in the Hospital: AWHONN Practice Brief Number 9. *Journal of Obstetrics, Gynecology, & Neonatal Nursing*, 49(5):500-502. doi:10.1016/j.jogn.2020.06.004
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Selecting the Sampled Procedures: What's the Correct Case?

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Introduction

It is imperative to maintain an efficient workflow for the SCR. Case selection using the NSQIP Sampling Strategy, is one of the components that impacts the workflow. We hypothesize that automating case selection will reduce time required of the SCR, while improving the accuracy and consistency of data.

Methods:

The sampling strategy was automated using Visual Basic for Applications (VBA) within Microsoft Excel. Our programmer created a workbook called the Surgical Case Sampling Tool (SCST). Iterative validation and development occurred through collaboration with the SCR. The tool contains the list of procedures, limits on case collection, and a graphical user interface (GUI) for importing data. A database of CPT code combinations and the appropriate Principle Operative Procedure (POP) for each combination is included and is modified when new procedure code comparisons arise.

Results:

The SCST has three phases of output. The first identifies cases with missing procedure codes. When these are addressed, the second output identifies cases where multiple procedure codes are used. Initially, the user is queried regarding the POP, but the iterative evaluation allows the tool to learn for future cycles. The final output is the list of cases to be included.

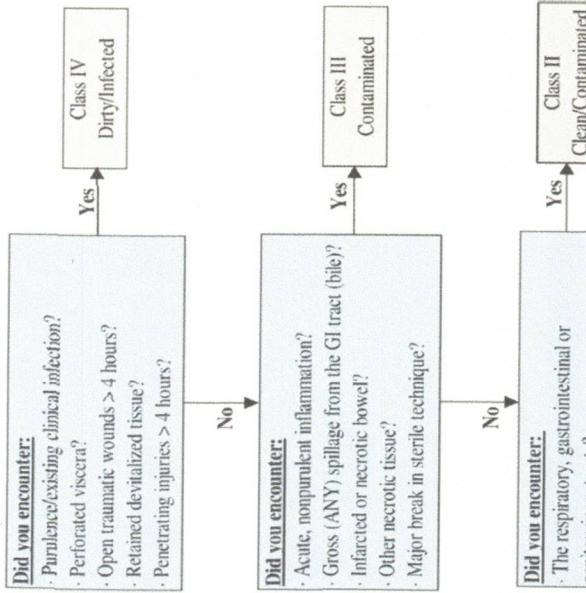
Conclusion:

The SCST increased the accuracy of case selection. The POP database allows consistency of POP selection. Using the SCST to automate the case sampling strategy reduces the amount of time required for this process. The SCR workflow and quality of data is improved by removing the user from menial tasks, allowing time to focus on qualitative work.

Surgical Wound Classification

The Importance of Correct Classification

Algorithm



Risk adjusting outcomes is estimating a probability that a patient may have a poor outcome based on the condition of the patient prior to intervention.

Accurate risk adjusting is important when benchmarking data, to ensure cases are compared fairly.

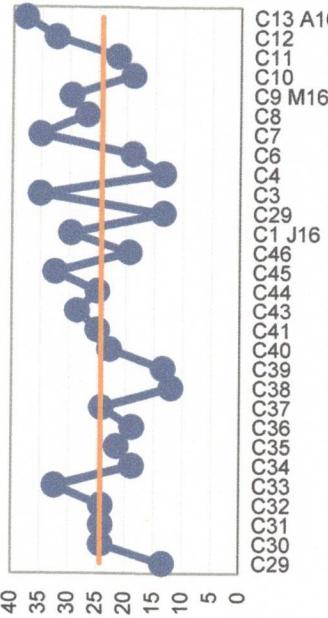
Professionals responsible for documenting wound class should have adequate and continued education on classification to ensure accurate benchmarking.

- NOTE:**
- Chronic inflammation only does not change the classification.
- Gross spillage you can see with the naked eye.

Wound Classification Examples

1. Clean	Pyloromyotomy; Shunt procedures unless infected; Fundoplication alone; Cystectomy w/o incise ovarian tract; Percutaneous pinning of fracture
2. Clean/ Contaminated	Appendectomy –interval; Cholecystectomy – stones; Pyloroplasty; Gastrectomy; T&A; Bronchoscopy; Endoscopy; Tracheostomy; Cystectomy w/ incise of ovarian tract
3. Contaminated	Appendectomy – Acute inflammation; Cholecystectomy – Acute inflammation
4. Dirty	Appendectomy –perforated; I&D – Presence of Purulent drainage or existing infection.

Wound Classification Error Rate of NSQIP Captured Cases



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