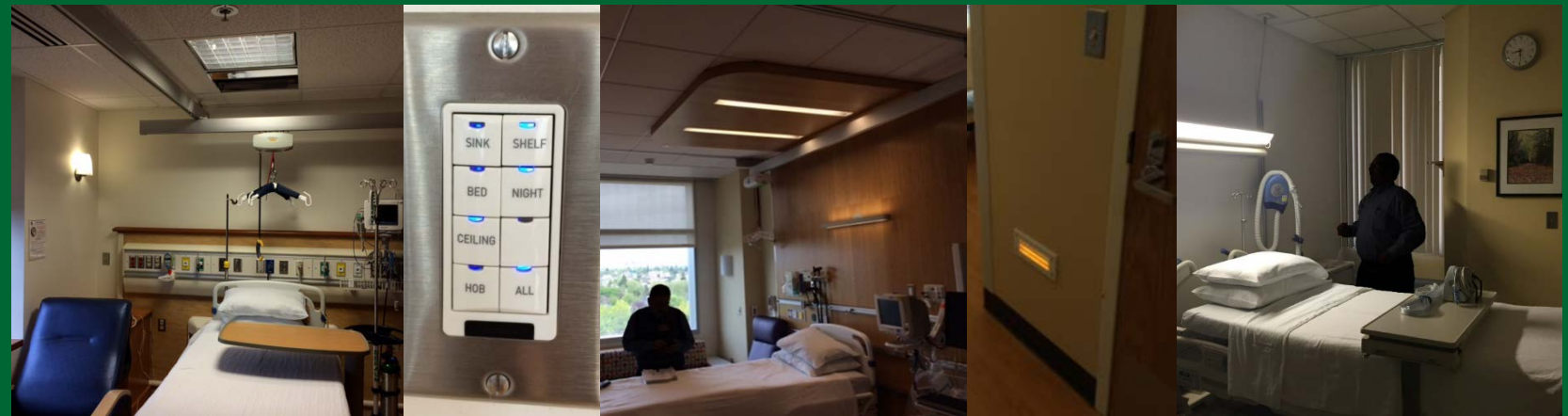


The Nurses' Perspective on Hospital Patient Room Lighting



DOE SSL Healthcare Lighting Webinar Series

September 13, 2016



Pat Lydon, CEM

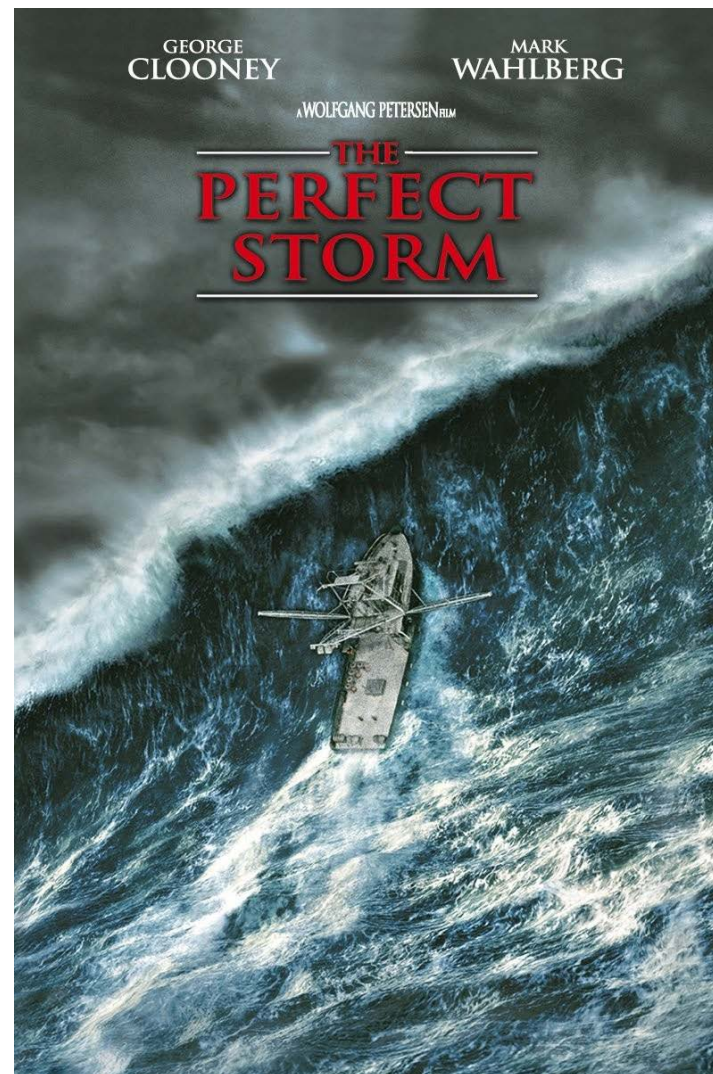
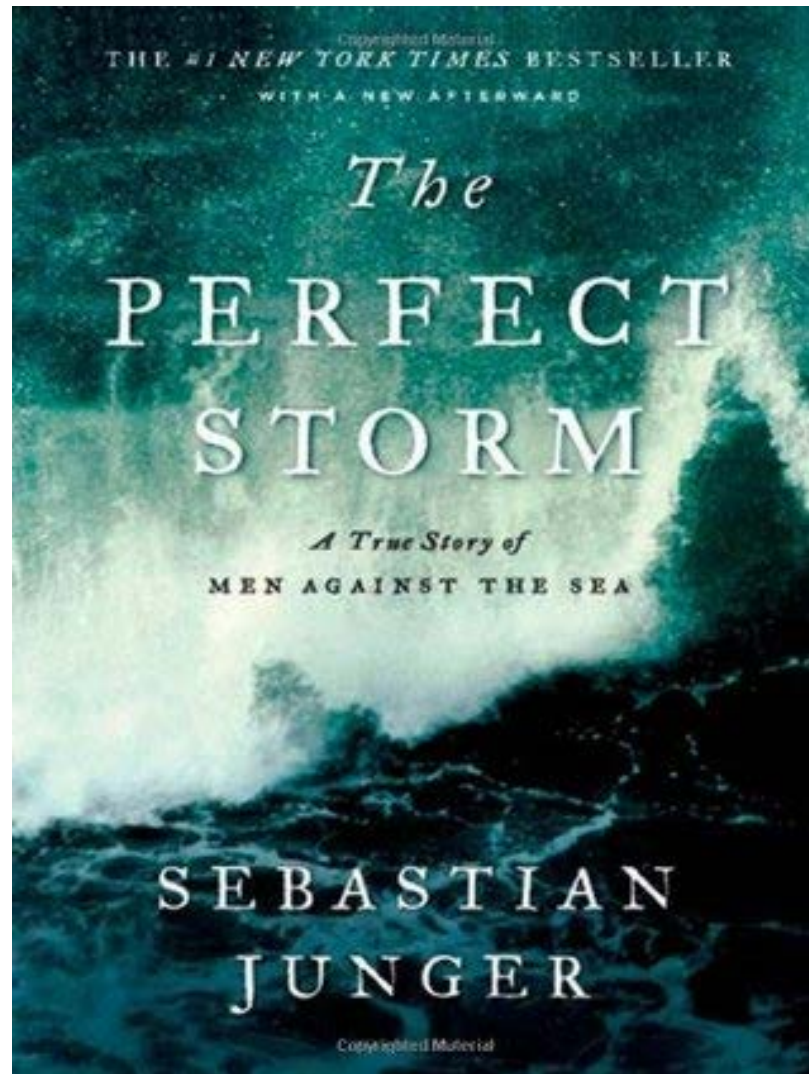
Legacy Health

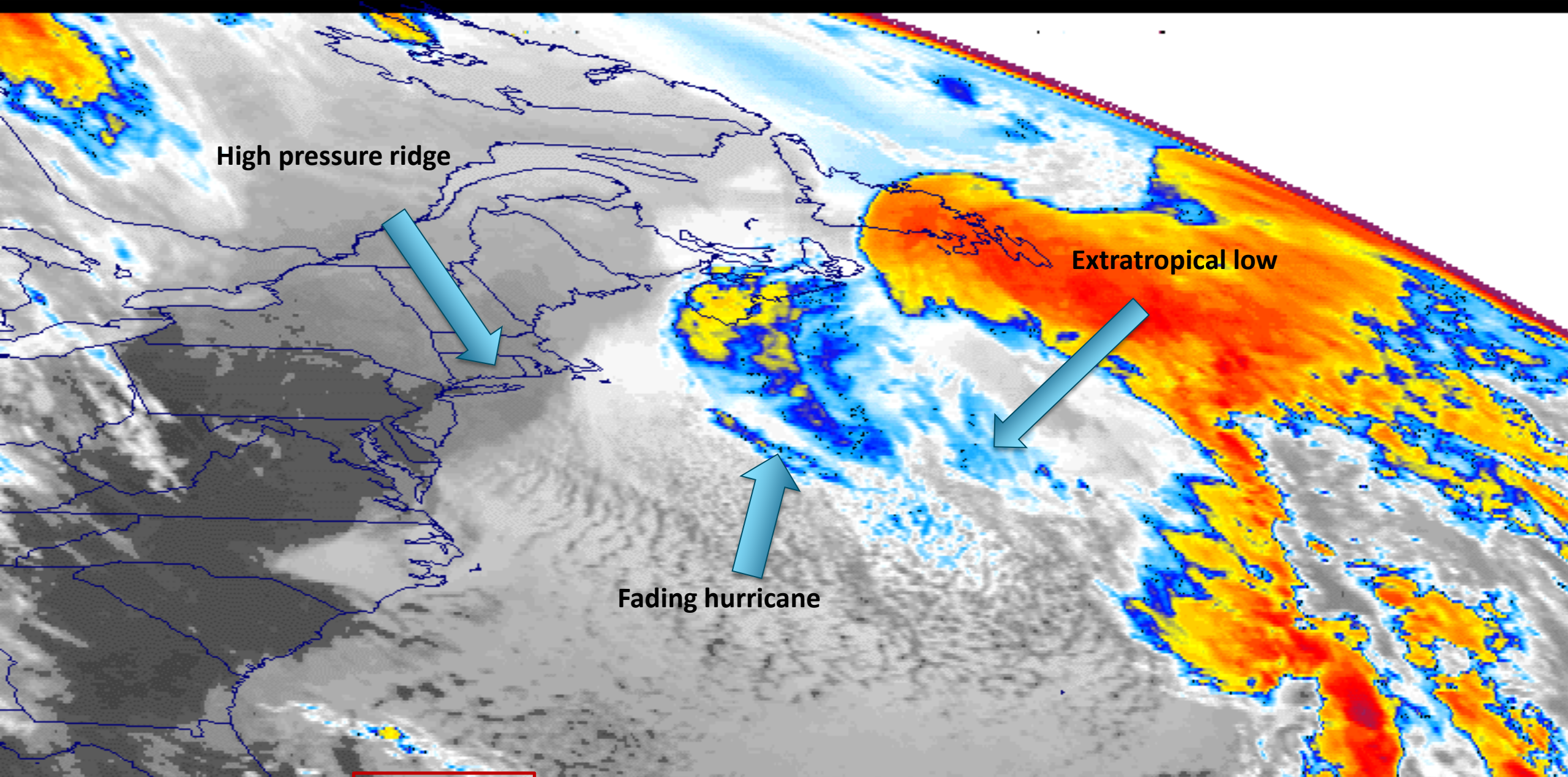
Robert Davis, Ph.D., FIES

Andrea Wilkerson, Ph.D., LC

Pacific Northwest National Laboratory

Lighting for Healthcare



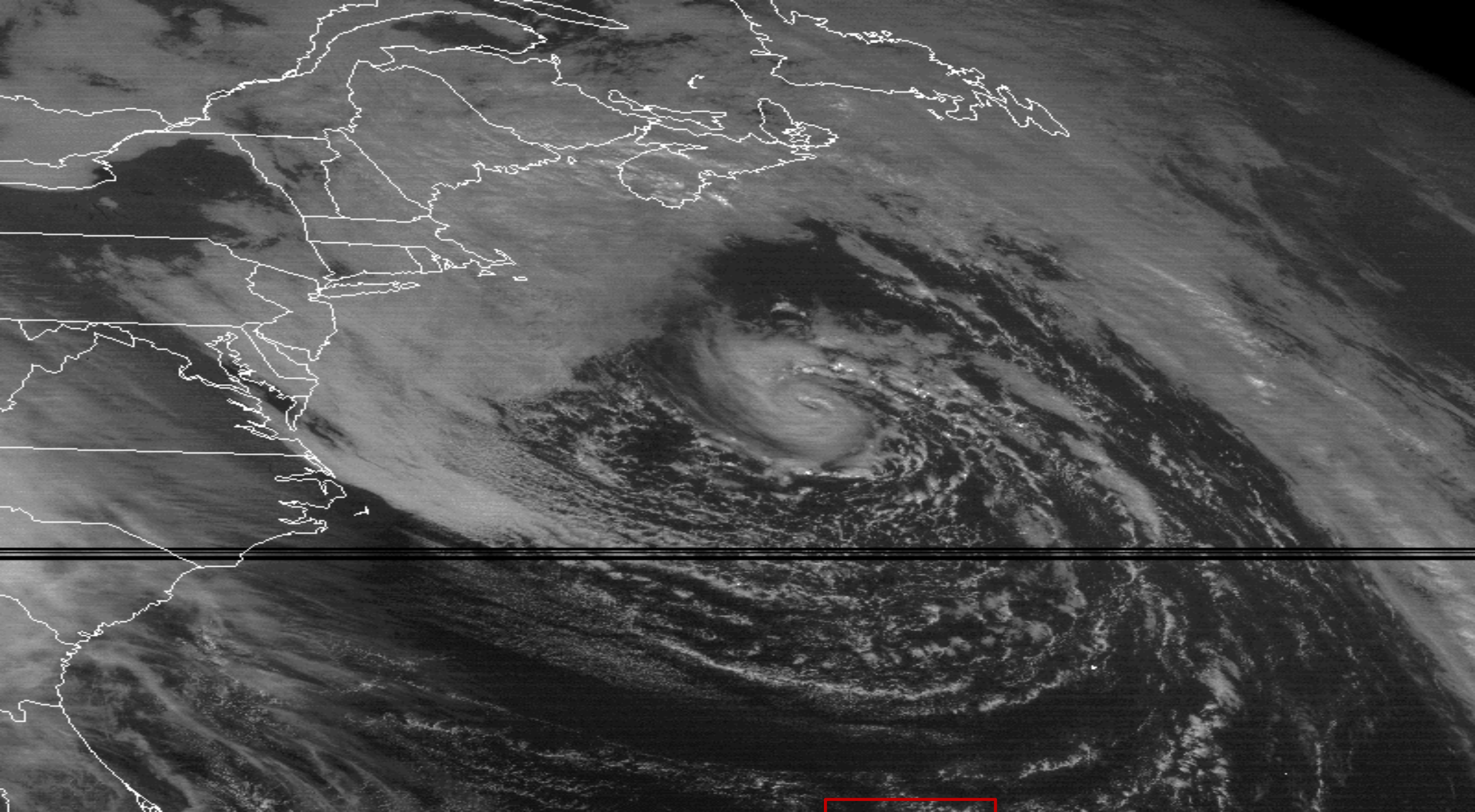


High pressure ridge

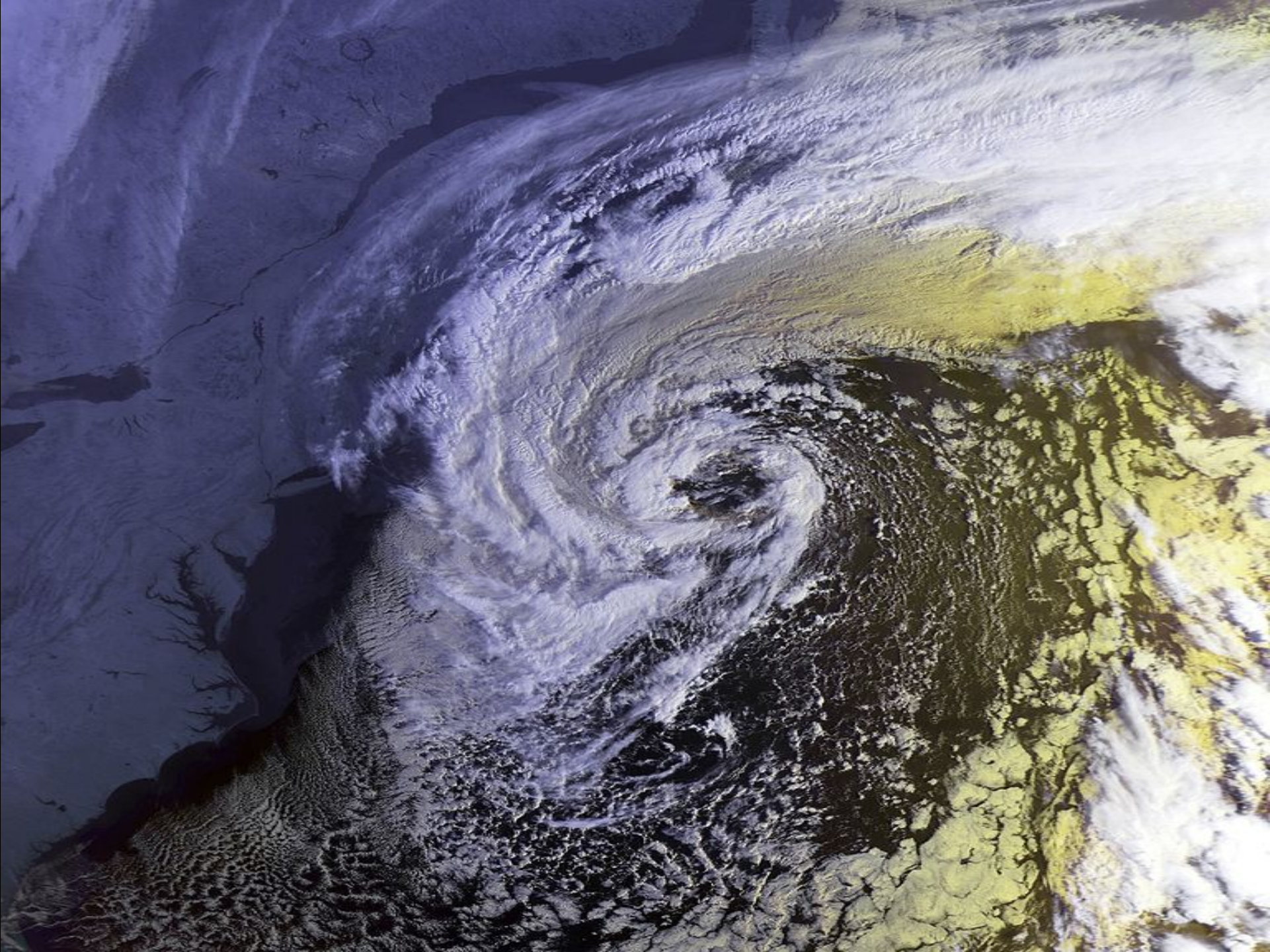
Extratropical low

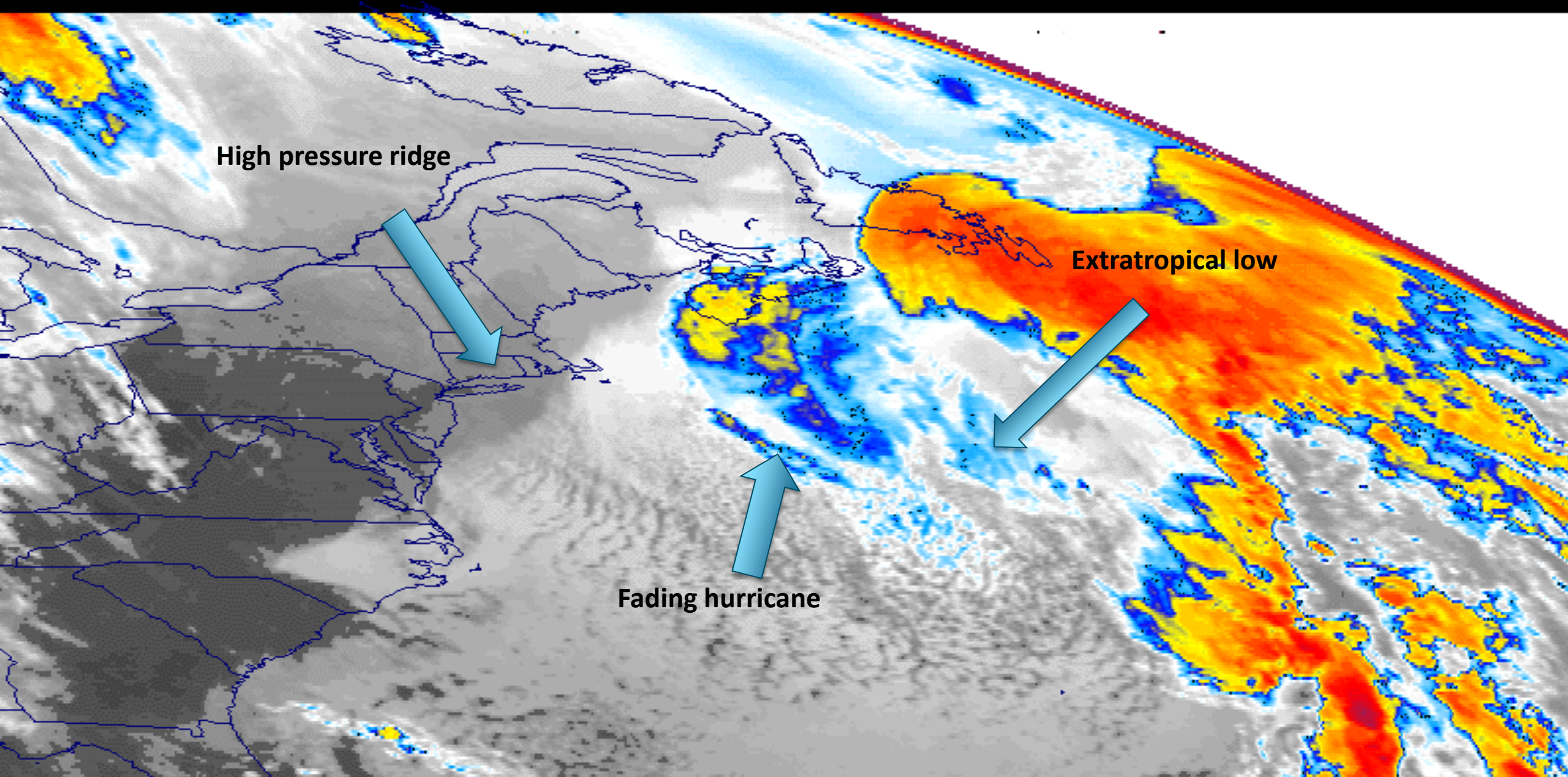
Fading hurricane

0007 GOES-7 IR 08 29 OCT 91 302 180100 01425 09293 04.00



GOES-7 1KM VISIBLE ZOOMED OUT 3X 1 NOV 91 18:01 UTC

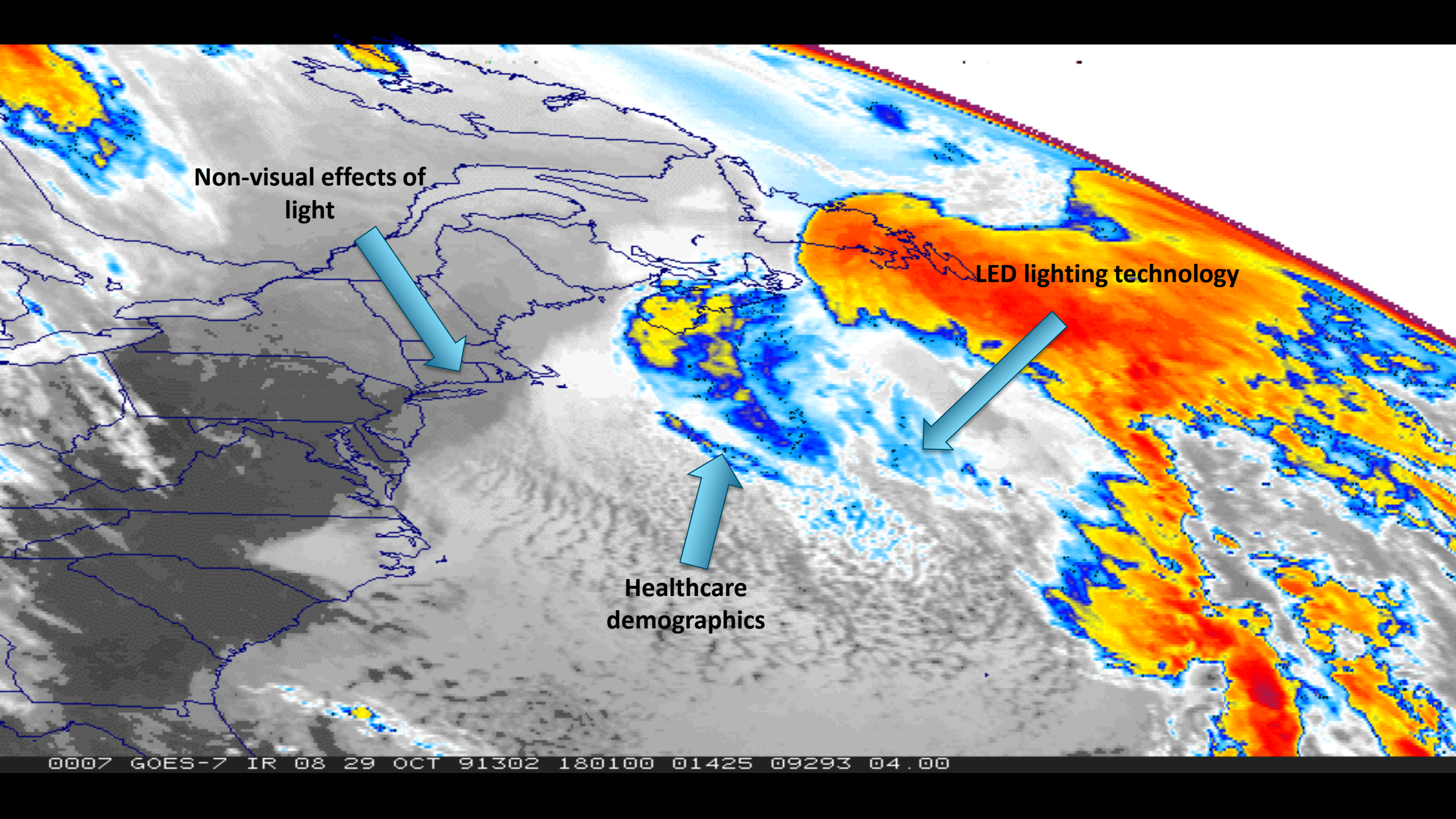




High pressure ridge

Extratropical low

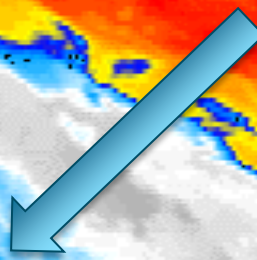
Fading hurricane



Non-visual effects of light



LED lighting technology



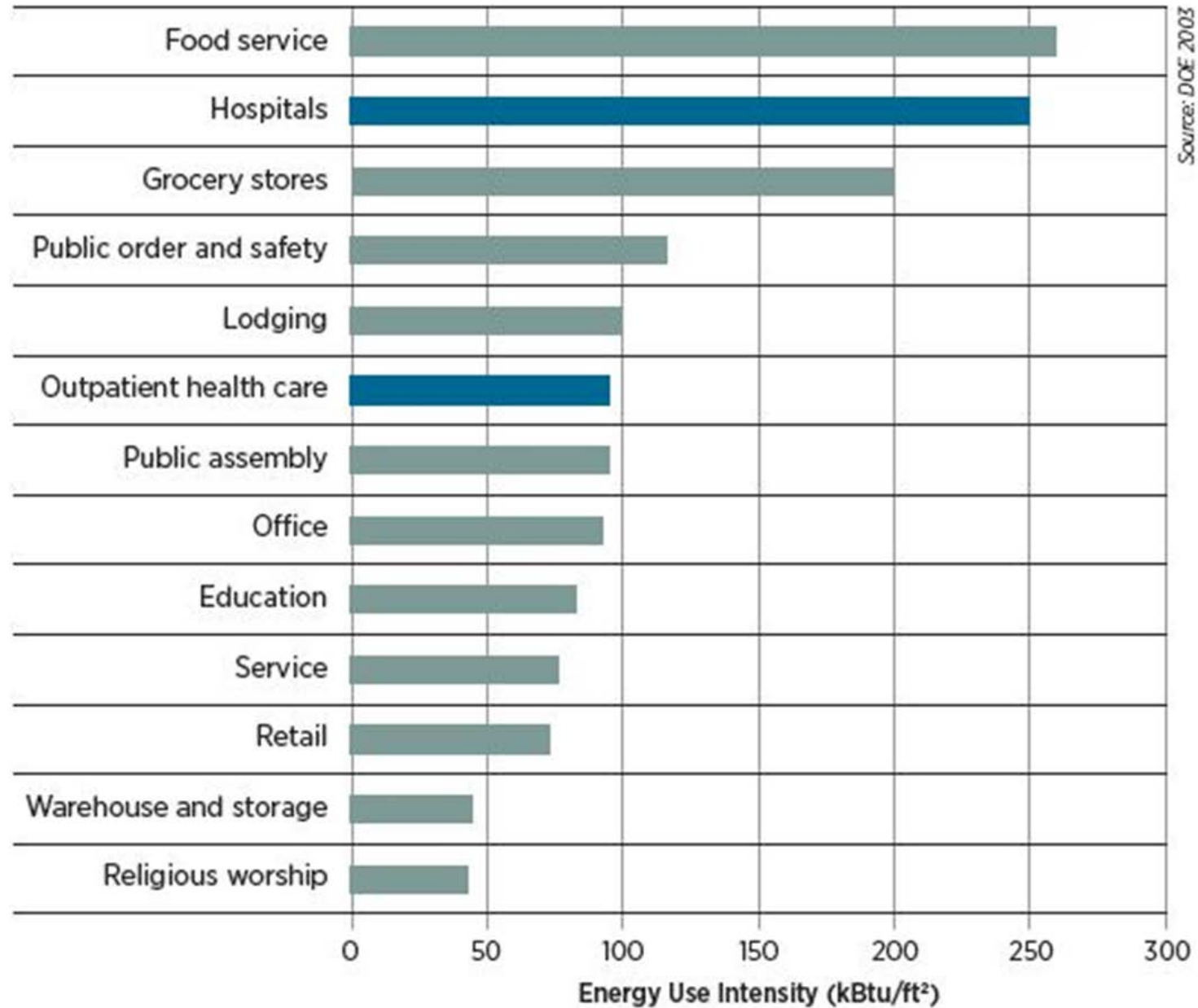
Healthcare demographics



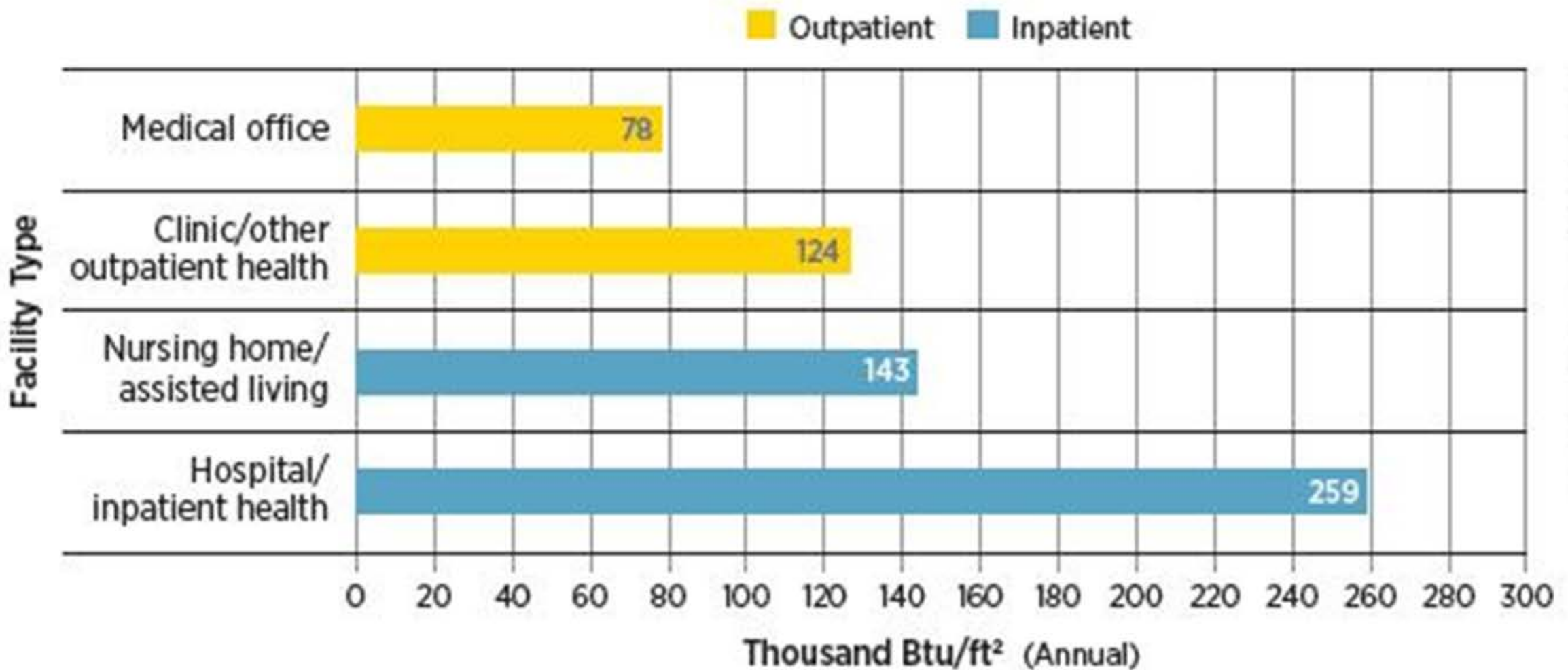
US Healthcare by the Numbers



Energy Use Intensity

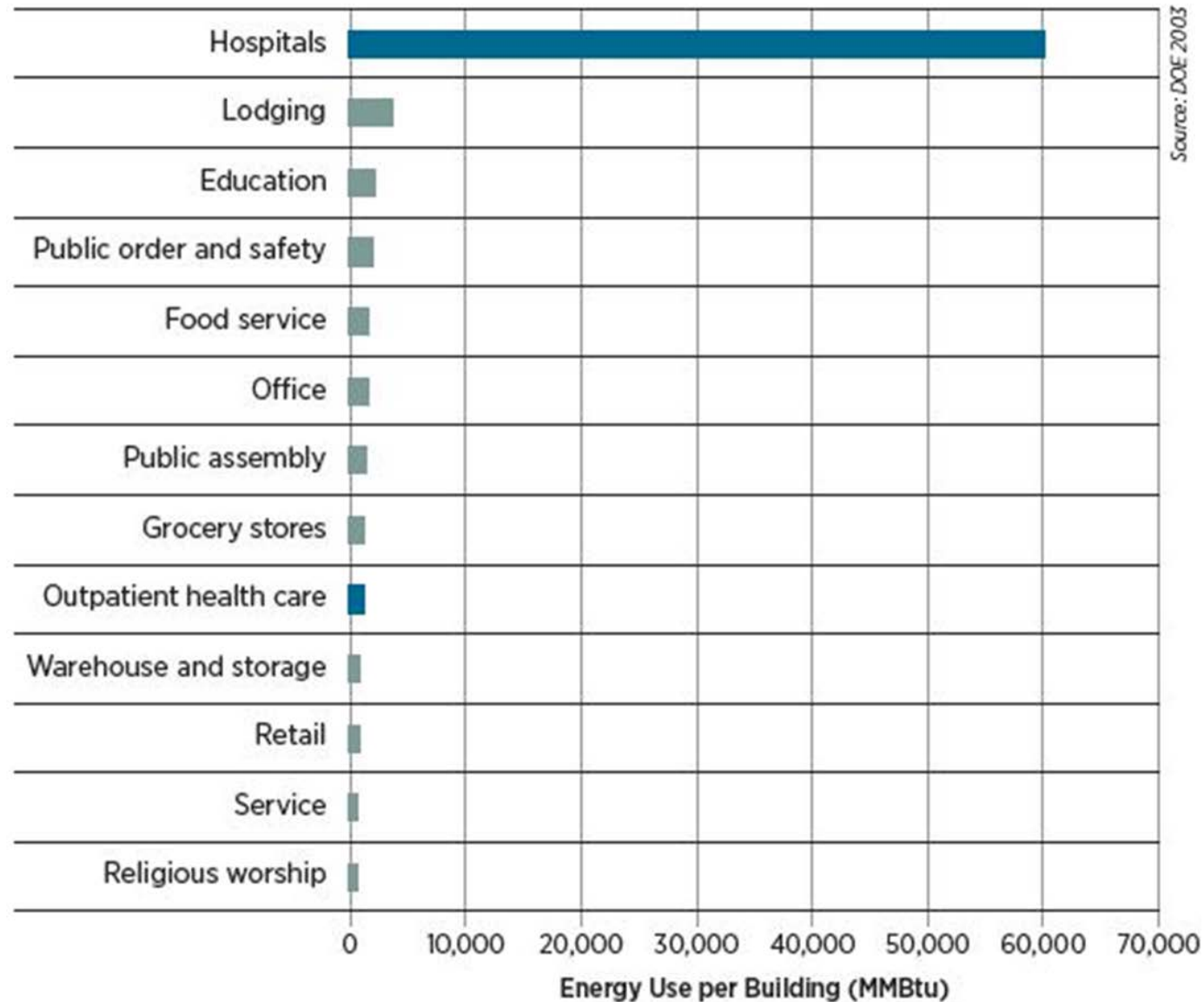


Energy Use Intensity in Healthcare



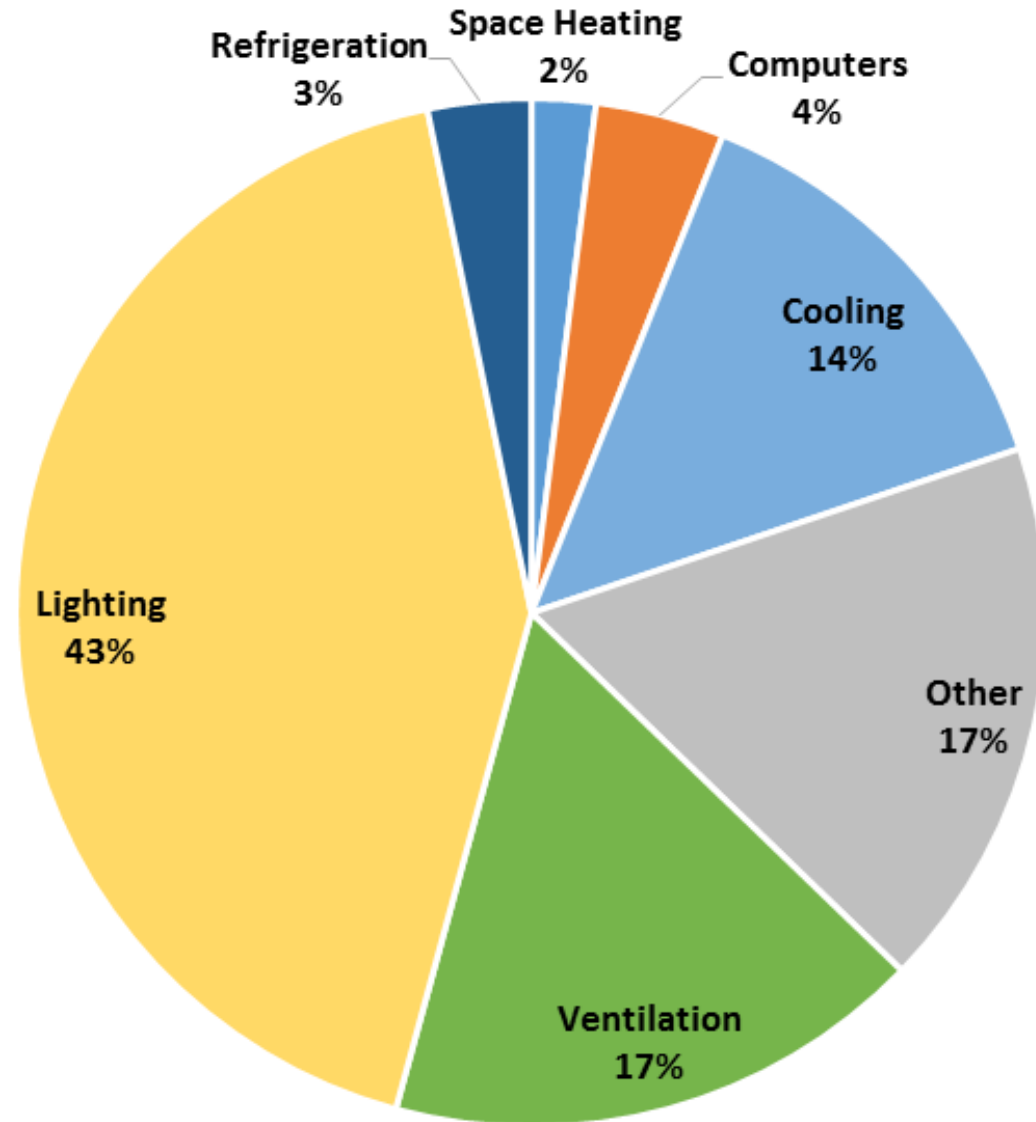
© E Source; data from the U.S. Energy Information Administration (DOE 2003)

Energy Use per Building

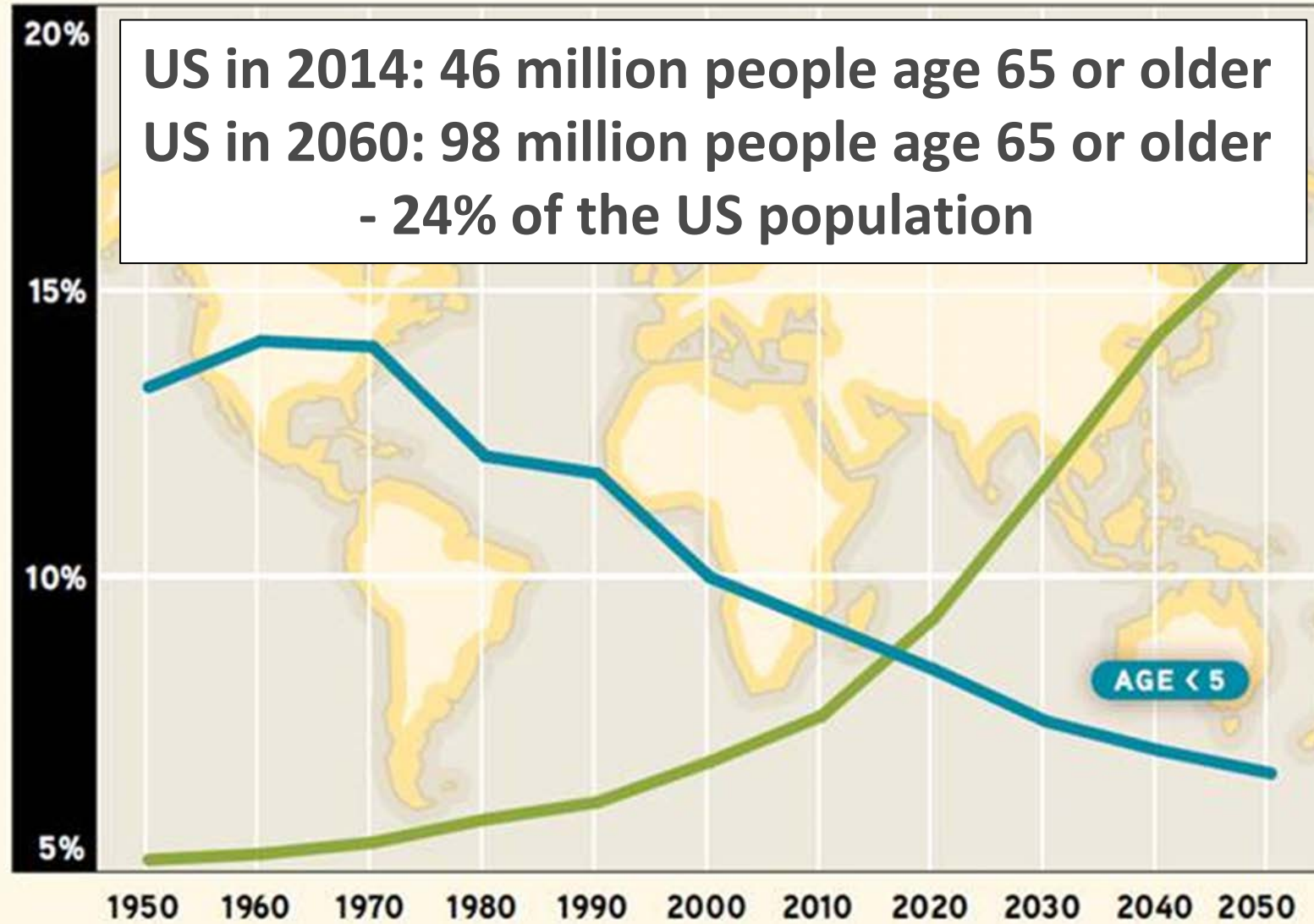


Source: DOE 2003

Electricity end uses in healthcare



YOUNG CHILDREN AND OLDER PEOPLE AS A PERCENTAGE OF GLOBAL POPULATION



Source: United Nations Department of Economic and Social Affairs, Population Division. *World Population Prospects. The 2004 Revision*. New York: United Nations, 2005.

Tunable LED Systems

CALiPER

Report 23:

Photometric Testing of White-Tunable LED
Luminaires

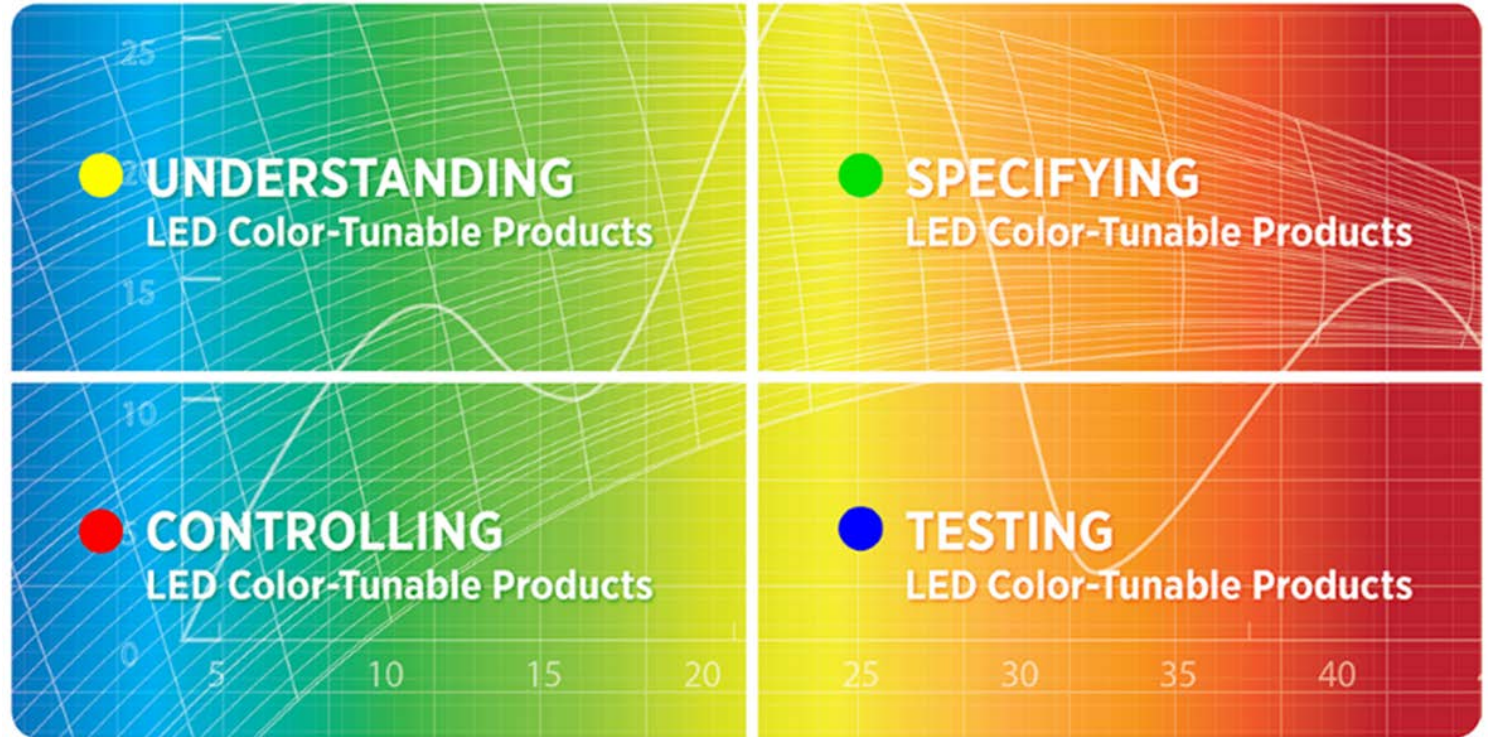
August 2015
Addendum January 2016

Prepared for:

Solid-State Lighting Program
Building Technologies Office
Office of Energy Efficiency and
Renewable Energy
U.S. Department of Energy

Prepared by:

Pacific Northwest National
Laboratory

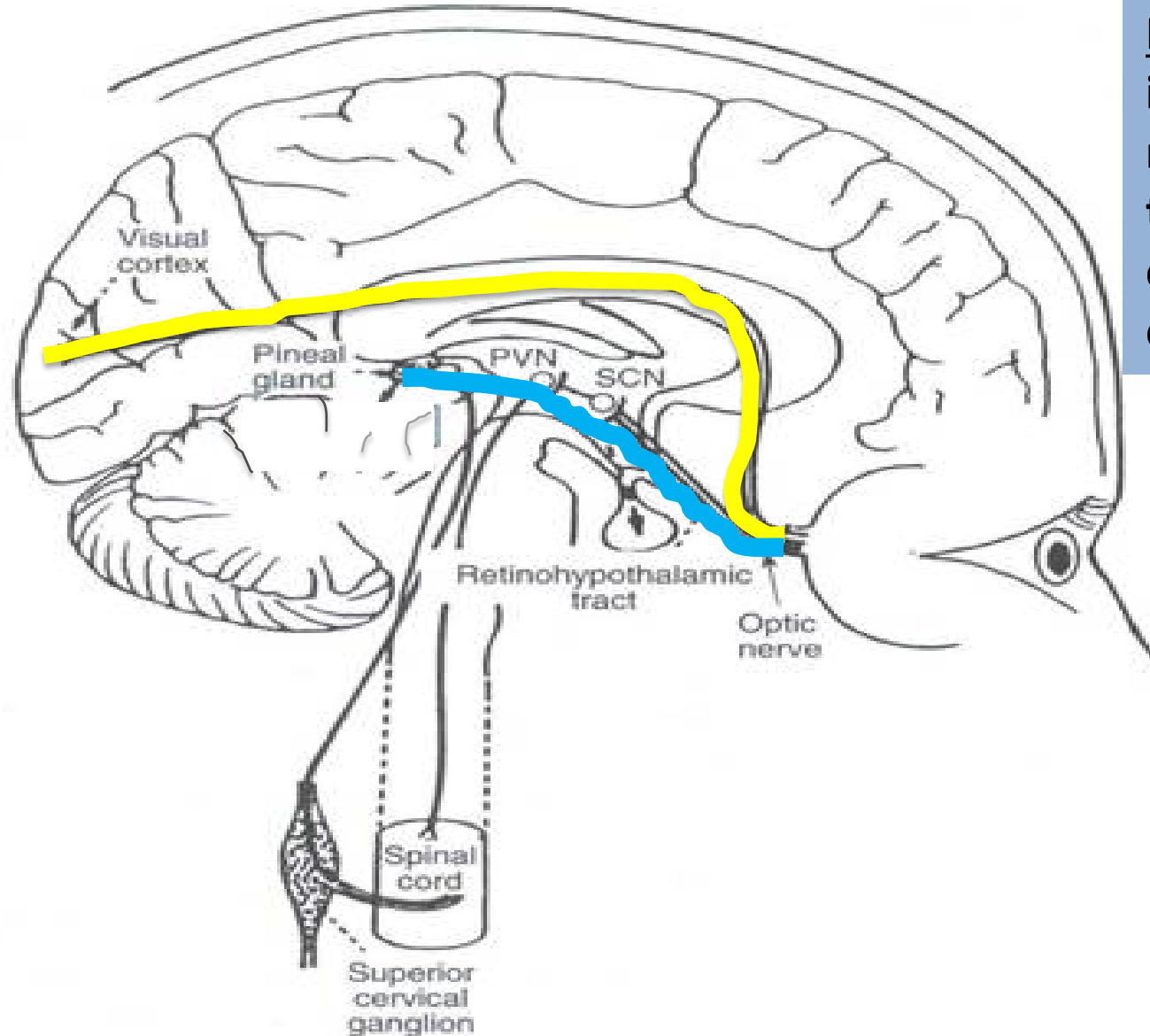


Visual & Non-visual effects of light

Visual Pathway

Retinal Ganglion Cells (RGCs) carry signals from the rods and cones to the visual cortex, which controls vision

- *Writing*
- *Reading*
- *Watching*
- *Communicating*
- *Learning*
- *Focusing*
- *Appreciating*
- *Enjoying*

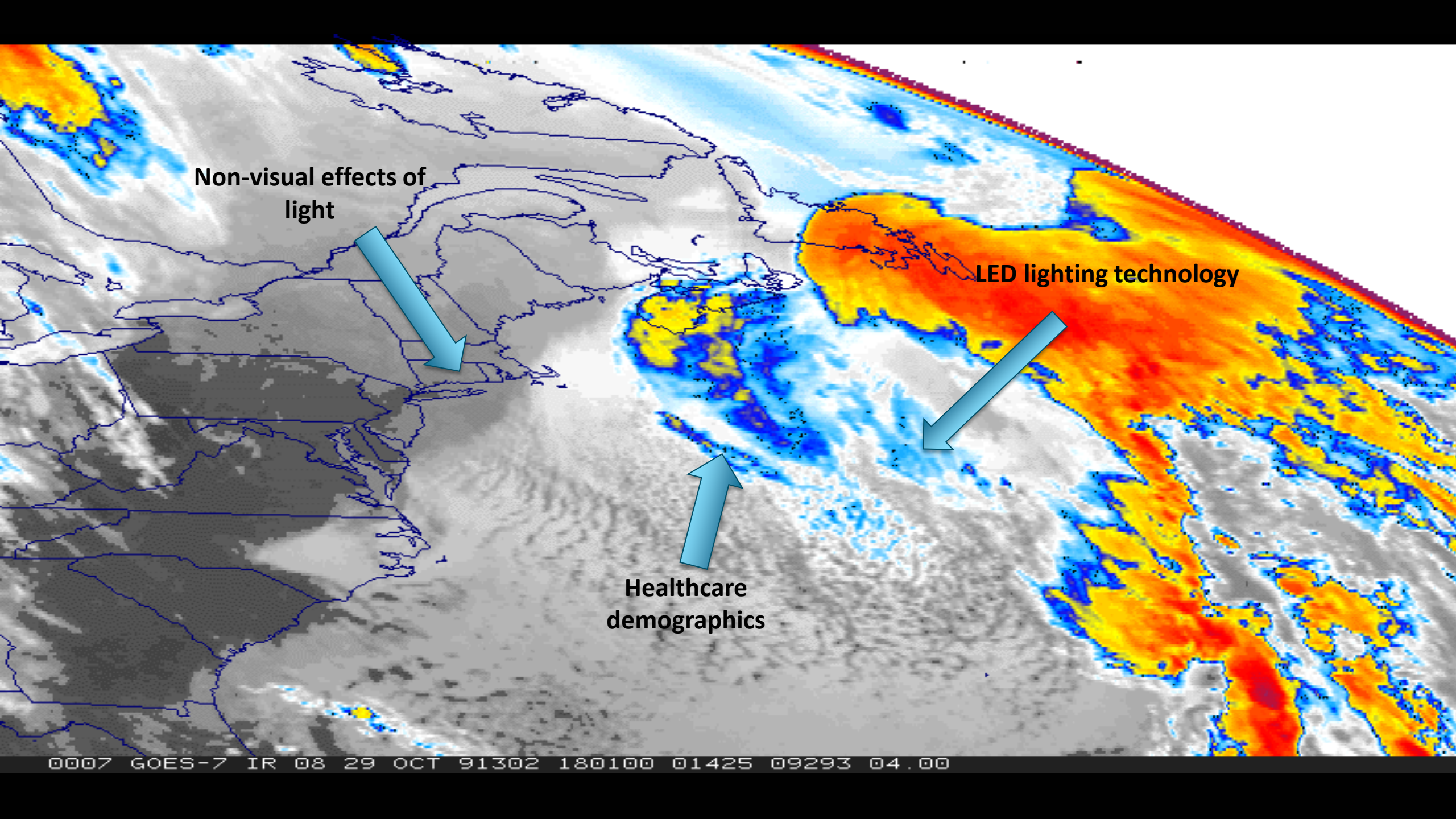


Non-Visual Pathway

ipRGCs are photoreceptors connected to the hypothalamus, which controls many biological effects

- *Suppressing melatonin*
- *Enhancing alertness*
- *Affecting cognition*

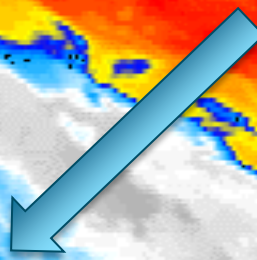
- *Photic*
- *Non-photic*



Non-visual effects of light



LED lighting technology



Healthcare demographics



DOE Healthcare Webinar Series

The Nurses' Perspective on Hospital Patient Room Lighting

Sept 13, 2016 Robert Davis & Andrea Wilkerson, PNNL
Pat Lydon, Legacy Health

Evidence-Based Design for Healthcare Lighting: Where's the Evidence?

Oct 4, 2016 Robert Davis & Andrea Wilkerson, PNNL
Anjali Joseph, Clemson University

Tuning the Light in Senior Care

Oct 18, 2016 Robert Davis & Andrea Wilkerson, PNNL
Connie Samla, Sacramento Municipal Utility District



LEGACY
HEALTH



EMANUEL Medical Center GOOD SAMARITAN Medical Center MERIDIAN PARK Medical Center MOUNT HOOD Medical Center SALMON CREEK Medical Center

THE CHILDREN'S HOSPITAL Legacy Emanuel LEGACY MEDICAL GROUP LEGACY LABORATORY LEGACY RESEARCH LEGACY HOSPICE

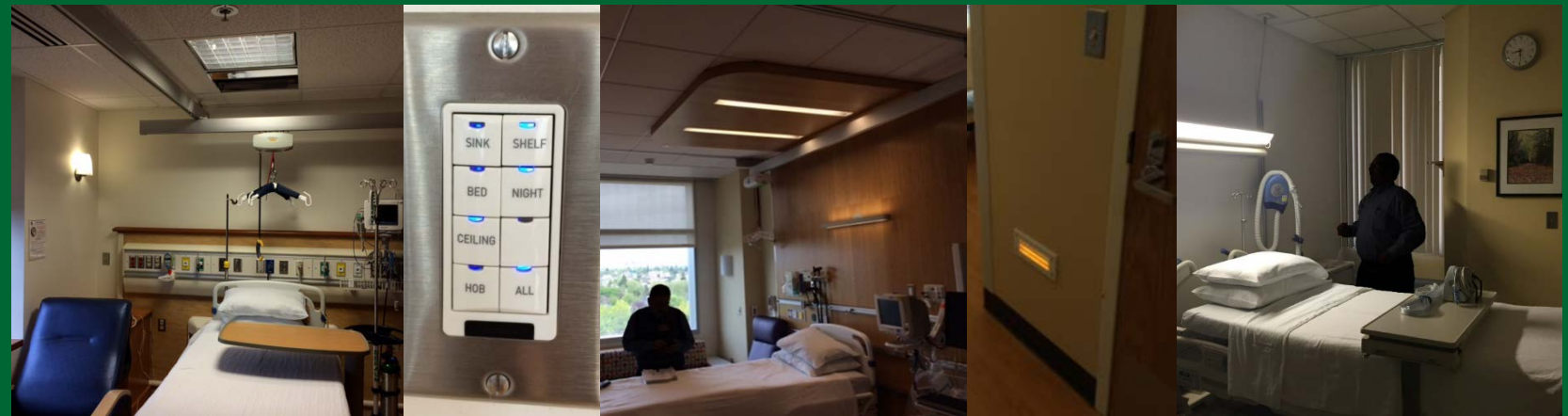
About Legacy Health

- Nonprofit, locally owned, based in Portland
- Serving Oregon and Southwest Washington
- 6 hospitals on 5 campuses:
 - > Legacy Good Samaritan Medical Center (NW Portland, OR)
 - > Legacy Emanuel Medical Center (N Portland, OR)
 - > Randall Children's Hospital at Legacy Emanuel (N Portland, OR)
 - > Legacy Meridian Park Medical Center (Tualatin, OR)
 - > Legacy Mount Hood Medical Center (Gresham, OR)
 - > Legacy Salmon Creek Medical Center (Vancouver, WA)
- Approx. 4.5 million sq. ft.

Institutionalizing Energy Efficiency

- Energy Trust of Oregon Strategic Energy Management participants
 - > Continuous improvement in O&M
 - Site assessments
 - Monthly energy reviews
- Capital planning cycle
 - > Energy efficiency currently secondary priority
 - > Need to do more to focus on TCO and investment quality
- Employee engagement
 - > New employee orientation
 - > Physician portal
 - > Nurse recruiting to sustainability committee

The Nurses' Perspective on Hospital Patient Room Lighting



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September 13, 2016



Pat Lydon, CEM
Legacy Health

Robert Davis, Ph.D., FIES
Andrea Wilkerson, Ph.D., LC
Pacific Northwest National Laboratory

Nurse Survey

What:

17 Question Nurse Survey

Where:

4 Hospitals

- Older, Urban Renovated
- Older, Urban
- Older, Suburban
- Newer, Children's

Who:

252 Nurses

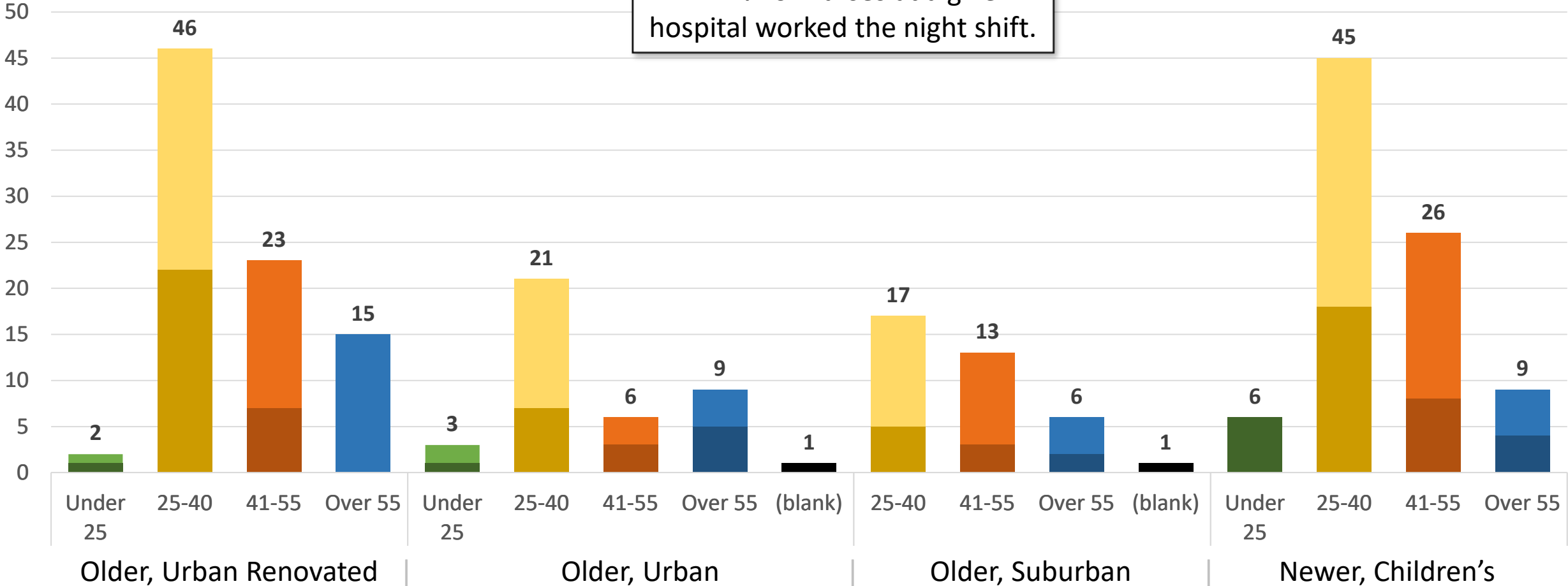
When:

2015 August



Who? Age and Shift

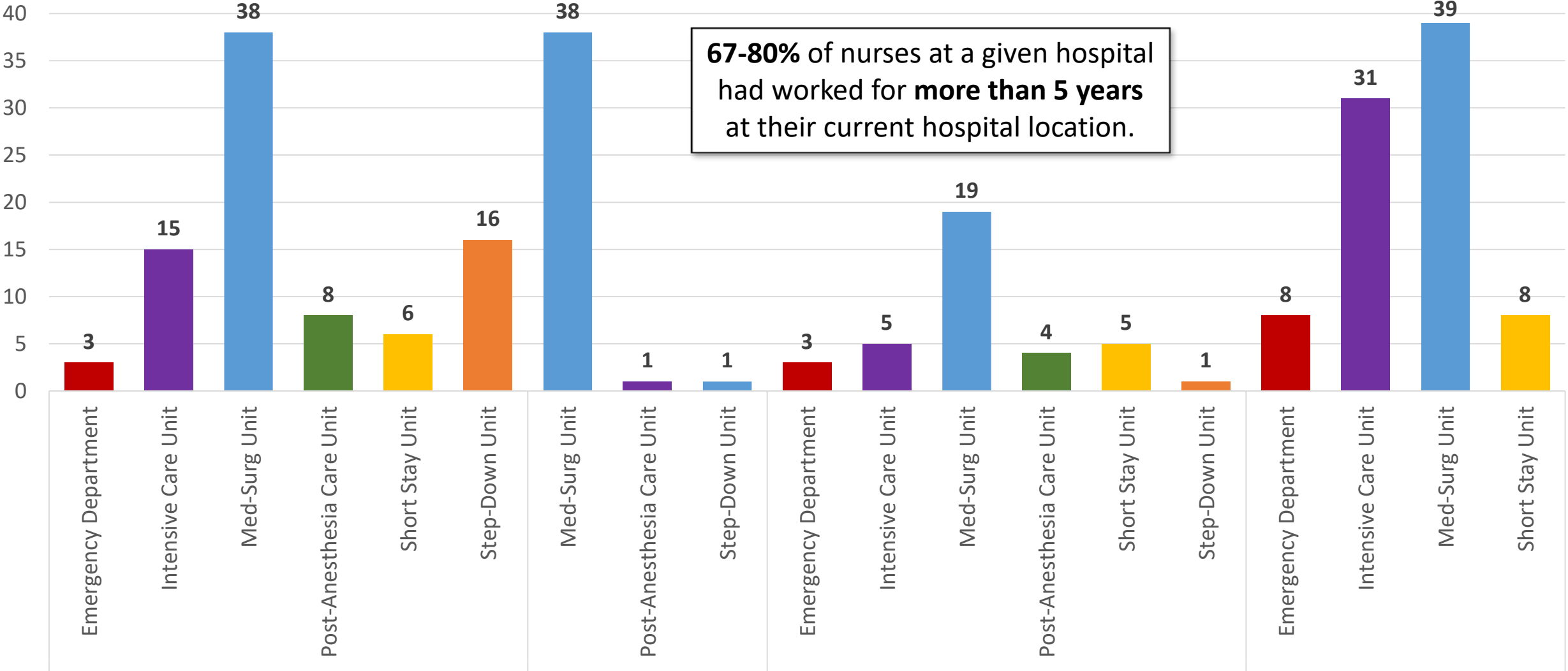
27-42% of nurses at a given hospital worked the night shift.



Who? Department

95% of nurses were female.

67-80% of nurses at a given hospital had worked for **more than 5 years** at their current hospital location.



Older, Urban Renovated

Older, Urban

Older, Suburban

Newer, Children's

Survey Design

For the patient room in which you most often work:

Rate and Rank Impact of Attributes

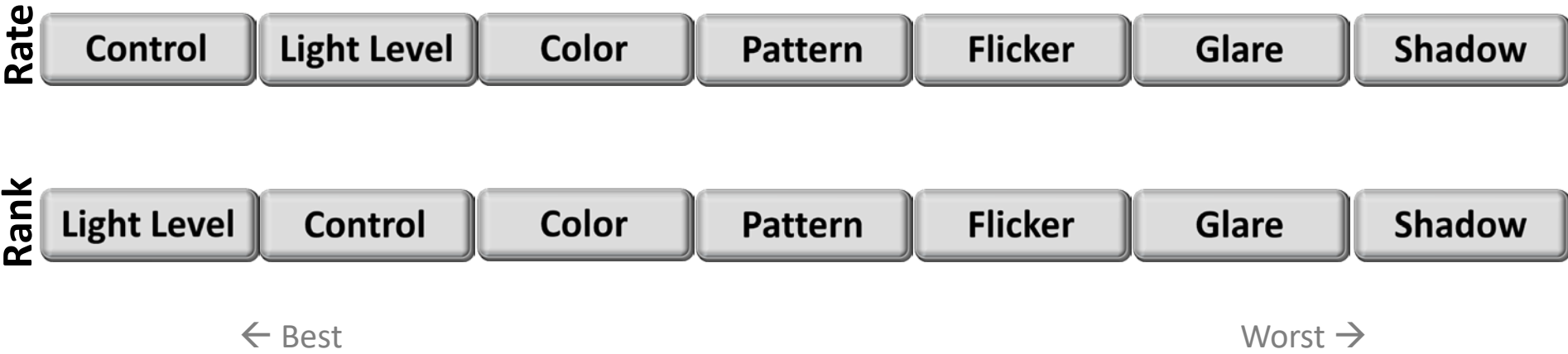


Rate Area



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental

Results? **Light Level** · Controls · Dimming · Nighttime Navigation · Supplemental



Results? **Light Level** · Controls · Dimming · Nighttime Navigation · Supplemental

Results? **Light Level** • **Controls** • **Dimming** • **Nighttime Navigation** • **Supplemental**



We have to **use a flashlight** to place a Foley **catheter** because there is **no adequate over-bed light**.

For inserting **catheters**, it would be nice to have a very **bright adjustable light fixture** attached to the **ceiling** to be able to move into place.

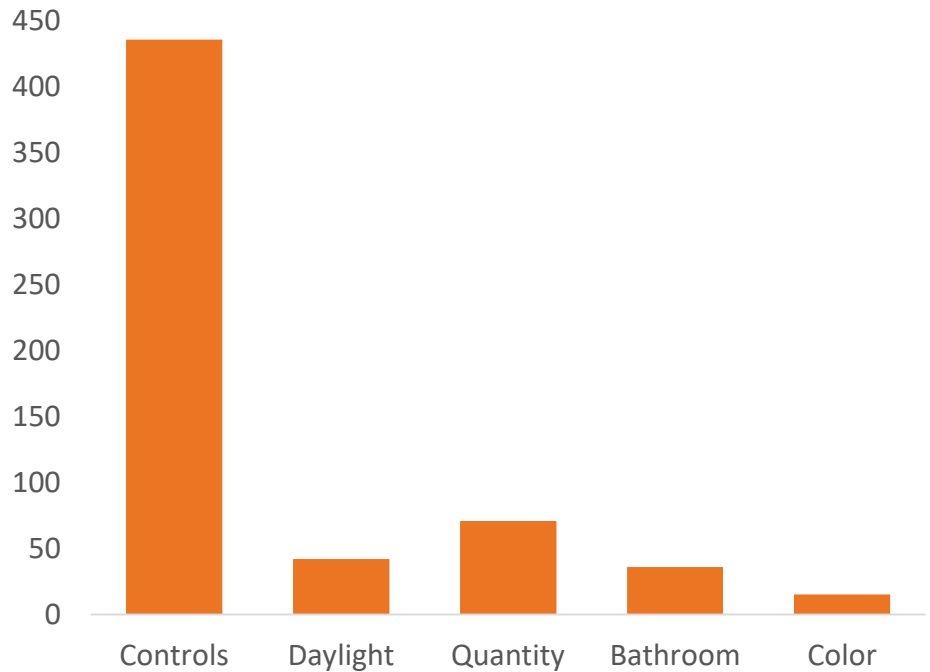
Whoever came up with the idea that **not having direct overhead lighting** was a good idea obviously **never worked as a nurse!!!**

Overhead lighting would **improve** my ability to successfully perform my **duties** as an **IV nurse**, which has a large impact on **patient satisfaction!**

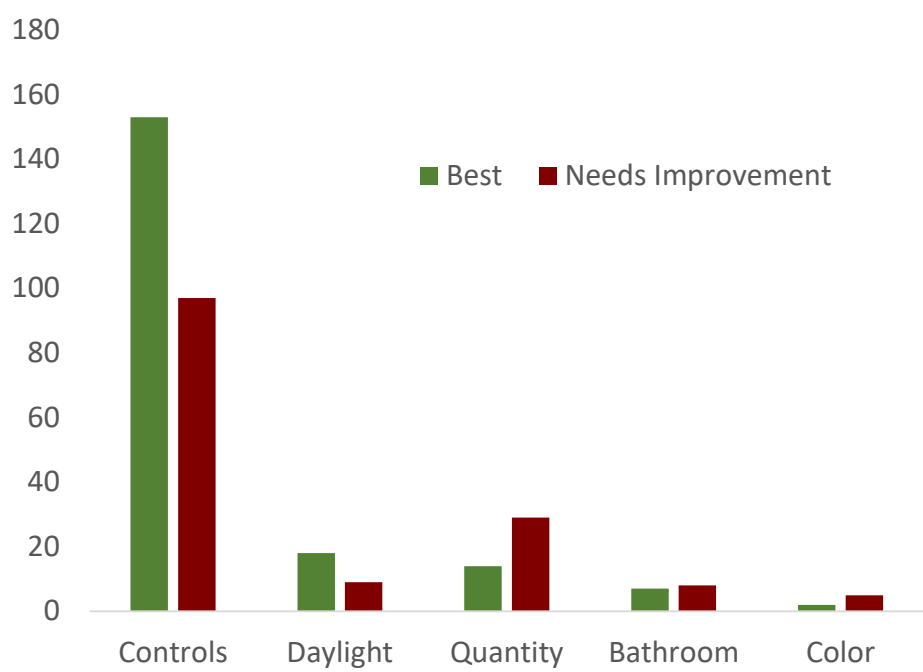
Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



All comments (excluding supplemental)



What is best, what needs improvement



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



If lighting is needed, it would be nice to be able to **turn it on remotely**, because sometimes you are all **set up to do a procedure and realized that you need a little more light.**

I think **bathroom light switch** should be **outside the room** so patients and staff aren't fumbling for them inside the bathrooms.

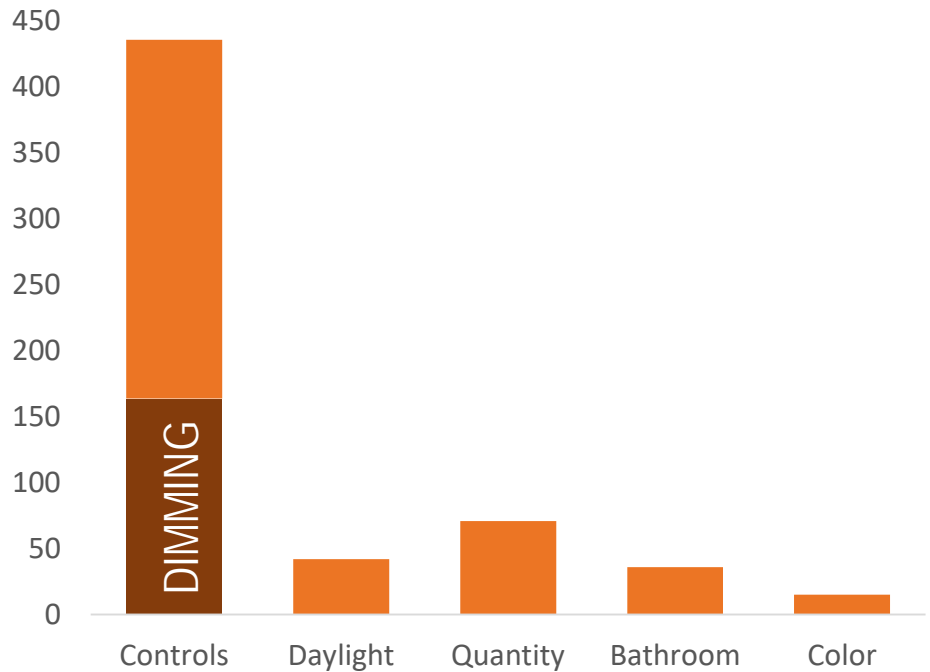
For a critical patient, it is **challenging** to get an **appropriate amount of light**. The **spotlights provide more light** but often **skew skin tone**, create **glare**, and create a **blind spot**. It takes a **lot of adjusting** and readjusting.

Placement of **light switches** is **not** always **obvious**. I have to search around to figure out what switch works which lights, and what will work best for a given situation.

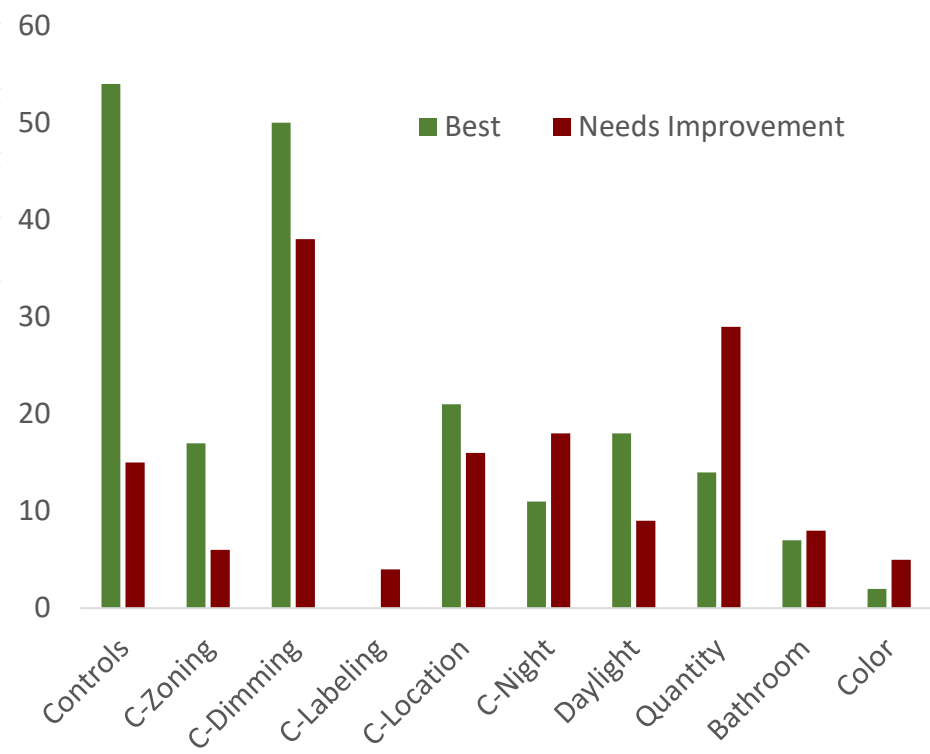
Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



All comments (excluding supplemental)



What is best, what needs improvement



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



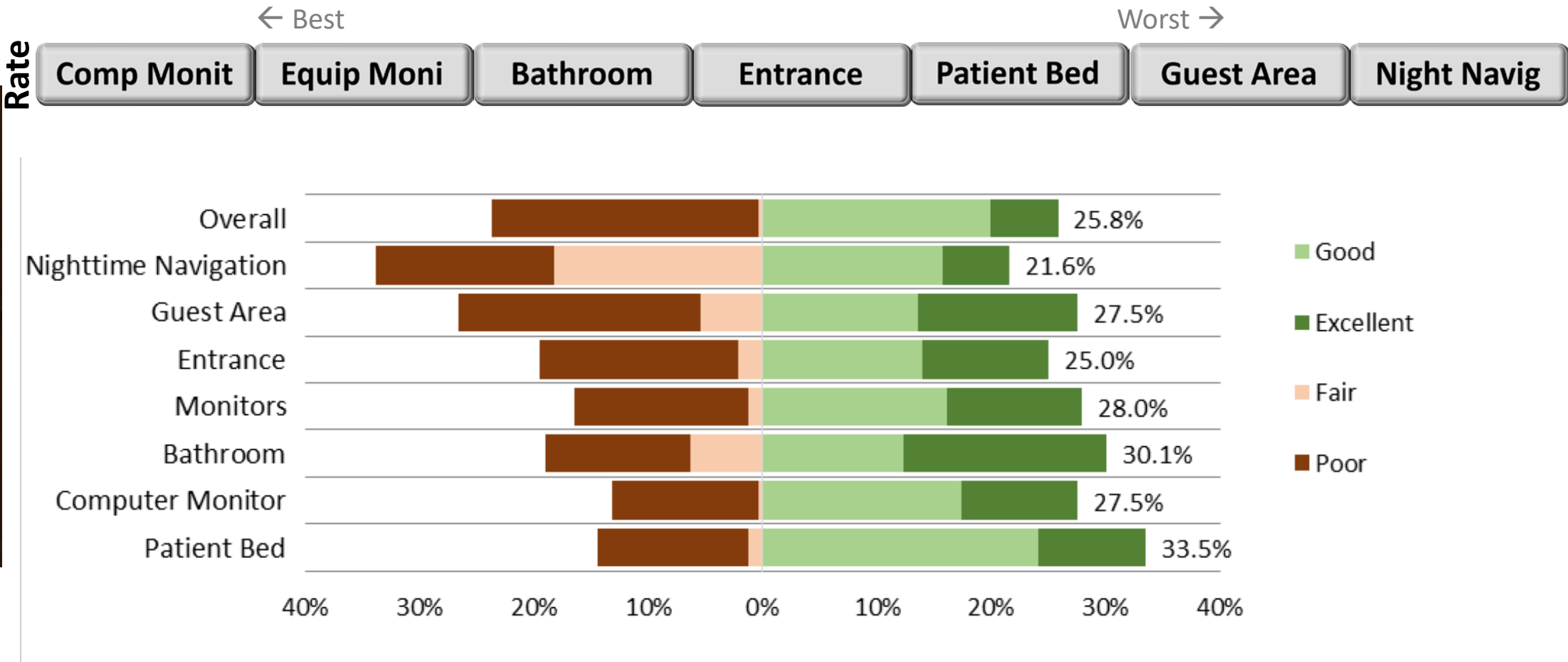
Variance of **natural** and **artificial light** is sometimes **difficult**.

Sometimes the best lighting for staff work ability is the **brightest overhead bed light**, but it is **painful to patient's eyes** (when usually brighter light is **needed** by staff doing **care of lower body areas**).

Ability to **adjust** lighting from **low** (calming, less stimulating) to **high** (for lab draws, exams, wound care, etc.) would **impact our patient care experience greatly** in both a **therapeutic** way for patients, and in helping us with **better visibility for staff** when needed.

The **overbed light** is **obnoxiously bright**; however, necessary at times. It would be nice if there were **more dim light options** around the room.

Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



Note: Ratings of "Neutral" or "NA" are not included in this graph

Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



Flash lights are very necessary for me to do my job. I'm always having to change out the flash light batteries each week.

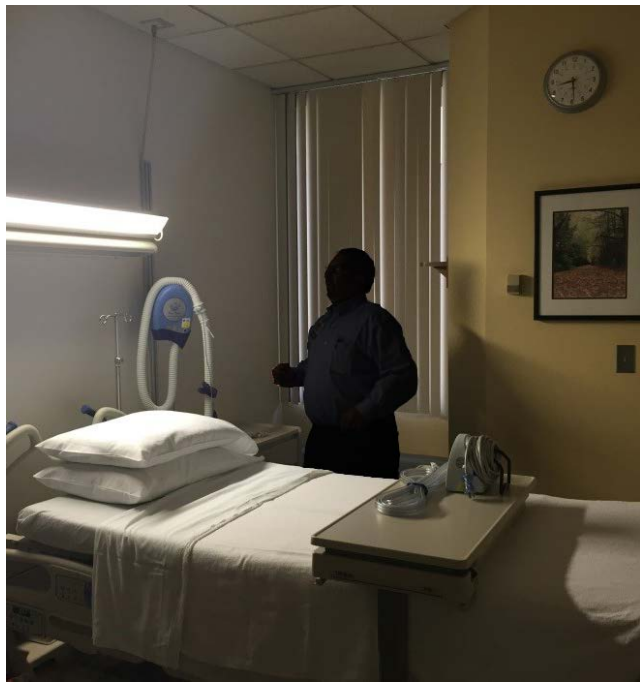
The best thing about the lighting is being able to close the bathroom door, with the bathroom light on.

The lighting is often too harsh in the patient rooms if I turn on the lights to complete my exam in the middle of the night.

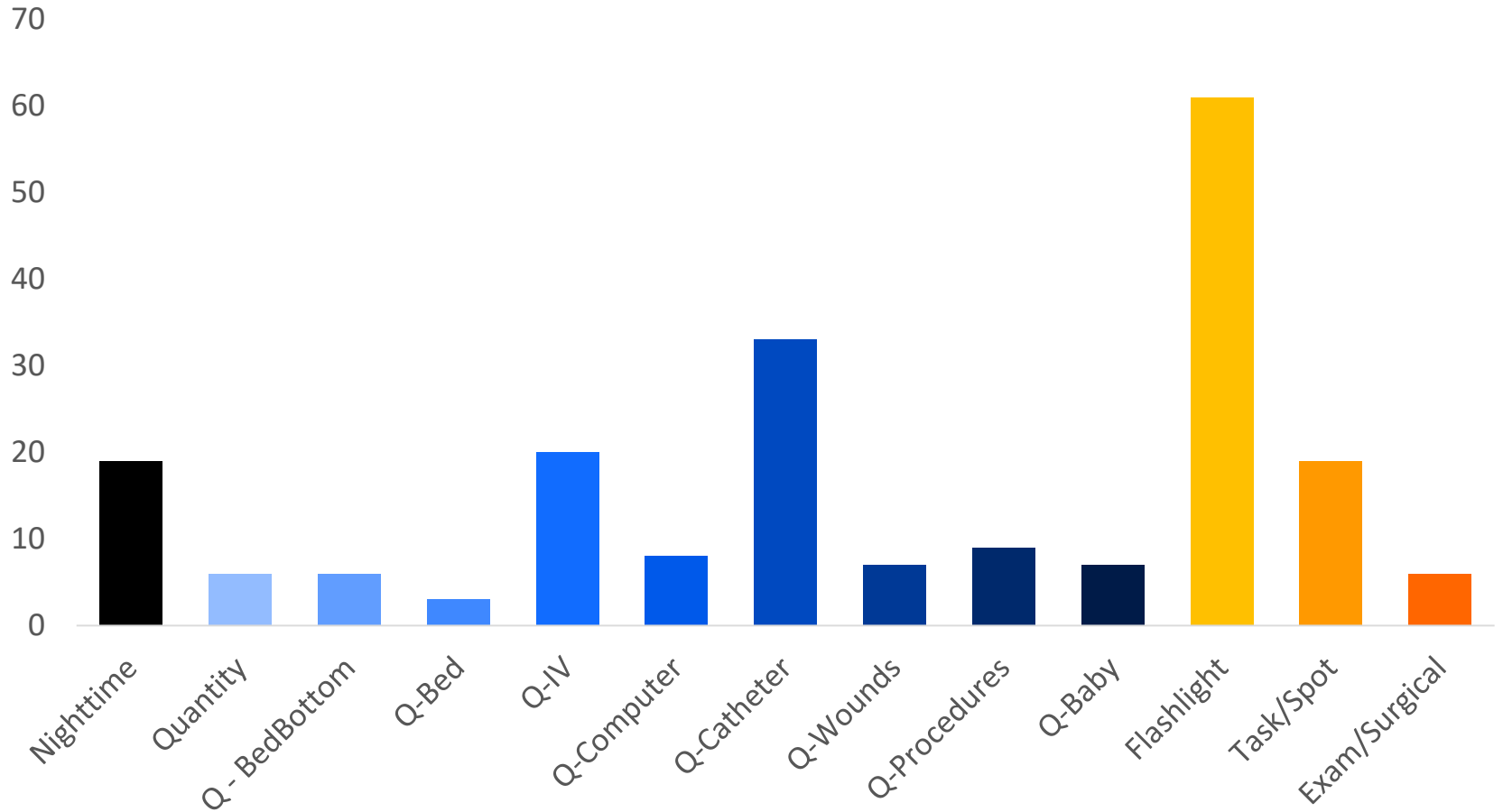
I use the scanner to shine on the computer so I can see it in the dark without turning on lights.

Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental

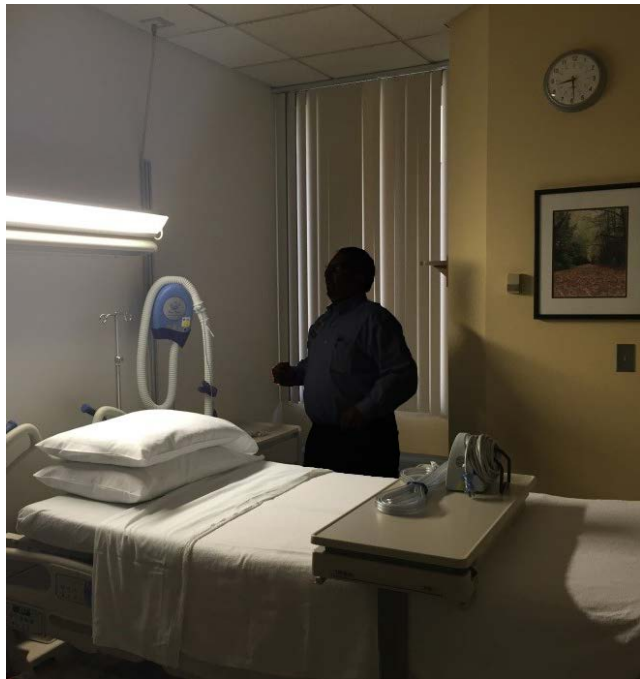
For the patient room in which you most often work:



Do you require additional lighting? NO 32% YES/SOMETIMES 68%



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



Sometimes I will turn the **harsh room lights off** and do my **care by** the light of extra lights (**bathroom light, otoscope, flashlight**).

The feature of **pulling the top light down** (head of bed) is **helpful for IV starts** at times; however, **not adjustable enough** if the head of the **bed is elevated**.

IV starts require optimal lighting, which is **not currently available** in patient rooms.

Need a **light that shines** from the **foot of the bed** for urinary catheterizations.

Results? **Light Level** · **Controls** · **Dimming** · **Nighttime Navigation** · **Supplemental**



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



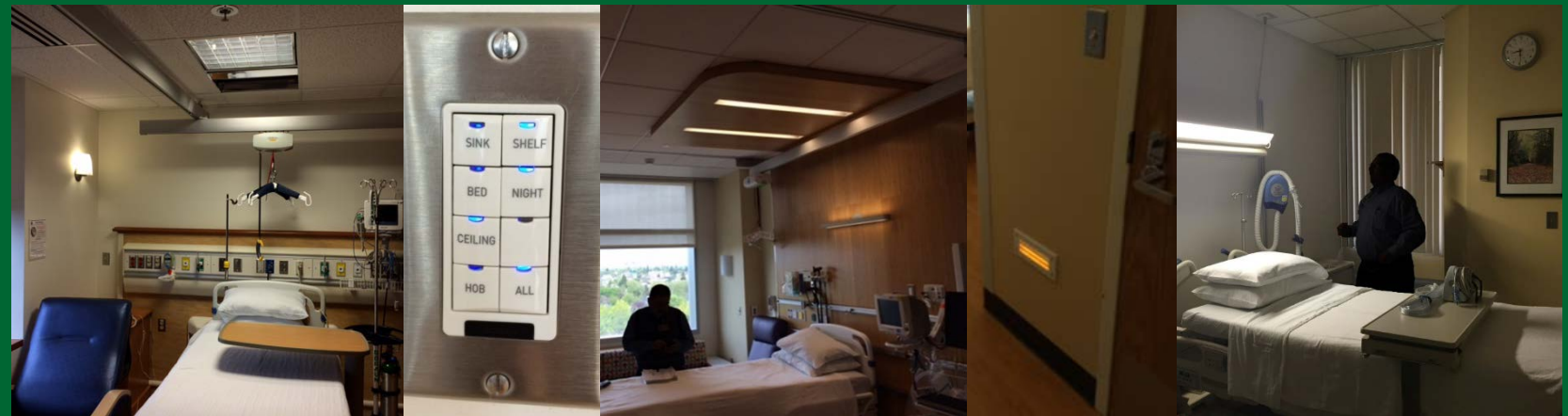
Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



Results? Light Level · Controls · Dimming · Nighttime Navigation · Supplemental



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