



Ventilation Setbacks for Healthcare Facilities Peer Exchange

March 24, 2015

2:00 PM - 3:00 PM EDT

(562) 247-8321

Access Code: 457-722-027

Overview and Agenda

- Welcome and Overview
- Ventilation Requirements & ASHRAE Standard 170
- How to Obtain Buy-In for OR Air Exchange Setbacks
- New York Presbyterian's Experience with HVAC Setbacks
- Question & Answer Session

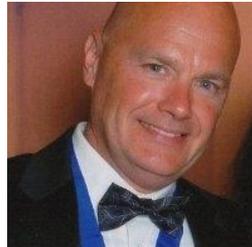
Presenters

Jeff Boldt



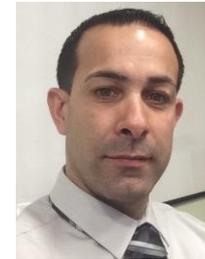
- Director of Engineering
- Voting Member 90.1 & 189.1
- Author AEDG Large Hospitals & Small HC Facilities
- Consultant to 62.1

Paul Slebodnik



- Director Facilities Management

Roberto Nunez



- Director Facilities Operations

Ventilation Requirements & ASHRAE Standard 170

Jeff Boldt, KJWW

VENTILATION REQUIREMENTS

- FGI-2010 and 2014
- ASHRAE 170-2008 and 2013
- ASHRAE 62.1/IMC
- Individual States
 - IA – FGI-2010
 - WI – FGI-2010 (ventilation only)
 - IL – IDPH
 - CA – OSHPD

VENTILATION REQUIREMENTS – ASHRAE-170 EXAMPLES

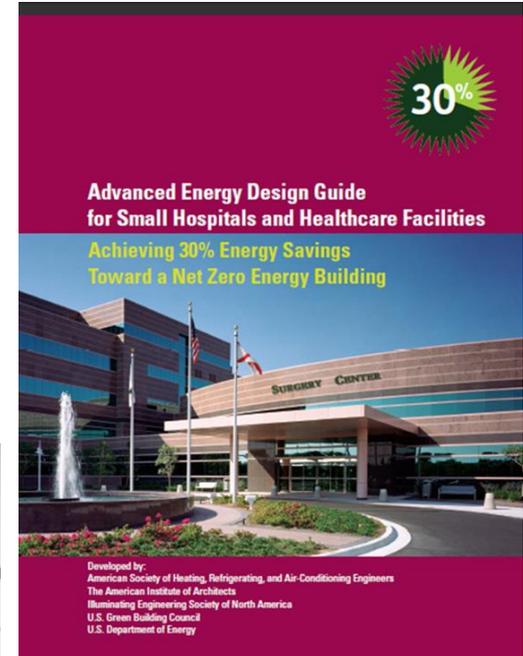
- Patient Rooms
 - 6 ACH Total – 2 ACH OA
 - 4 ACH Total in 170-2013
 - Unoccupied – 0 ACH is **implied** to be permitted in 170-2008 and 2013
 - OSHPD appears to allow reduction to 25%



VENTILATION REQUIREMENT – ASHRAE-170 EXAMPLES

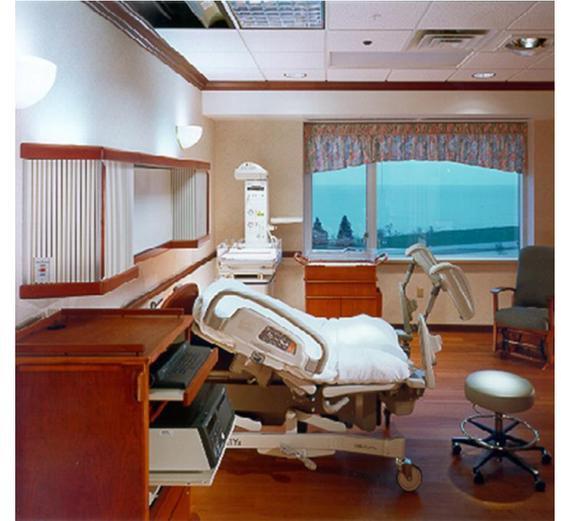
- **Operating Rooms**

- 20 ACH Total – 4 ACH OA
- Unoccupied = maintain pressure relationships
- Huge impact on surgery centers
- OSHPD appears to allow reduction to 6ACH
- Must be safe



CEILING HEIGHTS

- **Most codes based on ACH**
 - High ceilings can mean high energy
 - $150\text{sf} \times 8'\text{ceiling} \times 6\text{ACH}/60 = 120 \text{ cfm}$
 - $150\text{sf} \times 9.5'\text{ceiling} \times 6\text{ACH}/60 = 143 \text{ cfm}$
- **170 has special displacement ventilation provisions**
 - Only count first 6' in the volume
 - $150\text{sf} \times 6' \times 6\text{ACH}/60 = 90 \text{ cfm}$
 - Stayed at 6ACH and 6' in 170-2013



VENTILATION REQUIREMENT – 90.1-2010/IECC-2012

- Zones for which the volume of air that is reheated, recooled, or mixed is less than the larger of the following:
 1. 30% of the zone design peak supply rate;
 2. The outdoor airflow rate required to meet the ventilation requirements of Section 6.2 of ASHRAE Standard 62.1 for the zone;
 3. Any higher rate that can be demonstrated, to the satisfaction of the authority having jurisdiction, to reduce overall system annual energy usage by offsetting reheat/recool energy losses through a reduction in outdoor air intake for the system.
 4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.



ANSI/ASHRAE/IESNA Standard 90.1-2010
(Supersedes ANSI/ASHRAE/IESNA Standard 90.1-2007)
Includes ANSI/ASHRAE/IESNA Addenda listed in Appendix F

ASHRAE STANDARD

Energy Standard for Buildings Except Low-Rise Residential Buildings

I-P Edition

See Appendix F for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, the IESNA Board of Directors, and the American National Standards Institute.

This standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addenda or revisions, including procedures for timely, documented, consensus action on requests for change to any part of the standard. The change submittal form, instructions, and deadlines may be obtained in electronic form from the ASHRAE Web site (www.ashrae.org) or in paper form from the Manager of Standards. The latest edition of an ASHRAE Standard may be purchased from the ASHRAE Web site (www.ashrae.org) or from ASHRAE Customer Service, 1791 Tullie Circle, NE, Atlanta, GA 30329-2306. E-mail: orders@ashrae.org. Fax: 404-321-5478. Telephone: 404-830-8400 (worldwide), or toll free 1-800-527-4723 (for orders in US and Canada). For reprint permission, go to www.ashrae.org/permissions.

©Copyright 2010 American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. ISSN 1041-2336

Jointly sponsored by



American Society of Heating, Refrigerating
and Air-Conditioning Engineers, Inc.
1791 Tullie Circle NE, Atlanta, GA 30329
www.ashrae.org

VAV IS MANDATED IN MOST 90.1/IECC HOSPITALS

- **Example**

- Patient Room

- $150\text{sf} * 9'\text{ceiling} * 6\text{ACH}/60 = 135\text{ cfm minimum}$
 - Cooling load = 250 cfm
 - 90.1/IECC permits reheating only 135 cfm

4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

VAV IS MANDATED IN MOST 90.1/IECC HOSPITALS

- **Example**

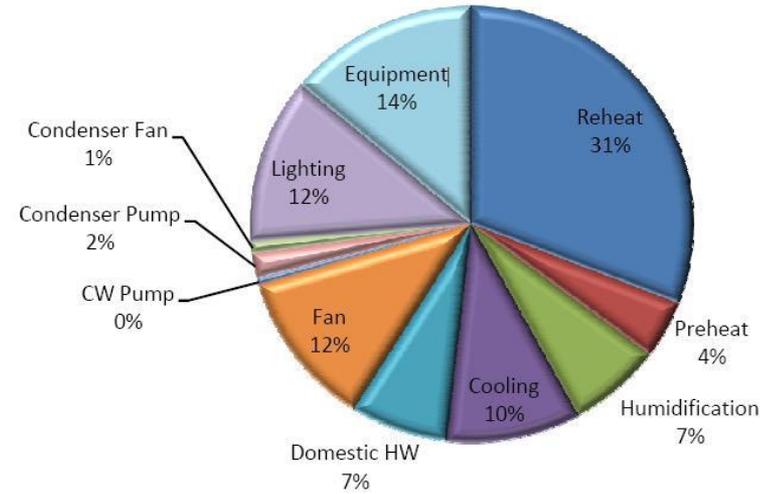
- Operating Room

- $400\text{sf} \times 10'\text{ceiling} \times 20\text{ACH}/60 = 1,333 \text{ cfm occupied}$
 - Unoccupied flow to maintain $0.01'' = 400 \text{ cfm}$
 - 90.1/IECC permits reheating only 400 cfm when unoccupied

4. The air flow rate required to comply with applicable codes or accreditation standards, such as pressure relationships or minimum air change rates.

DOAS

- **Minimizes Reheat**
 - Often near heat balance
- **Geothermal + DOAS**
 - Majority of savings are from DOAS & Heat Pumps

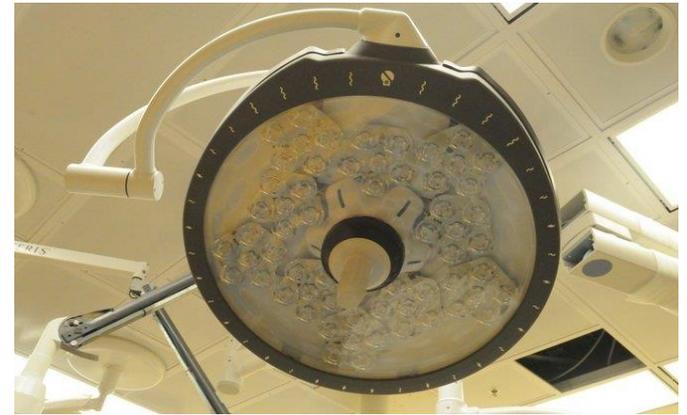


DEMAND CONTROLLED VENTILATION (DCV)

- **Highly Variable Occupancies**
 - Conference Rooms
 - Dining Rooms
 - Lecture Halls
- **Normally Not Regulated by Std. 170**
 - Math is complex, except in CA or for single-zone systems

RETROFITS - LED SURGICAL LIGHTS

- Save lighting energy
- Save much more HVAC energy
- No beam of halogen light heat
- Staff turns up the thermostats
- Maintaining 60% maximum RH is much easier



LED Surgical Light

RETROFIT – SURGICAL LIGHT EXAMPLE

- 1 Operating Room
- Halogen Exam Light
 - Lighting 250 W (each)
 - HVAC (60F @ 60% RH = 45F dew-point) = 19 kW
- LED Exam Light
 - Lighting 65 W (each)
 - HVAC (65F at 60% RH = 50F dew-point) = 13 kW
- Savings
 - Lighting = 370 W (two lights)
 - Ventilation = 6,000 W

LED Surgical
Light



How to Obtain Buy-In for OR Air Exchange Setbacks

Paul Slebodnik, Cleveland Clinic



**How to Obtain Buy-In
for
OR Air Exchange Setbacks**

March 24, 2015

**Paul Slebodnik – Director
Facilities**

What's the Big Deal?

- **Surgical Perspective**
 - **Safety – Impact on Infection Rates**
 - **Comfort – Surgical Team**
- **Administration/Facilities**
 - **Tasked with \$12 mm in utility savings**
 - **This is one of the largest single opportunities**
 - **Provides an opportunity to standardize the OR look and feel**

Figure Out How to Control It

- **Determine how to activate patient occupancy mode**
 - **Light switch**
 - **RFID**
 - **Occupancy Sensor**
 - **Fixed Schedule**
 - **Daily Schedule**
- **Determine how to activate set-back**
- **Emergency Situation**
 - **Over-ride**
 - **Special rooms (no set-back)**

Obtain Infection Prevention Buy-in

- **Share that existing conditions not optimal**
 - After hours
 - Current in-room information
 - ACH monitoring not in all OR's
- **Present that this is not a new concept**
 - Washington state in 1986 standard practice
 - ASHE recognizes it as a best practice
 - Other major HC systems are doing it
- **Reiterate**
 - Relative pressure relationships are maintained
 - Temperature and Humidity maintained

Obtain Approval from Surgical Executive Committee

- **Present it as the benefit to quality it is**
 - **Improved oversight**
 - **Continuous monitoring (w/ alarms)**
 - **Temp/Humidity/Pressure/ACH**
 - **In-room visibility of all 4 (consistent with BAS)**
 - **Surgical control desk has visibility**
 - **No human intervention required**
 - **Visible indication if not at 20 ACH (red “pill”)**
 - **Audible alarm if system fails**
- **Provide prototype to see & ask questions**

Present Status

- **Setbacks have been utilized in some of the regional hospitals for a while**
- **IP endorsement has been given**
- **Surgical Executive Committee has agreed to move forward**
 - **Prototypes are installed in two OR's but are only being used to show condition status**
 - **Sequences have been written**
 - **Two OR re-cap are putting in the equipment**
- **Final approval of funding is being presented today**



Cleveland Clinic

Every life deserves world class care.

New York Presbyterian's Experience with HVAC Setbacks

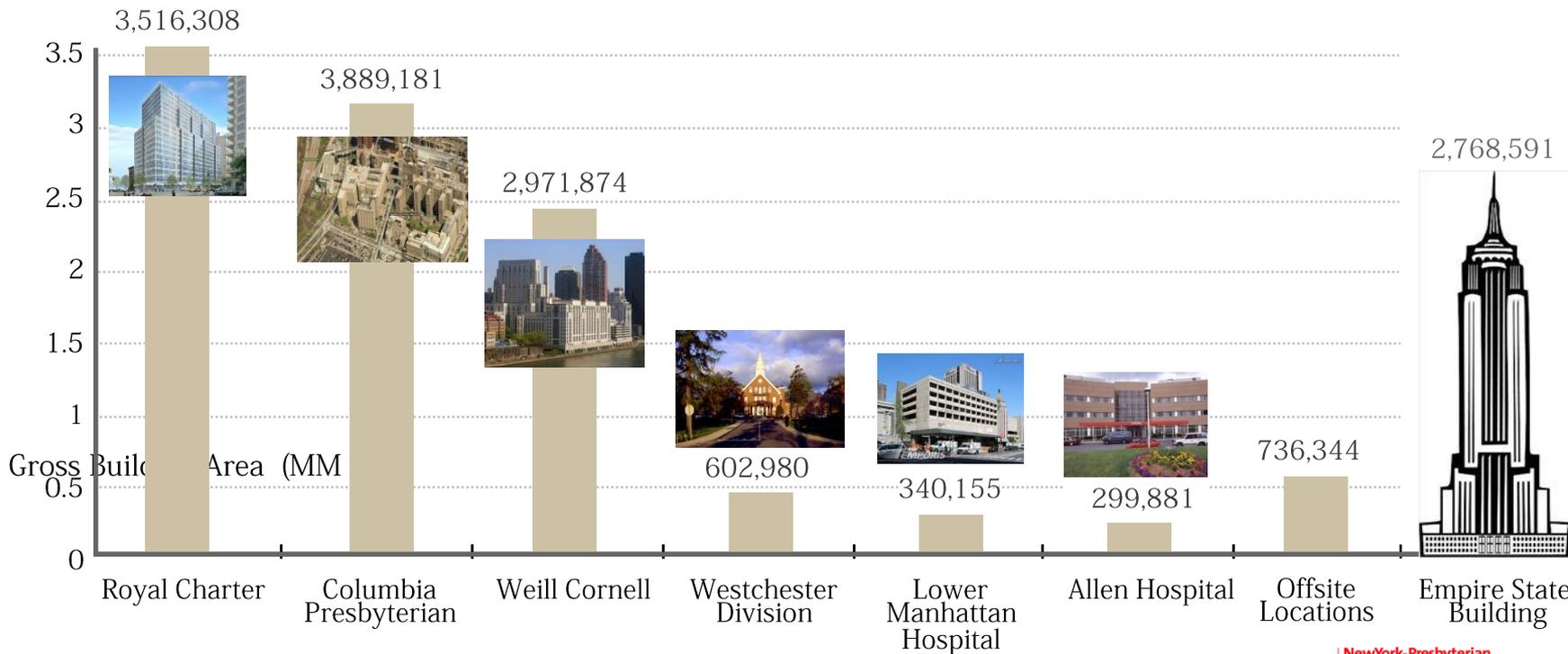
Roberto Nunez, New York Presbyterian

New York Presbyterian Hospital

- Ventilation Setbacks for Healthcare Facilities

New York Presbyterian Facilities

Total NYP
+12 million sq ft



Energy Goals

NYC Mayoral Sustainability Challenge

- PlaNYC – Reduce greenhouse gas emissions by 30% from 2005 levels by 2018



Department of Energy – Better Buildings Challenge

- Reduce EUI by 20% by 2020 from 2011 baseline.



Energy STAR Portfolio Manager

- Achieve Energy STAR label
- Achieve Partner of the Year – Sustained Excellence in Energy Management
- Reduce Kbtu/SF by 2% from prior year



Healthier Hospital Initiative – Practice Greenhealth

- EUI Reduction of 3% from 2012 by 2015



Awards and Recognitions

- **ASHE Energy to Care 2014 Recognition** - Enterprise wide +10% EUI reduction since 2009
- **4 - ENERGY STAR Partner of the Year Awards (2005-2008)**
- **6 - ENERGY STAR Sustained Excellence in Energy Management (2010-2015)**
- **ENERGY STAR Climate Communications Award 2014**
- **NYP/TAH ENERGY STAR Certified Building 2014**
- **NYP/TAH Practice GreenHealth Environmental Excellence Award for Energy.**
- **NYP/WD Westchester Green Business Challenge Certification 2014**

AMAZING
THINGS
ARE
HAPPENING
HERE

 **NewYork-Presbyterian**

 **NewYork-Presbyterian**

ASHRAE Standard 170 vs NYC DOB Code

- ASHRAE Standard 170 increased the ACH requirements for operating rooms to 20.
- NYC DOB requires operating rooms to operate at **25 air exchanges if a 100% outdoor air unit is not utilized.**
- **100% outdoor air is NOT recommended if you are looking for energy savings.**

Building Automation

- Building Management System (BMS)
- Used to monitor and control ventilation in all critical and non- critical areas
- Tightens controls on all air handling units and variable air volume boxes
- Better temperature and pressure controls with less energy consumption

Building Automation

- Tighter controls on air handling unit operations
- Operate at required outputs without exceeding set-points
- Prevents excessive energy consumption and wear on units
- Prevents drifts below required set-points to keep operating rooms compliant.

Building Automation

- Remotely monitor, control, and log:

Room Temperature

Temperature Discharge @ VAV Box

Damper Position

Humidity

Reheat Valve Position

CFM Discharge

Room Pressure

Air Exchange Rate

Taking advantage of Night Setback and Occupancy Sensor

- Limited opportunities for energy savings during normal operation
- During off-hours- Temperature and Static Set-points for are automatically changed through the BMS.
- Near Future- Utilize occupancy sensors to reduce Operating Room set-points to night setback when not in use.

Q & A

Join us at the Better Buildings Summit

Registration is now open!

WHO: 800+ Better Buildings partners and stakeholders and nearly 200 speakers will share demonstrated and proven solutions.

WHAT: 2 ½ days of sessions and meetings focused on the sharing of the most successful energy efficiency strategies. There will be plenty of time for attendees to ask questions, network, and exchange new ideas.

WHEN: May 27-29, 2015

WHERE: Washington D.C.

Quick links:

- [Agenda at-a-glance](#)
- [Register today](#)
- [Reserve your hotel room](#)

It only happens once a year, so don't miss it!

Additional Questions? Feel Free to Contact Us

eere.energy.gov/betterbuildingsalliance

Today's Presenters	Jeff Boldt KJWW boldtjg@kjww.com Paul Slebodnik Cleveland Clinic Foundation Pasleb@ccf.org	Roberto Nunez New York Presbyterian Hospital ron9014@nyp.org
DOE Program Support	Michael Deru Space Conditioning Team Lead Michael.Deru@nrel.gov	John Jameson Healthcare & Higher Education Account Manager John.Jameson@icfi.com

Thank You!