

HGA

ELECTRICAL RECEPTACLES: WHERE  
CODE-MINIMUM MEETS  
OPERATIONALIZING PATIENT CARE

39th Annual FPC Seminar + Expo

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## Speakers

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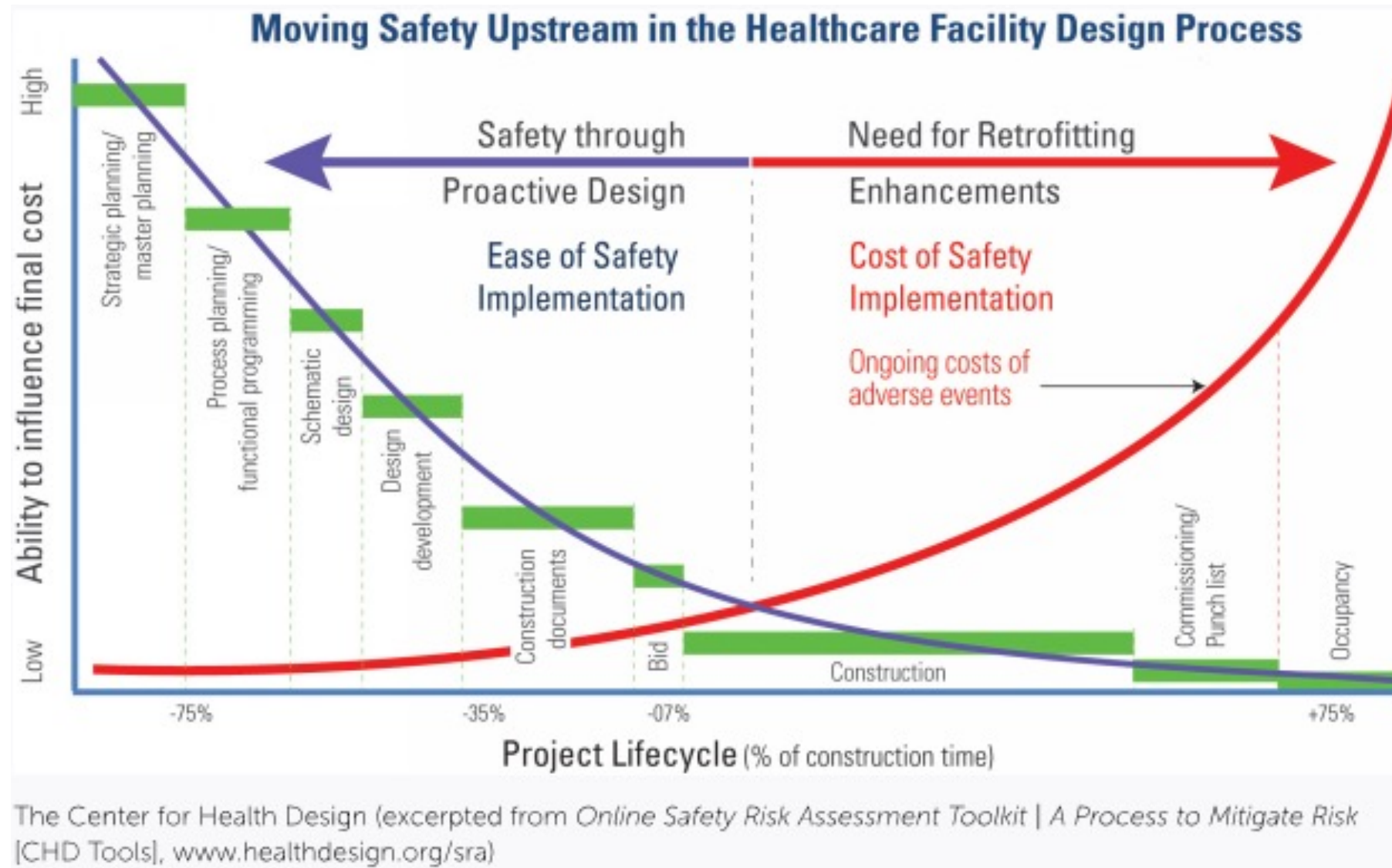
# LEARNING OBJECTIVES

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1. Identify relevant codes and standards requirements for receptacles in patient care areas.
2. Recognize the importance of staffing needs and functional considerations when determining quantities and locations of receptacles
3. Discover how the current delivery of healthcare impacts power requirements and design
4. Learn how to approach receptacle design from a holistic approach that includes the patient, family members and staff.



# WHY IS THIS IMPORTANT- AND WHY TALK ABOUT IT NOW?



Timing has an impact on design decisions in the project life cycle. Short- and long- term costs show why a practice, thoughtful design improves the delivered health care environment.

CODES AND STANDARDS



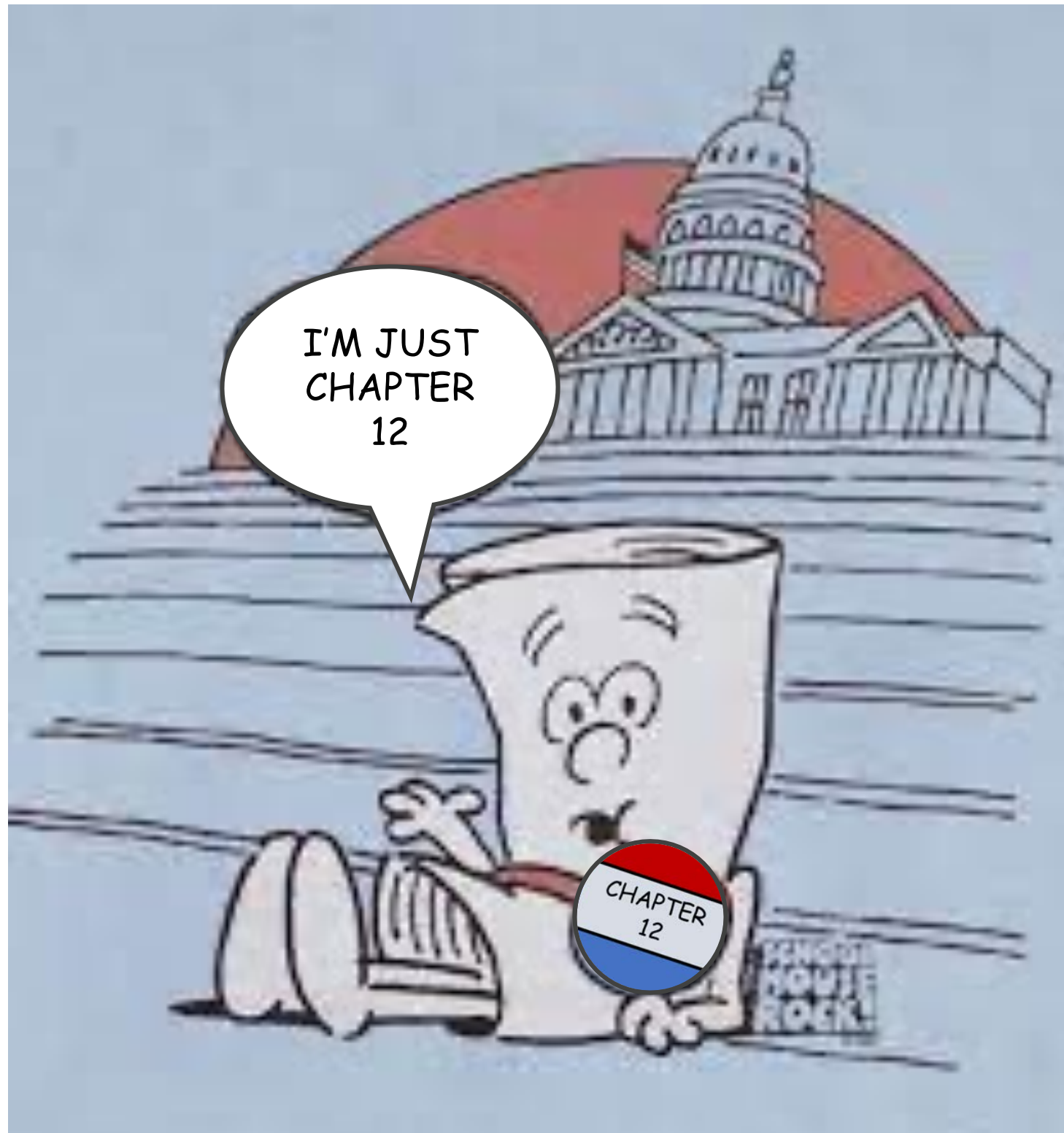
# BUILDING CODES, STANDARDS AND GUIDELINES

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Today

Tomorrow

... And Looking at the Crystal Ball of the Future



### **Code cycles and adoption of codes and guidelines vary state to state. How should this be handled?**

1. Confirm which codes are used in the jurisdiction where a project is located and validate what is applicable for occupancy, licensing, and reimbursement.
2. These are often not in alignment so — when comparing multiple references - always err toward following more stringent requirements and confirm compliance with the authority having jurisdiction and/or reimbursement agency.

# RELEVANT CODES, STANDARDS, AND GUIDELINES

## **NFPA 70: *National Electrical Code, 2023 ed***

### **90.2 Use and Application.**

#### **90.2(A) Practical Safeguarding.**

The purpose of this *Code* is the practical safeguarding of persons and property from hazards arising from the use of electricity.

This *Code* is not intended as a design specification or an instruction manual for untrained persons.

#### **90.2(B) Adequacy.**

This *Code* contains provisions that are considered necessary for safety. Compliance therewith and proper maintenance result in an installation that is essentially free from hazard but not necessarily efficient, convenient, or adequate for good service or future expansion of electrical use.

## **NFPA 99: *Health Care Facilities Code, 2021 ed***

### **1.1 Scope.**

**1.1.1** The scope of this document is to establish minimum criteria as follows in 1.1.2 through 1.1.14.

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#### **1.1.4 Electrical Systems**

**1.1.4.2** (1) Specific requirements for wiring and installation of electrical systems and components thereof are covered in NFPA 70.

# RELEVANT CODES, STANDARDS, AND GUIDELINES

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## ***FGI Guidelines for Design and Construction of Hospitals, 2022 ed***

### **Disclaimers**

FGI endeavors to develop performance-oriented and evidence-based minimum requirements as guidance for design of U.S. health care facilities without prescribing design solutions. Those using this document should rely on their own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstance.



**WARNING**

**CODES ARE  
ALWAYS  
CHANGING\***

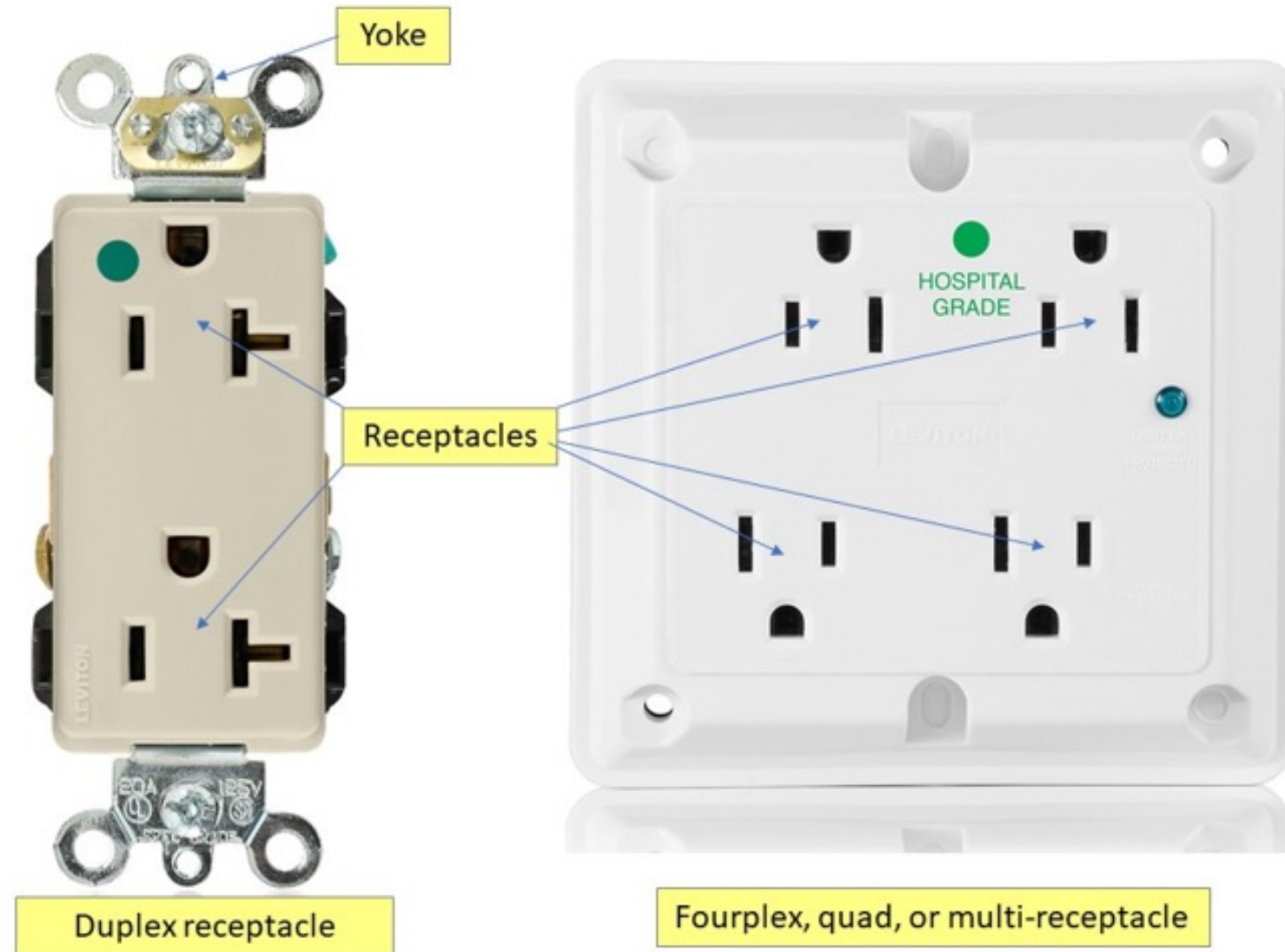
# CHALLENGE OF MINIMUM REQUIREMENTS

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- National codes and standards have been developed to coordinate with federal and state regulations for reimbursement and occupancy compliance.
- With very few exceptions, these codes and standards are written as minimum requirements to establish a threshold that must be achieved for minimal compliance.
- Minimum standards may become the benchmark for design and are often less than optimal—and sometimes inadequate—for the clinical end user and the patient population.

# POINT OF CLARIFICATION – DEFINITION OF A RECEPTACLE

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# BASIC CODE INFORMATION

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## **What documents tells me how many receptacles are required where?**

1. NFPA 99 takes the lead on the device quantities and determining branch of power. NFPA 70 references the information, and FGI aggregates this information and enhances details as appropriate for patient care.
2. What happens when there is a conflict? Again- the rule of thumb is that the most stringent requirements should be applied.





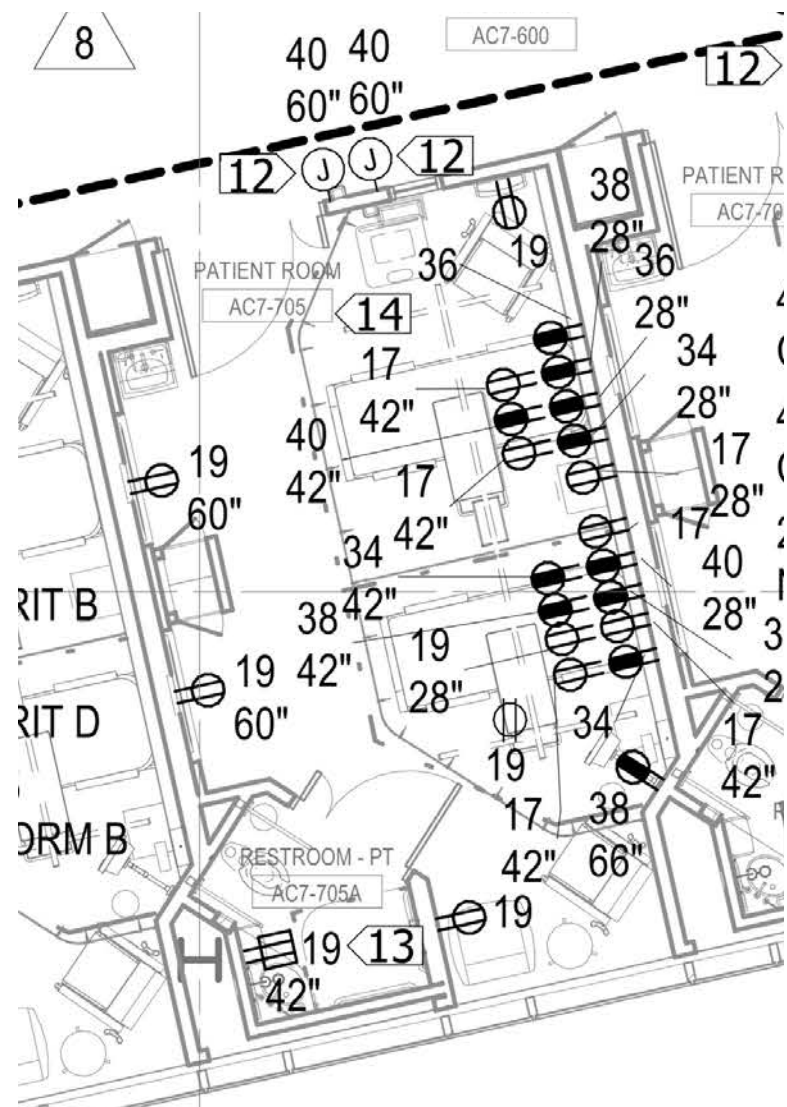
## **Patient Bed Location:**

1. The location of a patient sleeping bed, or the bed or procedure table of a Category 1 space.

## **Risk categories 1 and 2:**

1. Category 1 Space — Space in which failure of equipment or a system is likely to cause major injury or death of patients, staff, or visitors.
2. Category 2 Space — Space in which failure of equipment or a system is likely to cause minor injury to patients, staff, or visitors.

# MED/SURG ROOM



# WHO DETERMINES THE CATEGORY

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## **NFPA 99, 2021 ed Risk Assessment**

### **4.2 \* Risk Assessment.**

#### **4.2.1**

The health care facility's governing body shall establish the processes and operations that are planned for the health care facility.

#### **4.2.1.1**

The governing body shall conduct risk assessments and shall determine risk categories based on the character of the processes and operations conducted in the health care facility.



# CODE MINIMUM DEVICE COUNTS

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## **Patient bed locations in Category 1 spaces:**

1. Minimum of 14 receptacles of which at least 7 shall be connected to either the normal branch circuit or a critical branch circuit supplied by a different transfer switch than that supplying the other critical branch power source at the same location.

## **Patient bed locations in Category 2 spaces:**

1. Minimum of 8 receptacles of which at least 4 shall be connected to either the normal branch circuit or a critical branch circuit supplied by a different transfer switch than that supplying the other critical branch power source at the same location.



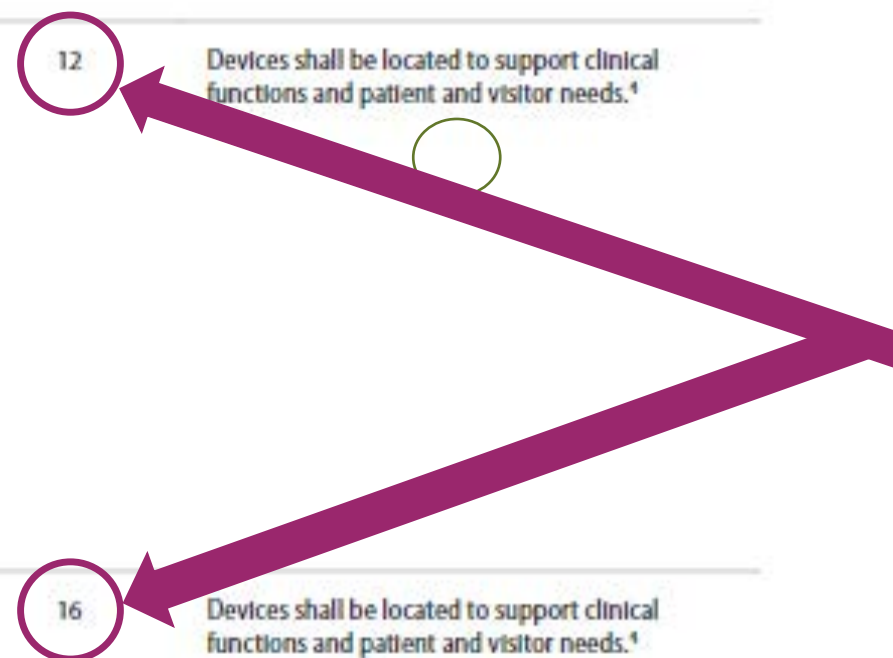
# FGI GUIDELINES FOR DESIGN AND CONSTRUCTION 2022 ED PATIENT CARE AREAS MINIMUM DEVICE COUNTS

## 2.1 COMMON ELEMENTS FOR HOSPITALS

**Table 2.1-1**

**Electrical Receptacles for Patient Care Areas in Hospitals**

Section	Location	Minimum Number of Single Receptacles <sup>1</sup>	Receptacle Locations <sup>2</sup>
<b>PATIENT BED LOCATIONS</b>			
2.1-2.4.2	Airborne infection isolation (AII) room <sup>1</sup>	12	Devices shall be located to support clinical functions and patient and visitor needs. <sup>4</sup>
2.2-2.2.2	Medical/surgical unit patient room <sup>1</sup>		
2.2-2.2.4.4	Protective environment room <sup>1</sup>		
2.2-2.5.2	Intermediate care unit patient room		
2.2-2.10.2.2	Postpartum unit patient room <sup>1</sup>		
2.2-2.12.2	Pediatric and adolescent unit patient room <sup>1</sup>		
2.6-2.2.2	Rehabilitation unit patient room		
2.2-2.6.2	Intensive care unit (ICU) patient care station	16	Devices shall be located to support clinical functions and patient and visitor needs. <sup>4</sup>
2.2-2.7.2	Pediatric intensive care unit (PICU) patient room		
2.2-2.9.2	Neonatal intensive care unit (NICU) infant		



**NFPA Category 1: 14**  
**NFPA Category 2: 8**  
 (Patient Bed Location)

# FUNCTIONAL CONSIDERATIONS





Image courtesy Michelle Stenbeck, Former Patient Care Director, Neurology, Orthopedic & Spine Programs, Abbott Northwestern Hospital



# PLANNING CRITERIA

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- Staffing and Functional Considerations
  - Consistent headwall design
  - Proximity of equipment
  - Patient room adjacencies
- Emergency Operations Plan
- Project Budget



# PLANNING — TYPICAL VARIABLES

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## **Design Considerations for Receptacles in Patient Rooms**

Patient acuity

Surge capacity

Patient care equipment – type and quantity

Accommodations for patient and visitor

Communication & technology



# PLANNING - PATIENT ROOM ZONES

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**Family Zone**

**Patient  
Zone**

**Staff Zone**



# PLANNING - PATIENT ROOM ZONES

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**Family Zone**

**Patient  
Zone**

**Staff Zone**



# PLANNING - PATIENT ROOM ZONES

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**Family Zone**

**Patient  
Zone**

**Staff Zone**



# PLANNING - PATIENT ROOM ZONES

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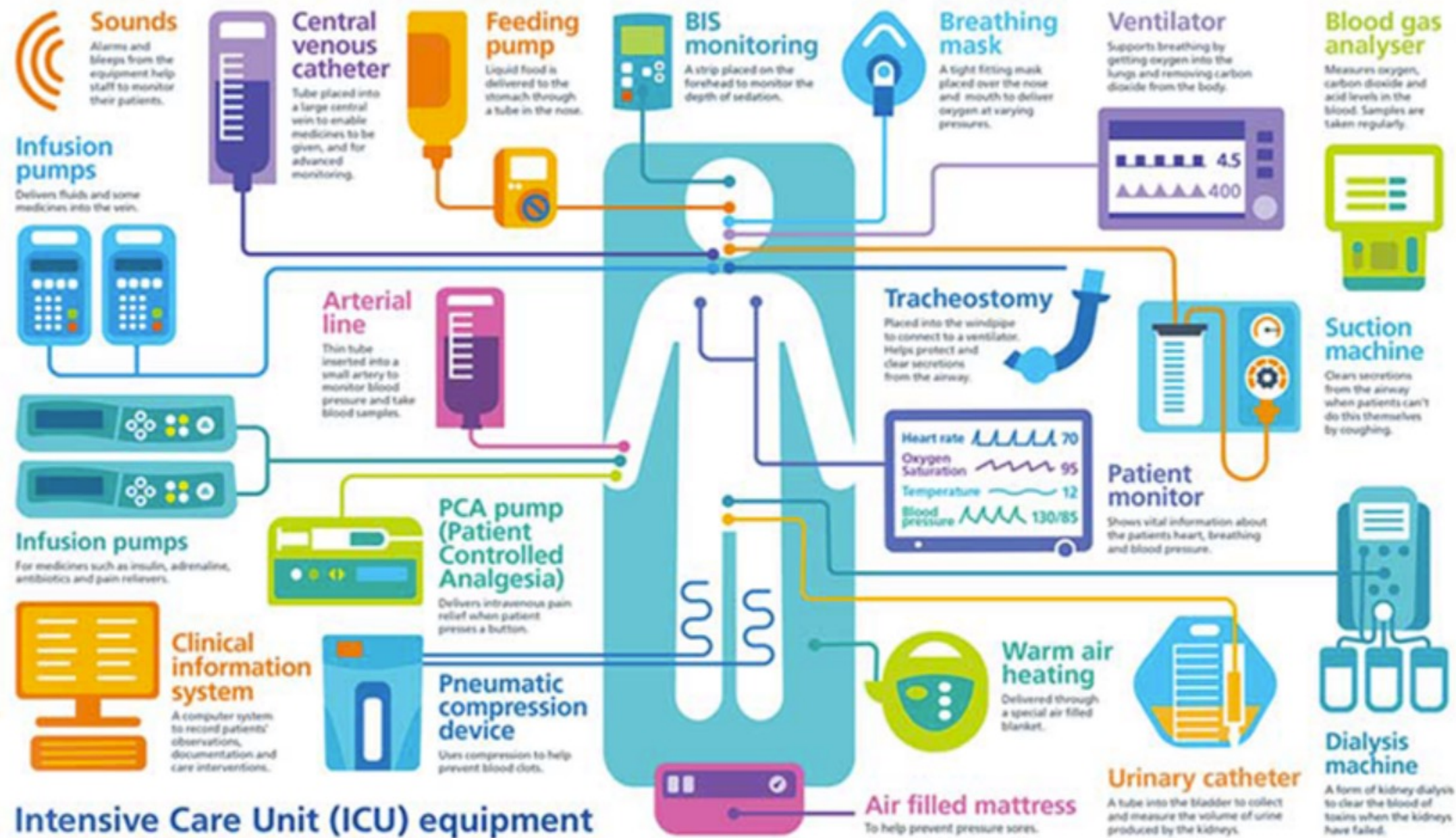
**Family Zone**

**Patient  
Zone**

**Staff Zone**



# PLANNING - EQUIPMENT REQUIREMENTS



<https://www.hospitalgraphics.co.uk/projects/intensive-care-unit-equipment-diagrams/>

# PLANNING – ELECTRICAL DESIGN

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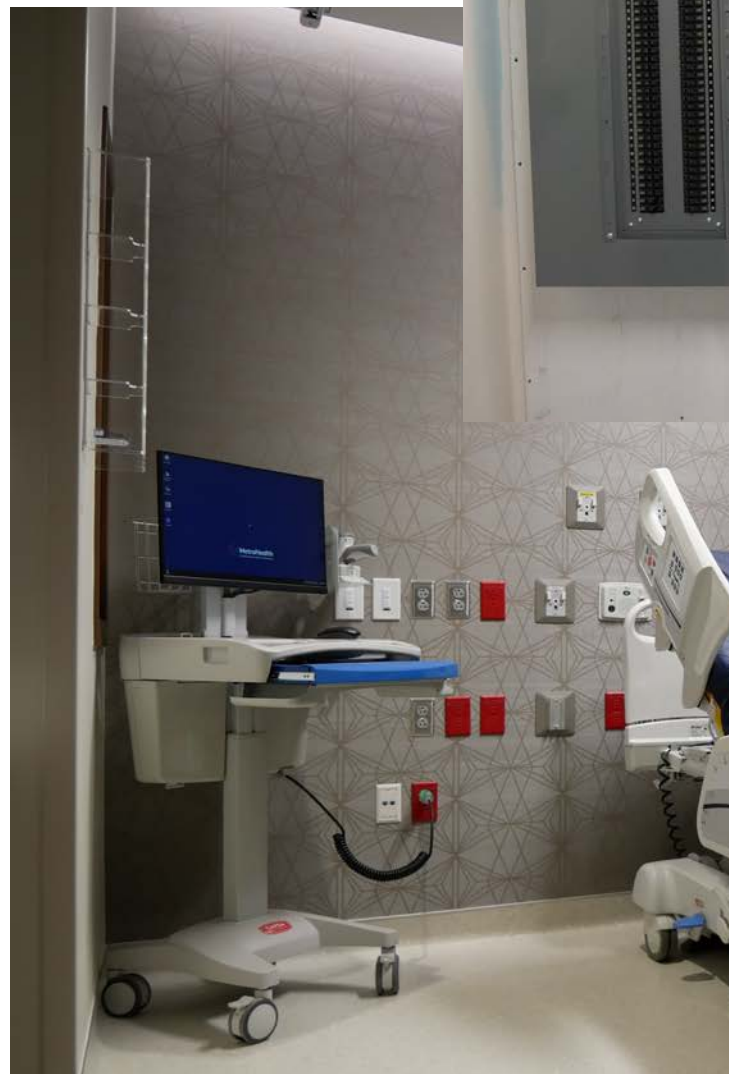
Branch of Power

Circuiting Strategy

Circuit Loading

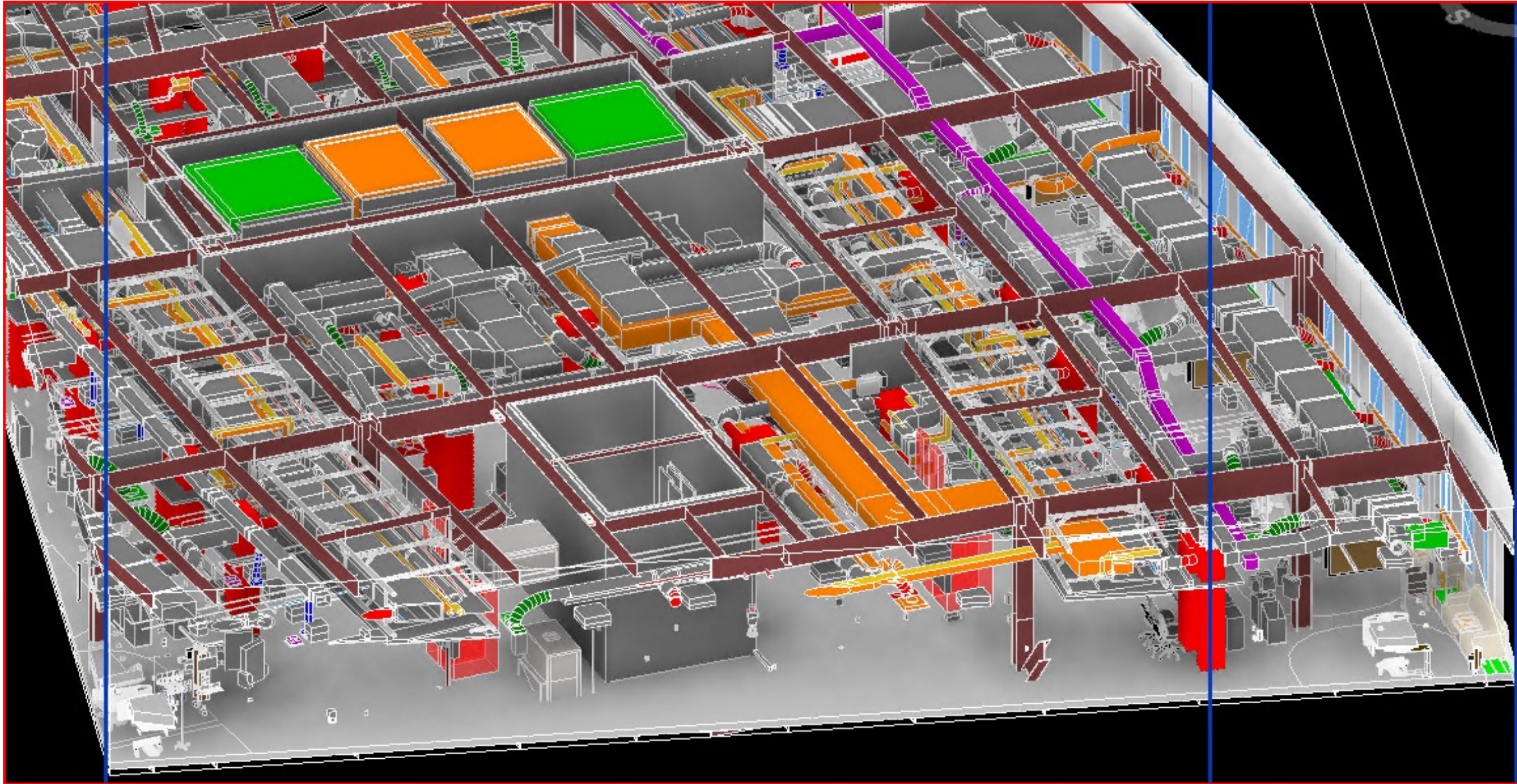
Panelboard Loading

Future Provisions



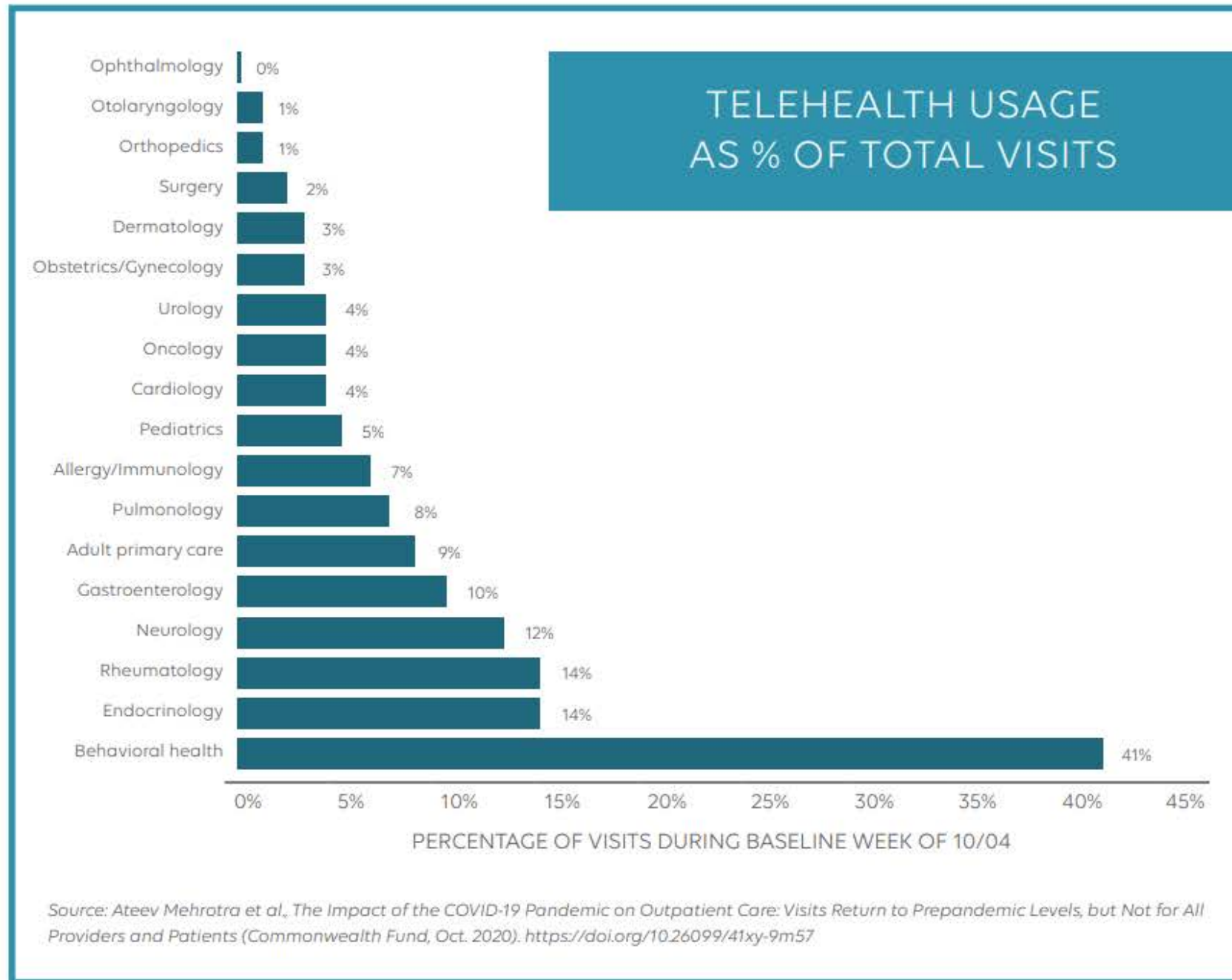


# PLANNING - CONSTRUCTABILITY



# IMPACT OF HEALTHCARE DELIVERY

# HEALTHCARE DELIVERY: TELEHEALTH



# HEALTHCARE DELIVERY: NET NEW TECHNOLOGY

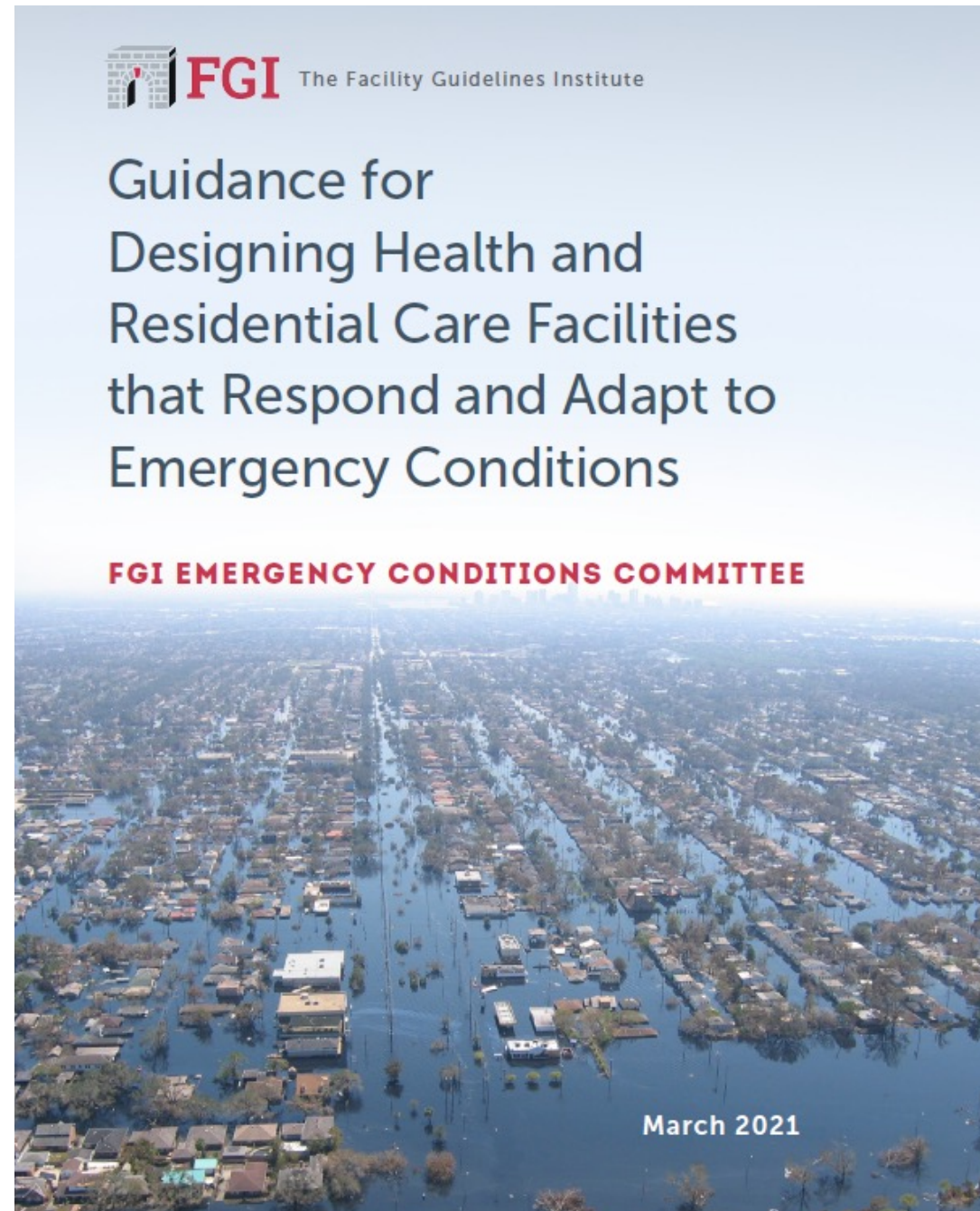


# HEALTHCARE DELIVERY: BEDSIDE DIAGNOSTICS & TREATMENTS



# HEALTHCARE DELIVERY: EMERGENCY CONDITIONS

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CODE SENSIBLE  
DESIGN

# CODE SENSIBLE DESIGN

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With this base knowledge of the receptacle requirements in NFPA 99, NFPA 70, and the FGI *Guidelines*, why would receptacles beyond the minimum prescriptive quantity be needed?





# RECOMMENDATIONS FOR CODE SENSIBLE DESIGN

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Process for Determining Electrical Receptacle Requirements



Needs Assessment Tool



# DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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## General Process:

1. Review NFPA 70, NFPA 99, and the FGI *Guidelines* documents for minimum requirements.
2. Confirm the facility and/or health care organization standards and if they should be considered minimum requirements or a starting point for discussion.
3. Conduct an assessment in collaboration with the health care organization to understand the proposed use of space.



# DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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## **Communication with stakeholders:**

1. Request clinical input.
2. Request input from on-site biomedical equipment staff.
3. Request input from the safety and security director.
4. Request facility management input.
5. Open and maintain a dialogue with the facility-side project team.





Anything else?

# DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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## **Existing or Remodeled space considerations:**

1. Conduct a site visit to understand the existing installation.
2. Determine if the current electrical system including up to the primary distribution source, not just the local panelboard, can accommodate additional load.
3. Address infrastructure needs in conjunction with the receptacle design.



# DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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## **Final Considerations:**

1. Consider future technologies, including alternate power technologies, and alternate uses of the space.
2. Discuss a design solution with the client and assure there is alignment in expectations and clinical outcome.
3. Obtain approval for the design solution from affected stakeholders and regulatory entities, as required.
4. Finalize the design solution and generate the required construction documentation within the constraints of the overall project budget.



# DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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## **And Remember - Ask questions:**

1. The FGI white paper shares some recommended questions to ask during planning.
2. Don't assume a facility is the same as the last one (or even the same as their last remodel)—ask the questions.



DEPARTMENT:		DATE:
Patient acuity:		Revisions:
Patient type or range of diagnoses:		
Patient room function:		
Room number(s):		
Design Criteria	Y/N?	Comments
1. Design for surge capacity		
2. Design for multiple functions/modalities		
3. Will telehealth service occur in this room?		
4. Will dialysis occur in this room?		
5. Imaging equipment provisions		
6. Pediatric space (tamper-resistant receptacles)		
7. Staffing and functional considerations		
a. Same hand or mirrored design		
b. Consistent headwall design		
c. Ergonomic requirements		
d. Proximity of equipment		
8. Has the emergency operations plan been evaluated or incorporated into the design?		
9. Will patients have acute behavioral health needs?		
10. Will mobile or permanent patient lifts be used in the room?		

# NEEDS ASSESSMENT TOOL

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# NEEDS ASSESSMENT TOOL

Patient Room Zone Criteria			
Patient zone equipment—list items below.	Location	Power requirements	Additional requirements (life-supporting, tamper-resistant, dedicated circuit, etc.)
1.			
2.			
3.			
4.			
Staff zone equipment—list items below.	Location	Power requirements	Additional requirements (life-supporting, tamper-resistant, dedicated circuit, etc.)
1.			
2.			
3.			
4.			
Family zone equipment—list items below.	Location	Power requirements	Additional requirements (tamper-resistant, dedicated circuit, furniture connections, USB devices, etc.)
1.			
2.			
3.			
4.			





The White paper can be downloaded (for free) from the FGI Website:

<https://fgiguidelines.org/resource/electrical-receptacles-in-patient-care-areas/>