HGA

ELECTRICAL RECEPTACLES: WHERE CODE-MINIMUM MEETS OPERATIONALIZING PATIENT CARE

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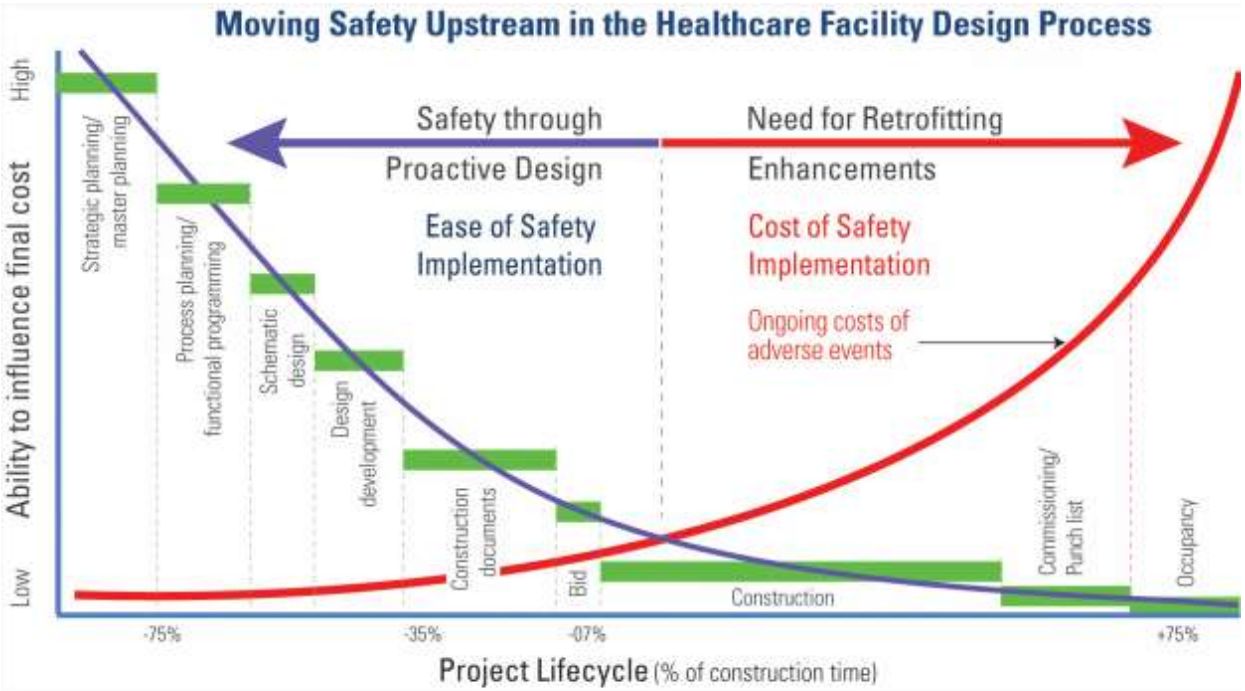
LEARNING OBJECTIVES

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.

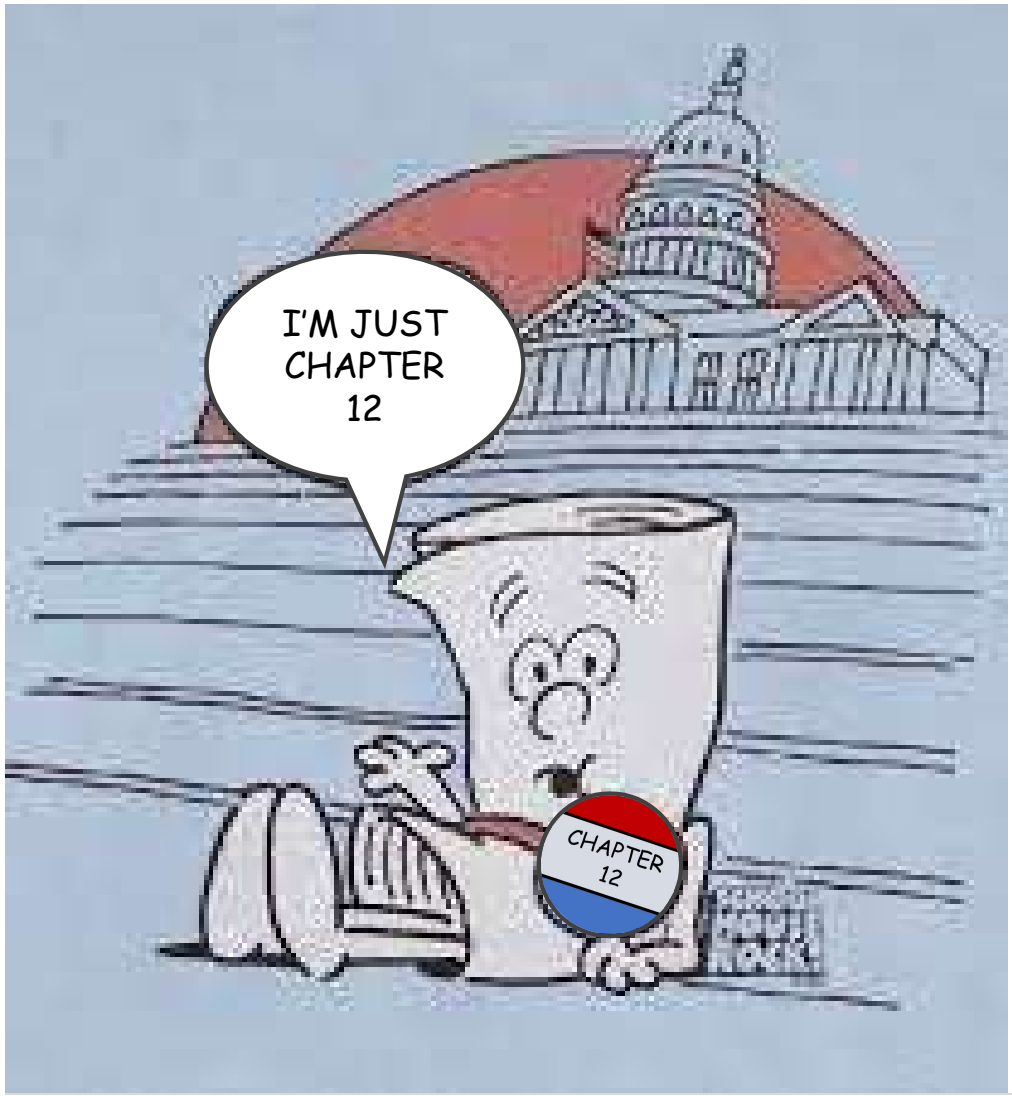
WHY IS THIS IMPORTANT- AND WHY TALK ABOUT IT NOW?



The Center for Health Design (excerpted from *Online Safety Risk Assessment Toolkit | A Process to Mitigate Risk* [CHD Tools], www.healthdesign.org/sra)

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

Today

Tomorrow

… And Looking at the Crystal Ball of the Future

BASIC CODE INFORMATION

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.

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

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*

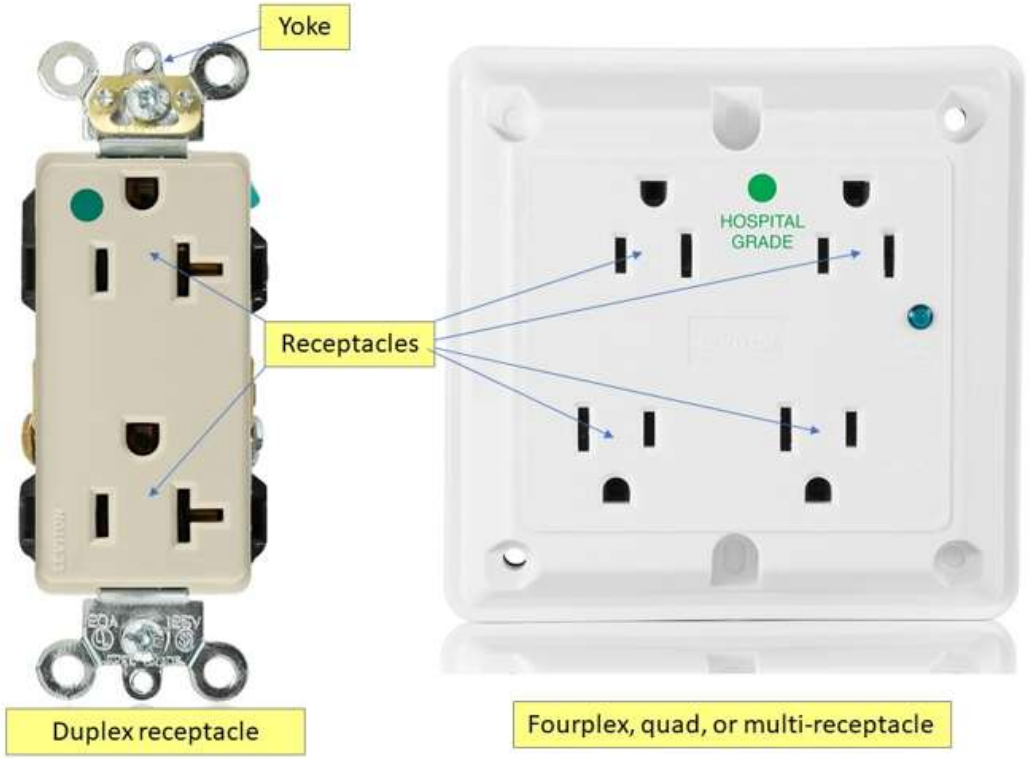
CHALLENGE OF MINIMUM REQUIREMENTS

- 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



Leviton

BASIC CODE INFORMATION

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.

NFPA 99 - 2021 ED

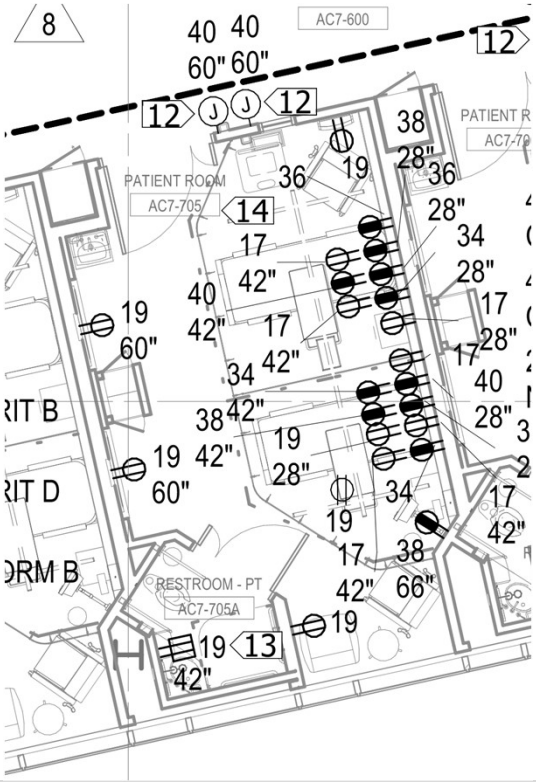
Patient Bed Location:

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

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

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

Table 2.1-1

Electrical Receptacles for Patient Care Areas in Hospitals

Section	Location	Minimum Number of Single Receptacles[1]	Receptacle Locations[2]
PATIENT BED LOCATIONS			
2.1-2.4.2	Airborne infection isolation (AII) room[3]	12	Devices shall be located to support clinical functions and patient and visitor needs.[4]
2.2-2.2.2	Medical/surgical unit patient room[3]		
2.2-2.2.4.4	Protective environment room[3]		
2.2-2.5.2	Intermediate care unit patient room		
2.2-2.10.2.2	Postpartum unit patient room[3]		
2.2-2.12.2	Pediatric and adolescent unit patient room[3]		
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.[4]
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


Hill-Rom
Hill-Rom

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

PLANNING CRITERIA

- Staffing and Functional Considerations
  - Consistent headwall design
  - Proximity of equipment
  - Patient room adjacencies

- Emergency Operations Plan

- Project Budget

PLANNING — TYPICAL VARIABLES

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

Family Zone

Patient Zone

Staff Zone

PLANNING - PATIENT ROOM ZONES

Family Zone

Patient Zone

Staff Zone

PLANNING - PATIENT ROOM ZONES

Family Zone

Patient Zone

Staff Zone

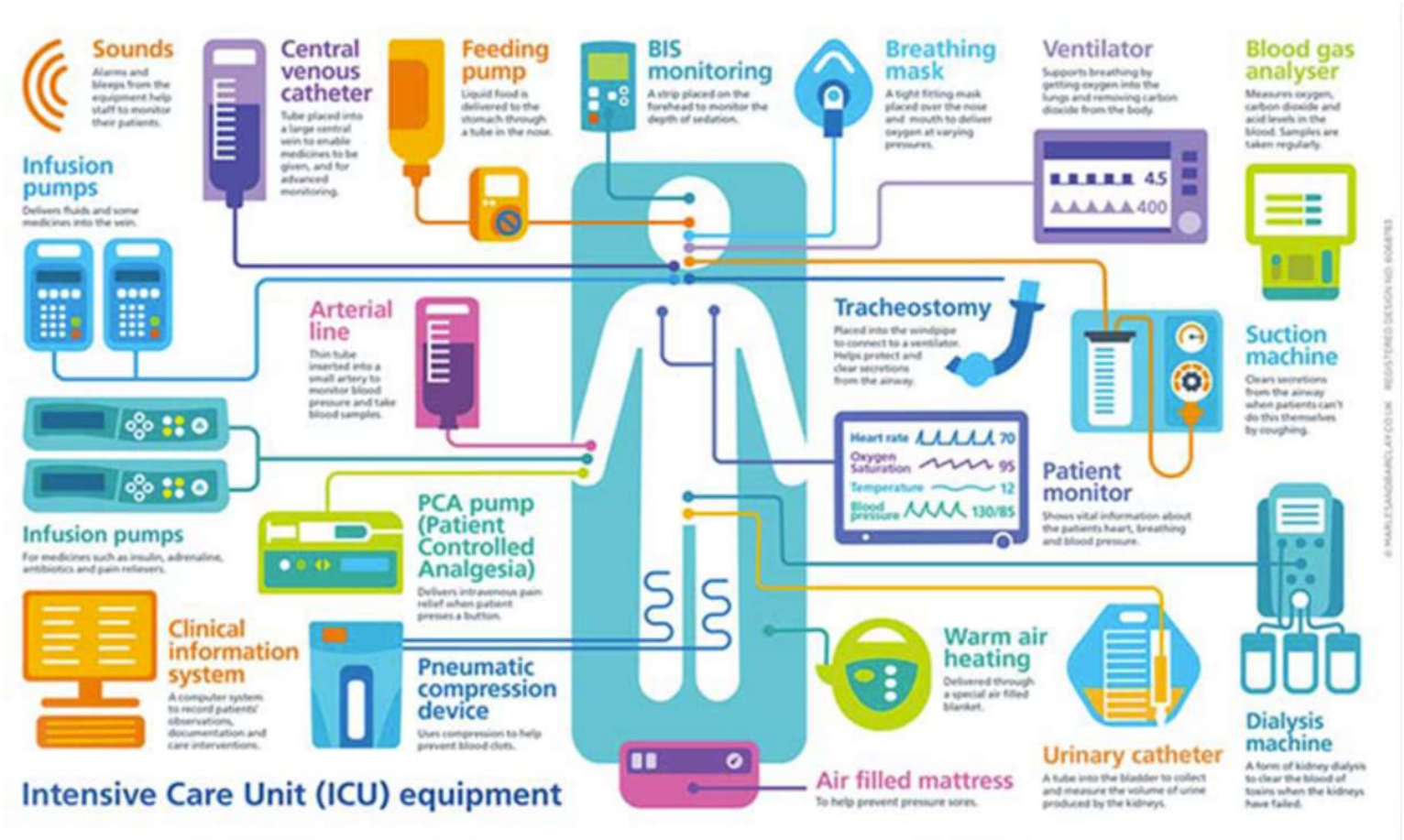
PLANNING - PATIENT ROOM ZONES

Family Zone

Patient Zone

Staff Zone

PLANNING - EQUIPMENT REQUIREMENTS



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

PLANNING – ELECTRICAL DESIGN

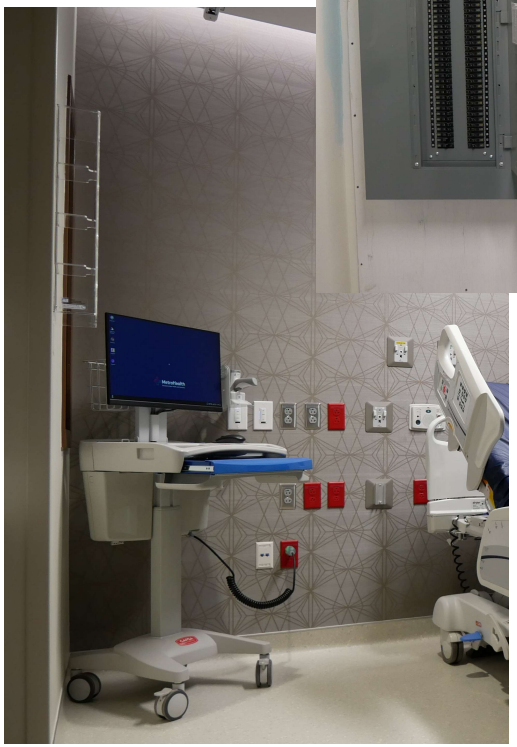
Branch of Power

Circuiting Strategy

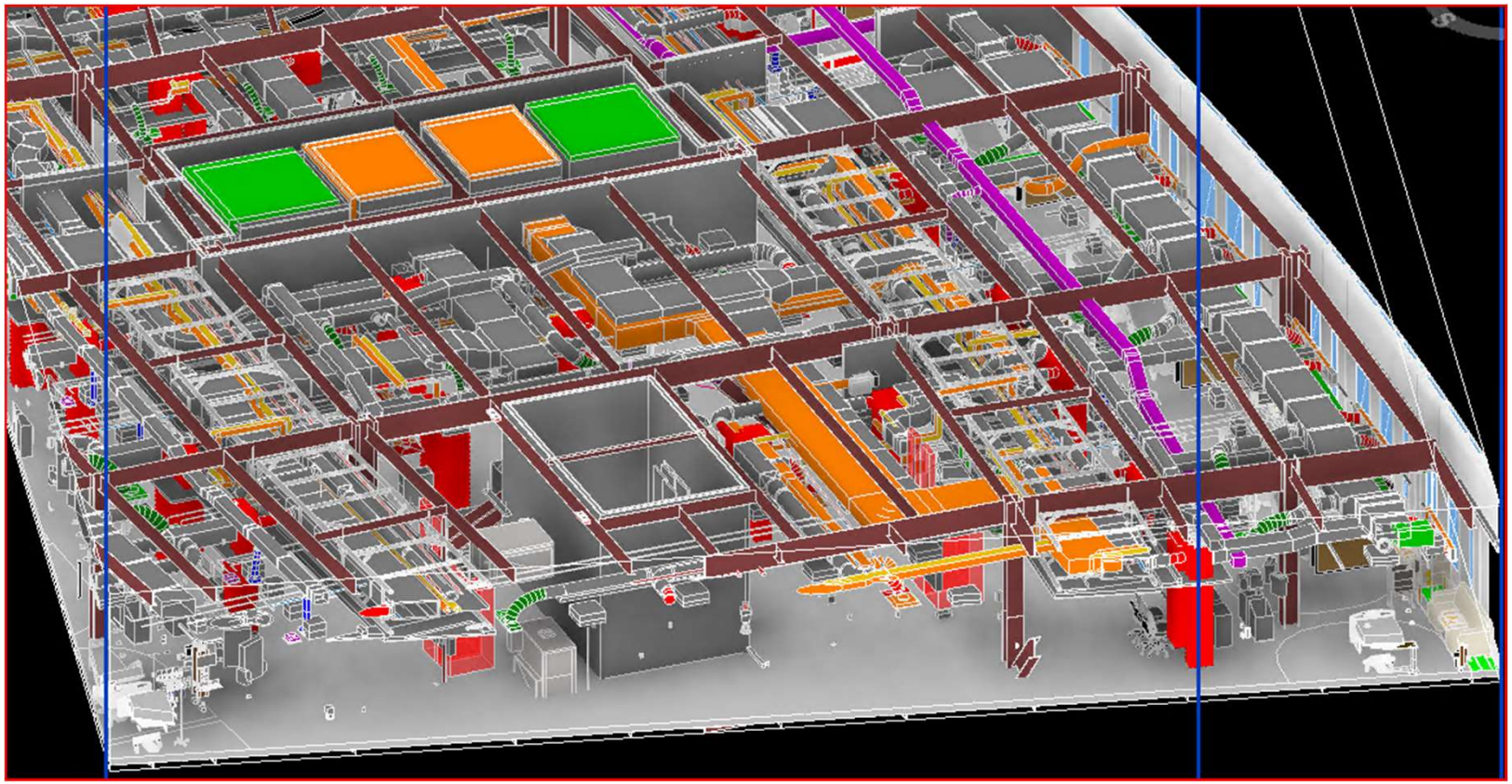
Circuit Loading

Panelboard Loading

Future Provisions

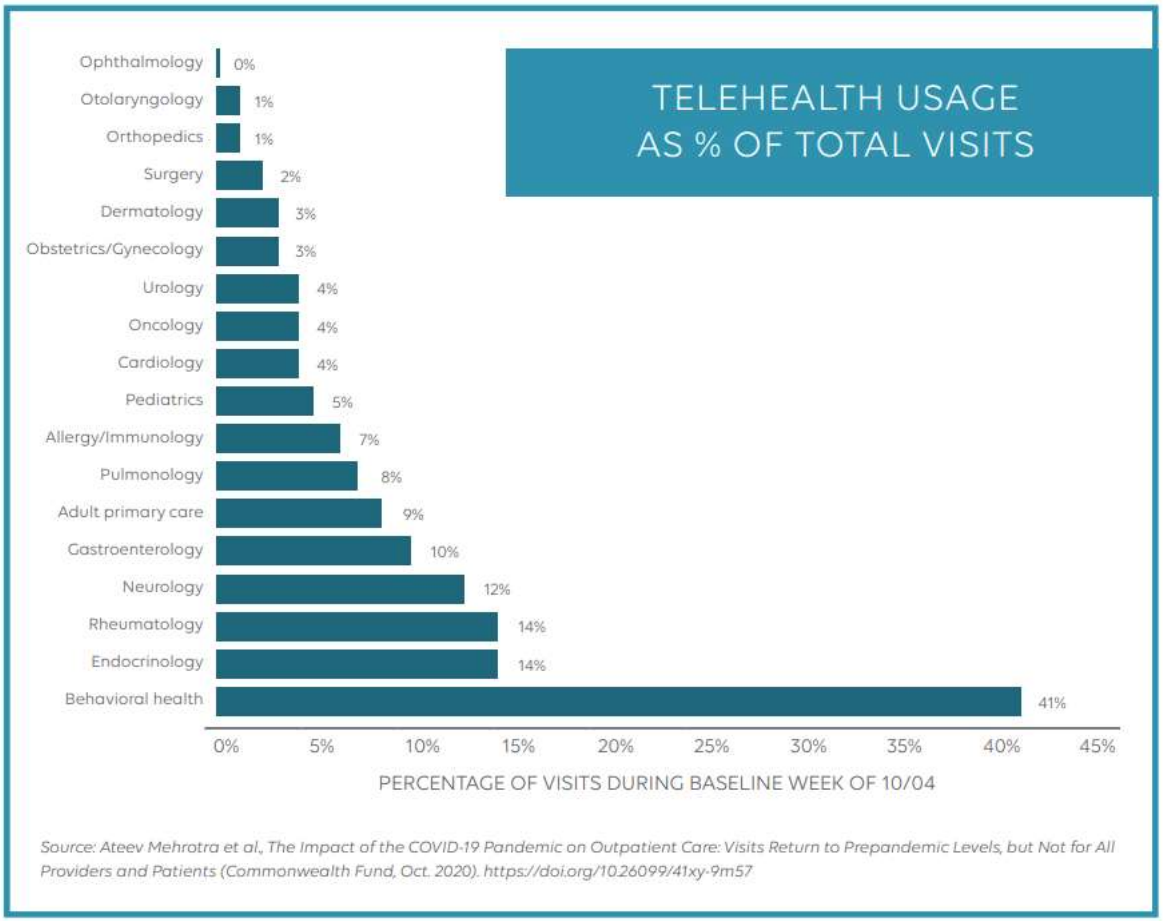


PLANNING - CONSTRUCTABILITY



IMPACT OF HEALTHCARE DELIVERY

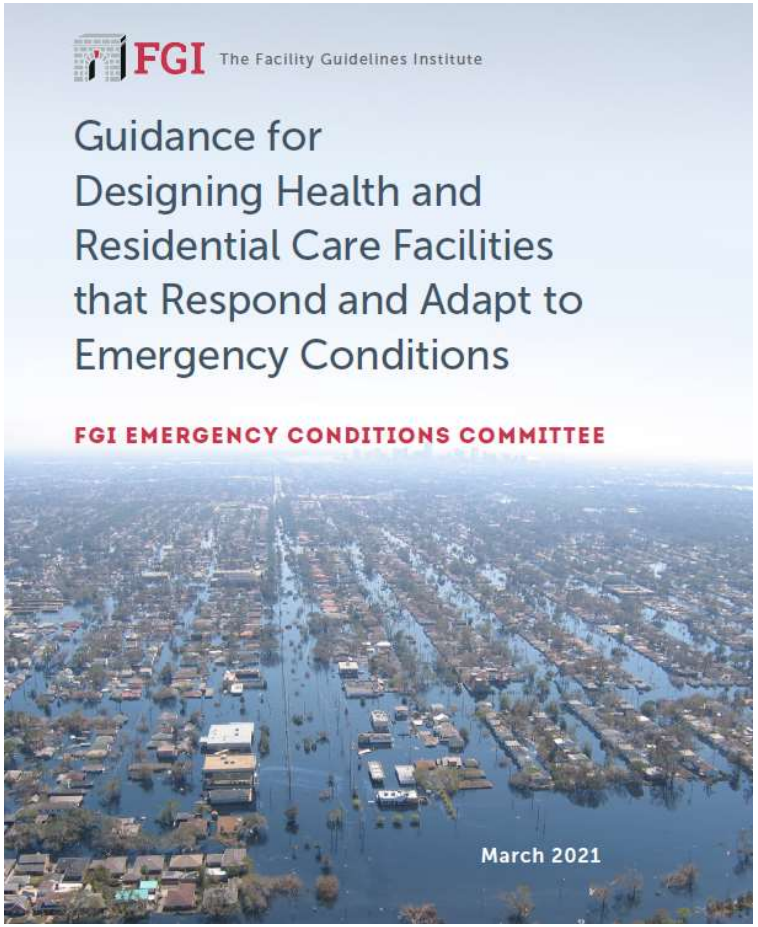
HEALTHCARE DELIVERY: TELEHEALTH



HEALTHCARE DELIVERY: NET NEW TECHNOLOGY

HEALTHCARE DELIVERY: BEDSIDE DIAGNOSTICS & TREATMENTS

HEALTHCARE DELIVERY: EMERGENCY CONDITIONS



CODE SENSIBLE DESIGN

CODE SENSIBLE DESIGN

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

Process for Determining Electrical Receptacle Requirements

Needs Assessment Tool

DETERMINING ELECTRICAL RECEPTACLE REQUIREMENTS

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

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

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

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

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.

NEEDS ASSESSMENT TOOL

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

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/