

2015 NFPA Conference & Expo

Evaluating Occupant Load Factors for Ambulatory Health Care Facilities

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Overview

- The History
- The Problem
- The Questions
- Spain's Research
- U.S. Research
- Let's Compare
- So What?

The History

- NFPA 101 gives Ambulatory Health Care uses their own occupant load factor in the 2006 edition.
- 100 ft²/pers (9.3 m²/pers) based on business use occupant load factor.
- 2015 edition changes this to 150 ft²/pers (13 m²/pers) for Ambulatory Health Care use only.

Health Care Use		
Inpatient treatment departments	240	22.3
Sleeping departments	120	11.1
Ambulatory health care	100	9.3
Detention and Correctional Use	120	11.1
Residential Use		
Hotels and dormitories	200	18.6
Apartment buildings	200	18.6
Board and care, large	200	18.6
Industrial Use		
General and high hazard industrial	100	9.3
Special-purpose industrial	NA	NA
Business Use (other than below)	100	9.3
Air traffic control tower observation levels	40	3.7

Courtesy of NFPA 101, 2012.

The Problem

- **Business Occupancy** is an occupancy used for the transaction of business (3.3.188.2.1, NFPA 101 (2012)).
- **Ambulatory Health Care Occupancy** is an occupancy used to provide services or treatment simultaneously to four or more patients that provides, on an outpatient basis, one or more of the following:
 - (1) treatment for patients that renders the patients incapable of taking action for self preservation under emergency conditions without the assistance of others;
 - (2) anesthesia that renders the patients incapable of taking action for self-preservation under emergency conditions without the assistance of others;
 - (3) emergency or urgent care for patients who, due to the nature of their injury or illness, are incapable of taking action for self-preservation under emergency conditions without the assistance of others. (3.3.188.1, NFPA 101 (2012)).

The Problem

- Similarities:
 - Offices
 - Conference Rooms
 - Consultation Rooms
 - Waiting Areas
- Differences:
 - Operating Rooms
 - Prep Areas
 - Post-Anesthesia Care Unit (PACU)



Courtesy of Elaine Kohan.

The Questions

- How are Ambulatory Health Care occupancies being used and by whom?
- How many people are within the space at a time?
- Does the Life Safety Code accurately reflect this usage?



Courtesy of Centers for Disease Control and Prevention.

Spain's Research- Scope



Focus on:

1. Data collection and determining occupant load factors.
2. Design a questionnaire for Ambulatory Health Care Facilities.

Courtesy of The Fire Protection Research Foundation.

Spain's Research- Scope



Survey Totals:

- 21 Ambulatory Health Care Facilities
- 18 primary care
- 1 urgent care and treatment
- 2 consultation and treatment services
- 1,180,343 ft²

Courtesy of The Fire Protection Research Foundation.

Spain's Research- Questionnaire

Building General Information

Name: Health Care Facility name:
 Position: N° of Floors: Floor Height (m): Internal code:
 City: Phone: E-mail: Date: Time:

Occupant load density

Floor Number									
Gross Floor Area									
N° of Staff									
N° of Visitors (companions)									
N° of Patients									
N° of Capable Patients									
N° of Incapable Patients									
Type of Disability									

N° of exits: ...
 Exit 1 width (m): Maximum travel distance (m): Exit 2 width (m): Maximum travel distance (m):
 Exit 3 width (m): Maximum travel distance (m): Exit 4 width (m): Maximum travel distance (m):

Remarks

Courtesy of The Fire Protection Research Foundation.

U.S. Research- Scope

Focus on:

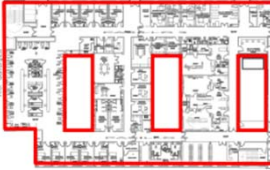
- Verification of Spain's Research outside of Santander.
- Survey Totals:
 - 8 facilities
 - 3 stand alone
 - 2 surgery floors
 - 3 primary care
- 111,574 ft²



Courtesy of Elaine Kohan.

U.S. Research- Data Collection

- Surveys during "Prime Time"
 - 7 a.m. to 12 p.m.
- Occupants split into:
 - Staff
 - Companion
 - Patient
- Gross floor area was used




Courtesy of The Fire Protection Research Foundation.

U.S. Research- Calculations

- Occupant Load Factor
 - Per area surveyed per hour
 - Per area surveyed per facility average
 - Per facility average
- Companion to Patient Ratio

$$\text{Ratio}_{\text{Companion/ Patient}} = \frac{N_{\text{Companions}}}{N_{\text{Patients}}}$$
- Patient to Staff Ratio

$$\text{Ratio}_{\text{Patients/ Staff}} = \frac{N_{\text{Patients}}}{N_{\text{Staff}}}$$



Courtesy of Elaine Kohan.

U.S. Research- Results

Facility	Average Occupant Load Factor	
	ft ² / pers	m ² /pers
Facility 1^A	144	13
Waiting Room	241	22.4
Prep	112	10.4
PACU	207	19.3
Nurse Room	20	1.9
Facility 2^A	156	14.5
Waiting Room	99	9.2
Prep	159	14.8
PACU	233	21.6
Offices	131	12.2
Facility 3[*]	214	19.9
Waiting Room	296	27.5
Front Desk	313	29.1
Back Desk	69	6.4
Prep	174	16.2
PACU	220	20.4

U.S. Research- Results

Facility	Average Occupant Load Factor	
	ft ² / pers	m ² /pers
Facility 4[*]	3756	348.9
Waiting Room	6312	586.4
Front Desk	448	41.7
Back Desk	4150	385.6
Patient Rooms	4113	382.2
Facility 5[*]	401	46.7
Facility 6^P	350	33.2
Floor 1	162	15.0
Floor 2	263	28.3
Floor 3	527	48.9
Floor 4	505	47.0
Floor 5	304	28.2
Floor 6	339	31.5

U.S. Research- Results

Facility	Average Occupant Load Factor	
	ft ² / pers	m ² /pers
Facility 7^P	518	48.1
Waiting Room	241	22.4
Patient Care	795	73.9
Facility 8^P	65	6.1
Pharmacy	40	3.7
Floor 1	50	4.7
Floor 2	104	9.7

^{*}Free standing urgent/ treatment AHC Facility
^P Primary Care AHC Facility
^A Urgent/ treatment AHC floor or wing within larger acute care hospital

U.S. Research- Analysis

- 17% of areas were less than 100 ft²/ person.
- 83% of areas were greater than 100 ft²/ person.
- One outlier facility within data set (Facility 4).
 - 3756 ft²/ person
 - 348.9 m²/person

Let's Compare

USA	ft ² /pers	m ² /pers	
Mean	701	66.3	U.S. Occupant Load Factors All Facilities
S.D.	1244	115.2	

USA	ft ² /pers	m ² /pers	
Mean	264	25.9	U.S. Occupant Load Factors Excluding Outlier
S.D.	163	16.8	

SPAIN	ft ² /pers	m ² /pers	
Mean	267	24.8	Spain Occupant Load Factors All Facilities
S.D.	172	16.0	

Lets Compare

U.S. Ratio Results

Ratio _{Companion/Patient}		Ratio _{Patient / Consultation}	
Mean	S.D.	Mean	S.D.
0.98	0.73	0.78	0.52

Spain Ratio Results

Ratio _{Companion/Patient}		Ratio _{Patient / Consultation}	
Mean	S.D.	Mean	S.D.
0.44	0.27	1.21	0.71

So What?

- 83% of facilities in U.S. study showed occupant load factors larger than 100 ft²/ person (9.3 m²/ person).
- Supportive of 2015 Life Safety Code change to 150 ft²/ person (13 m²/ person).
- Facilities can plan for staff and patients within the Ambulatory Care Areas.
- Facilities cannot plan for companions.
- Companion to Patient ratio may be able to help better predict these numbers.

Questions/Discussion

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