Refuge Areas and Vertical Evacuation of Multistorey Buildings: The End Users’ Perspectives

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Introduction

- Approximately 11% in Great Britain have a mobility impairment (Department of Work and Pensions, 2013)
- Prevalence of disability increases with age
  - Numbers of people aged 65 and over is projected to increase by 42% by 2025.
- Accessibility … responsibility of safe egress
- Traditionally the definition of the 'means of escape' has been recognised as insufficient
- Partial answer is to provide a Refuge Area to facilitate a more efficient evacuation
  - Fire Evacuation Lifts would be the preferred option in combination with the refuge
Refuge area definition ... ‘temporary’ and ‘safe space’

UK Guidance (BS9999, 2008) recommends that a refuge needs to:

- Accommodate a wheelchair
- Not less than 900x1400mm
- Not obstruct the evacuation flow
- Protected stairway affording egress from each storey and each final exit leading onto a flight of stairs external to the building

NOTE: In this example the landing is larger to allow access to the wheelchair space without disrupting the flow of persons escaping.

Figure taken from BS9999 (2008) p360
Protected Lobbies used as refuges (No. 1)

Figure taken from BS9999 (2008) p362
Would you be happy to use this in the event of a fire?

Would it instill you with confidence?

1. Size
2. Location
3. Communication
4. Information/signage
   • ‘familiarity’ and ‘acceptance’

*Picture of a refuge area in a 4 star hotel in Scotland
The aim of this study is:
- to determine the level of awareness, understanding, willingness and potential concerns about using refuge areas and understanding of vertical evacuation

Methods:
- Questionnaires distribution to charities and local authorities throughout Northern and Southern Ireland.
- Main Areas of questioning were:

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<tr>
<th>Knowledge Concerns</th>
<th>Willingness to use Concerns</th>
<th>Waiting time Concerns</th>
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<td>Reducing concerns</td>
<td>Alternative actions</td>
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Methodology

Sample
- 258 respondents in total (207 classified level of disability)
- Age ranged from 19 to 70 plus
- 73.4% classified themselves as having difficulties walking
  - 37.7% ‘would find it difficult’ and 35.75% ‘would not’ be able to descend one storey of stairs without assistance
- 72% who regularly visit multistorey buildings ‘would not be able to’ or would find it difficult ….

Data Analyses
- Focus will be on respondents that are potentially at a greater need of using a refuge area, i.e.
  - ‘would find it difficult’ & ‘would not’ be able to descend one storey.
55.9% never heard of the term ‘refuge area’

- Of those who never heard of a refuge area, 53% may need to make use of refuge

Findings for those reporting knowledge of refuge areas:

- Minimum Safe Time…

- Size of Refuge:
  - Over 40% did not know
  - 25% indicated 2 to 3 persons (e.g. wheelchair user, others needing assistance and accompanying person)

![Refuge Area - Minimum Safety Time](image)
63.9% did not know that they may be evacuated from the building last
69% would not be happy to wait until others have evacuated
Responsibility to safely evacuate people with disabilities from the building?

'Should NOT be used as a place to leave people with disabilities to await rescue by the fire service (BS9999 (p359)).
Willingness to use Refuge Areas

- 66% reported that they would ‘probably’ or ‘most definitely’ use the refuge area
- Willingness to use the refuge increased (71.8%) amongst those with less ability to descend stairs
  - More importantly, the remainder would ‘probably not’ or ‘definitely not’ be prepared to use a refuge
- Included one person who reported …

“downstairs on my butt (bottom) - classmates carried my chair down”
71.7% would not remain for >10 minutes without information.

Those ‘not able’ to descend one Storey are less willing to remain for longer periods.

Results - Waiting time!

- **Time Prepared to Wait in Refuge Without Information**
  
<table>
<thead>
<tr>
<th>Time</th>
<th>Not Able</th>
<th>With Difficulty</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Minutes or Less</td>
<td>54.7%</td>
<td>15.6%</td>
</tr>
<tr>
<td>6 - 10 Minutes</td>
<td>39.7%</td>
<td>25.0%</td>
</tr>
<tr>
<td>11 - 15 Minutes</td>
<td>6.3%</td>
<td>8.8%</td>
</tr>
<tr>
<td>More than 15 Minutes</td>
<td>23.4%</td>
<td>26.5%</td>
</tr>
</tbody>
</table>
Results - Prepared to Wait!

**Time Prepared to Wait in Refuge**

**Without Information**

- **5 Minutes or Less:** 39.7%
- **6 - 10 Minutes:** 25.0%
- **11 - 15 Minutes:** 6.3%
- **More than 15 Minutes:** 23.4%

**With Difficulty**

- **5 Minutes or Less:** 54.7%
- **6 - 10 Minutes:** 15.6%
- **11 - 15 Minutes:** 8.8%
- **More than 15 Minutes:** 26.5%

**Time Prepared to Wait in Refuge**

**With Information**

- **5 Minutes or Less:** 25.9%
- **6 - 10 Minutes:** 22.2%
- **11 - 15 Minutes:** 22.2%
- **More than 15 Minutes:** 43.3%
Areas point towards a general fear of isolation for those

Concerns how safe the refuge area would be.

“Very isolating & upsetting to be expected to wait in such an area even if it is for safety reasons”

VS

“No issues over using refuge areas provided building staff are well trained and informed of these specific areas”

<table>
<thead>
<tr>
<th>Area of Concern</th>
<th>Very Concerned (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being Forgotten</td>
<td>68.2</td>
</tr>
<tr>
<td>Info: Waiting Time</td>
<td>64.7</td>
</tr>
<tr>
<td>Being Left Alone</td>
<td>61.2</td>
</tr>
<tr>
<td>Info: Who Will Assist Me</td>
<td>57.9</td>
</tr>
<tr>
<td>Refuge Area Is Not Safe</td>
<td>54.1</td>
</tr>
<tr>
<td>Info: What Will Happen Next</td>
<td>52.4</td>
</tr>
</tbody>
</table>
## Results - Reducing Concerns

<table>
<thead>
<tr>
<th>Feature</th>
<th>Important / Very Important %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visibility Panel to Building Interior</td>
<td>87.7</td>
</tr>
<tr>
<td><strong>Seating Provision</strong></td>
<td><strong>84</strong></td>
</tr>
<tr>
<td>Window to Outside</td>
<td>83.9</td>
</tr>
<tr>
<td><strong>Fire Blanket Provision</strong></td>
<td><strong>79.1</strong></td>
</tr>
<tr>
<td>Hose Reel Provision</td>
<td>78.8</td>
</tr>
<tr>
<td>Fire Extinguisher Provision</td>
<td>77.7</td>
</tr>
<tr>
<td>Sprinkler System Provision</td>
<td>77.7</td>
</tr>
<tr>
<td>CCTV in Refuge</td>
<td>76.3</td>
</tr>
<tr>
<td>Info. How to be Assisted</td>
<td>74</td>
</tr>
<tr>
<td>Info. On What Action to take</td>
<td>71.9</td>
</tr>
<tr>
<td>Info. Expected Waiting Time</td>
<td>71.6</td>
</tr>
<tr>
<td>Someone to Wait With</td>
<td>71.3</td>
</tr>
<tr>
<td><strong>Two-way Communication</strong></td>
<td><strong>70.7</strong></td>
</tr>
<tr>
<td>Info. Time Refuge Affords</td>
<td>67.8</td>
</tr>
<tr>
<td>Emergency Lighting</td>
<td>64.6</td>
</tr>
</tbody>
</table>
Results - Alternative Actions

- Find assistance
  - 65.4% ‘unable’ to descend one storey vs. 43.6% who ‘would find it difficult’ would remain in the refuge
  - Between 34.6% that are ‘not able’ and 56.4% of those that would have ‘difficulty descending’ one storey would potentially leave the refuge area to find assistance

- Use Mobile Phone to Call for Help
  - Over 75% of respondents reported that it was ‘very probable’ / ‘most definite’.
Results - Alternative Actions

- Initiate vertical evacuation by using the stairs
  - 80% ‘cannot descend one storey’ vs. 35.7% who would find it ‘difficult descend one storey’ would remain in the refuge
  - 37.5% of those who would have ‘difficulties’ descending would ‘very probably’ or ‘most definitely’

- “Feet first on my back using my hands behind me”,

- “Scoot on my bottom lifting my legs with my arms to move legs down”

- “Swing down a few steps at a time using handrail”
Results - Vertical Evacuation

- Awareness of vertical evacuation strategies
  - Overall, respondents indicated ‘no’ to ‘little’ awareness of:
    - evacuation lift (89%)
    - evacuation chair (72.4%)
    - being assisted on own wheelchair (69.1%)

- Evacuation lifts
  - power supply failure, doors opening on smoke filled floors, overloading and being trapped

- Assisted downstairs in own wheelchair
  - Fear of falling and being injured & putting others in danger
Confidence levels of techniques for assisting persons with disabilities:

- Respondents indicated ‘reasonable / very confident’ in potentially using:
  - evacuation lift… (73.5%)
  - evacuation chair… (63%)
  - attachable powered evacuation devices… (56.8%)
- BUT
  - own wheelchair… (14.3%)

Feel as safe as a non-disabled person:
- 60% Disagree / strongly disagree
- 21.7% agree / strongly Agree
Conclusions

- Not a ‘ball bearing’ approach to people with disabilities!
- Negative feelings and concerns stem from limited awareness
- “a system based on refuges is only effective if the end users of that system fully understand it and are confident to use it” (DCLG, 2008, p18).

- Regular communication and reassurance
  - Highlights need for preparedness by building management
  - ‘management of evacuation procedures, and of refuges ... requires a major overhaul’ (Communities and Local Government, 2008).
Conclusions

- If refuge areas are not being utilized as we expect, this challenges the assumptions made in design:
  - Sizing of stairs & refuge areas and Evacuation procedures
- Dissemination of information!
  - An (increased) awareness may result in a readiness to use a refuge
- Deserves further consideration, both from an ethical, design and end users point of view.

"I am very glad to be made aware that such an area exists"