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TO AREAS OF REFUGE AND BEYOND: PROPOSALS FOR IMPROVING EGRESSIBILITY FOR THE DISABLED.

A CASE STUDY IN ITALY

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ABSTRACT

The tools and management approaches adopted in Italy for the evacuation of people with disabilities are similar to the ones present in other countries, especially in the UK and the United States. These were the first countries in the world that introduced the concept of 'Area of Refuge' (AR) as a means to let people egress through distinct evacuation phases, in addition to other specific solutions for people with disabilities. Anyway, there are currently a few studies on disabled occupants from which to derive information for the design of AR. This paper reports on a study which extends the work of McConnell & Boyce (2012) to investigate the level of knowledge that mobility impaired occupants in Italy have regarding AR, as well as their relative concerns, expectations and willingness to use AR. Given the importance of the contribution of "buddies" to the overall egress process, a sample of office workers has also been assessed, since these people may have to wait in the AR while accompanying mobility impaired occupants.

Results confirm that there is still a large proportion of disabled occupants that are not aware of the presence and use of AR and that AR are still currently designed in a manner that does not match their expectations. This paper suggests the current design of many AR should therefore be questioned and re-thought.

INTRODUCTION

In the evacuation of a multistorey building, disabled people are expected to be aware of egress procedures, and to easily find and identify Areas of Refuge (AR) in which to wait until rescued^{1,2}. AR are designed ineffectively because of the complexity of many contemporary buildings and the low levels of regulatory information on how to properly design them in accordance with people's expectations.

Italian building codes give only generic prescriptions on how to effectively design AR. The tools and management approaches adopted in Italy for the evacuation of people with disabilities were introduced in 1994³. They are similar to the ones present in other countries, especially in the UK and the United States which were the first countries in the world that introduced the concept of AR as a means to let people egress through distinct evacuation phases, in addition to other specific solutions for people with disabilities and for other occupants who may be interested in such solutions. In Italy, AR are required in almost every kind of multistorey assembly buildings (for example: offices, stadiums, theatres ect.) and are currently simply described as:

"...a static safe place contiguous with, or insterted in, a vertical egress route; this place should be designed in order not to hamper the usability of egress routes and should also be designed in a way such as to ensure the permanence of people with reduced or impaired mobility while waiting for rescuers"

leaving the designers with no further information on how to design AR in accordance with human behaviors and factors. The resultant AR are usually completely ineffective in the event of an actual emergency. For example, no specific information on the adoption of proper signage is given, so designers often forget to design proper environmental information for allowing wayfinding of AR in very complex and long layouts

(Figure 1). In addition, as regards building usability, they often do not take into account how to design AR in order to be easily used and understood by the end users (Figure 2).

Figure 1



High school in Italy. Very long corridor with AR at the end, which is very difficult to spot due to lack of proper signage.

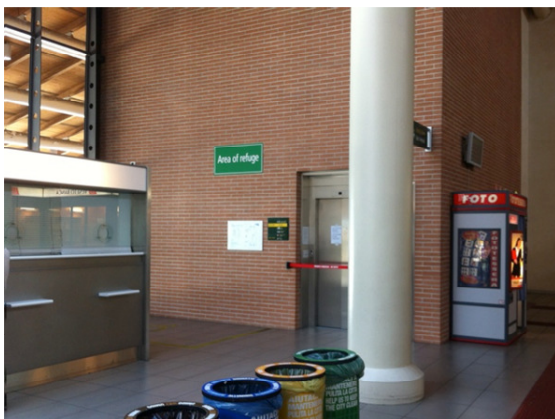
Figure 2



High school in Italy. AR located in an external emergency exit stair landing. Neither signage nor space for wheelchair manoeuvrability.

The combination of the shortcomings in the design of AR with the lack of evacuation drills by disabled occupants in multistorey assembly buildings and the scarcity of studies on their behavior and needs may result in totally ineffective egress. Disabled people may be unaware of AR, unable to identify/locate them, and lacking the confidence to remain in AR until rescued^{4,5}. The scientific literature, and general knowledge, on human behavior in relation to AR is still scarce, with only a few case studies on this specific topic, despite the literature on human behavior in fire is becoming more and more comprehensive, even when considering evacuation for people with disabilities⁶. Designers can gather some information on AR from guidance documents worldwide⁷ but very little is still known on the end users' perspective and, above all, on their willingness to use AR⁴. Therefore the design of AR is still strictly prescriptive, despite AR being realized in various complex environments. Figure 3 and 4 show how the design of AR may differ in relation to two different airports in two different European countries.

Figure 3



Treviso airport, Italy. AR located in a foyer in close proximity to an elevator. Lack of proper signage.

Figure 4



Stansted airport, UK. AR enclosed in the landing of an emergency stair, with proper signage.

It is very important to correctly design AR. The paramount aspect that contributes to the effectiveness of AR is the willingness of the users to use it^{2,8}. This goal can be reached by informing both the disabled and the rescuers. Proper design also requires consideration to design aspects, as already stated in 1996 by Proulx “The acceptance of areas of refuge by occupants, as a safe place to wait during an emergency, is also dependant on design details: telephone, window, chairs, distance to exit, ect.”⁹. Prior to that, a study undertaken in the US in the 90s, with the aim to study human behavior in relation to Staging Areas, highlighted potentials but also critical elements, giving indications on what aspects to consider in order for them to be effective, putting into relevance that one of the major aspects to consider is the end users’ willingness to use it⁸.

These aspects outlined almost 20 years ago are still missing from currently approved AR designs (Figure 5, 6, 7, 8).

Figure 5



Student house in Pordenone, Italy. AR located in a stair’s landing, with proper space and view to the outside but without any signage or remote two-way communication system.

Figure 6



An AR in the same student house as in Figure 5. This AR, in addition to having inappropriate signage, is located in a room adjacent to the stair’s lobby. Disabled may have the feeling of being segregated.

Figure 7



Bologna Fair Building, Italy. This AR is enclosed in an uncomfortable protected room, without any of the minimum features expected in AR.

Figure 8



Theatre in Pordenone, Italy. AR located in a corridor’s protected lobby, not directly close to vertical means of escape. Not enough space: a wheelchair person would obstruct the escape flow.

In the UK in 2008, the *Department for Communities and Local Government* undertook a survey with the aim of improving evacuation procedures for people with disabilities and to check the effectiveness and weaknesses of the current guidelines on emergency egress⁵. The research was carried out in order to find out the end users' perspective of both the workers and people with disabilities. As regards the workers, 35 professionals involved in emergency procedures were interviewed. The most interesting considerations emerged from the question "How does a disabled person get from a fire refuge to a place of safety?". The answers referred to many possibilities, for example: assistance & evacuation chair: 25%, assistance (trained): 24%; with personal emergency evacuation plan; 13%, lift / firefighting lift: 6%. This range of responses demonstrates that even specialists may not be aware of the procedures.

Participants were also asked to indicate the main problems of an evacuation system based on fire refuges and, in this case, highlighted that the main factor of success of the evacuation depends on human factors, such as: the possibility that the people in charge of assisting the disabled persons are out of the office or hurt themselves, management system malfunctions or lack of proper training. The *University of Ulster* in Belfast (UK) has conducted a research by mailing questionnaires to 300 people with multiple sclerosis and creating a focus group of 12 people chosen among all responders⁴. Interesting results relate to the level of knowledge and understanding of the use of AR: half of the respondents said they had never heard of AR, and 60.4% of respondents felt that they would not be comfortable remaining in a refuge area for more than 10 minutes without further assistance. In addition, respondents had very little knowledge of other systems that may be helpful during egress, such as evacuation lifts or evacuation chairs.

This paper reports on a study which extends the work of the Department for Communities and Local Government (2008) and Boyce & McConnell (2012) to investigate the extent of need/desire of people with reduced mobility, and office worker that may have to assist them, or other impairment to use AR, the knowledge that they have regarding what a refuge area is, how it will be used as part of their evacuation strategy, and their potential concerns.

ANALYSIS OF THE OF THE END USERS' LEVEL OF KNOWLEDGE ON AREAS OF REFUGE IN ITALY

Methodology and results

This research is based on the findings from the previous research made by McConnell and Boyce⁴, since the Italian legislation on AR is very similar to the British one. To assess the end users' perspective, the authors have investigated both (a) people with disabilities, in order to have additional data on this kind of population, but also (b) workers of the *Italian Workers Compensation Authority* INAIL, since these people may find themselves in the situation of having to assist a disabled persons inside of an AR.

The study consisted of two phases. This research involved an analysis of data gained from questionnaires that were distributed via 19 disability charities based in Northern Italy. Access to members' contact details were prohibited by the charities, so the first phase involved the distribution, via email, of an on-line web survey tool, i.e. Google Forms. The second phase involved the distribution of the same questionnaire to 42 INAIL office workers. The questionnaires sent to the members comprised a cover letter detailing the study and the questionnaire.

The questionnaire consisted of 30 questions with different typology of answer (multiple choice, open answer etc.) and was structured in 3 sections:

- 1) demographic information,
- 2) assessment on the use of multistorey buildings and the knowledge on AR,
- 3) assessment on the willingness to use refuge areas and concerns after being made aware of what an AR is.

a) Disabled population

Due to above mentioned privacy issues, it was not possible to exactly know the number of people to whom the questionnaire was submitted. The total number of answers received was 42 (significantly low in respect to the authors' expectations), mean age of the respondents 39 years, of whom 60% males (n=25) females 40% (n=17). A large proportion of them 62% (n=26) regularly visited multistorey buildings, contrary to only 38% (n=16) not being used to visit these kind of buildings. This is an important factor to keep in mind when comparing the degree of knowledge about AR. Amongst the people who regularly visit multistorey buildings, 61% (n=19) visit offices, while 39% (n=12) visit other types of buildings. Among the people who regularly visit multistorey buildings, the majority of them 58% (n=15) visit floors above ground floor, 31% (n=8) visit ground floor, while the remaining 12% (n=3) visit other parts of the building. When finally asked to self-assess the level of knowledge of their building's emergency plan, the majority of them claimed to know it 62% (n=16), 31% (n=8) admitted not know it, 8% (n=2) answered other.

Knowledge and understanding of refuge area

A majority of respondents regularly visit multistorey buildings, and they are primarily offices above ground level. Given these responses, these occupants should be expected to know and be trained about AR; when asked 'Have you ever heard the term Refuge Area?' only 7% (n=17%) had prior knowledge of AR, whereas almost all of them, 83% (n=34) has reported never having heard of AR.

Of the respondents who had reported hearing of a refuge area, 90% (n=36) indicated that their perceptions of its use only loosely corresponded to the definition/explanation provided by the Italian regulatory guidance, that is, matched the definition to 'somewhat', 'a little' or 'not at all'. Taking into consideration the full sample, only 10% (n=4) reported that the definition matched their perception 'to a great extent'.

Among the 17 people who identified themselves as knowing the AR, when asked where they would expect to find it, their responses were: 8% (n=1) 'on the stair's landing', 33% (n=4) 'on the atrium of the entrance stairway', 33% (n=4) 'in a room along a corridor', 17% (n=2) 'on a balcony', 8% (n=1) 'on other parts of the building'. Even if only a few people responded to this question (because they belonged to the very small group of people who had prior knowledge about the AR) this is indicative of the fact that people expect to find the area of refuge towards a familiar route. These people were also asked to report how they would identify an AR: the majority of them, 67% (n=10) referred to 'visual signage', only 13% (n=2) 'color' and 20% (n=2) think the AR is identifiable by 'particular signage based on sounds'.

Willingness to use refuge areas and concerns

The questionnaire then asked respondents if they would be prepared to use the refuge area, taking into consideration that they would not know how long they may have to wait before they were assisted to evacuate the building. Out of the 40 responses received, 28% (n=11) reported 'Yes, I would definitively use it', 40% (n=16) reported 'Yes, I would probably use it'. Nevertheless, a total of 33% (n=13) reported that 'Probably not, I would try to take the stairs' or 'Surely not, I would try to take the stairs'.

They seem to be willing to use the AR but if the design does not match their expectations it could prove ineffective, especially if the actual design of the AR presents the concerns reported below (Table 1).

Table 1 shows that for all respondents, the greatest concerns were 'being forgotten', followed closely by 'being left alone' and the 'lack of information/communication on the waiting time prior to assistance arriving'. Exactly like the previous study by McConnell & Boyce all point towards a general fear of the idea of being left alone in a refuge area⁴. Despite respondents being relatively less concerned with whether the 'refuge is safe', 61% (n=47) of those who responded reported being 'very' to 'to a great extent concerned' over this issue.

Table 1. Concerns Regarding the Use of Refuge Areas (disabled population)

Concern	Level of concern			
	Not at all	Moderately	Very	To great extent
Lack of information/communication on what will happen next	3% (n=1)	38% (n=15)	33% (n=13)	28% (n=11)
Lack of information on who is gong to assist	18% (n=7)	38% (n=15)	21% (n=8)	32% (n=9)
Lack of information/communication on waiting time prior to assistance arriving	5% (n=2)	20% (n=8)	40% (n=16)	35% (n=14)
Being left alone	18% (n=7)	18% (n=7)	23% (n=9)	43% (n=17)
Lack of proper illumination	8% (n=3)	46% (n=18)	26% (n=10)	21% (n=8)
Refuge Area is not safe	10% (n=4)	30% (n=12)	33% (n=13)	28% (n=11)
Being forgotten	5% (n=2)	26% (n=10)	26% (n=10)	44% (n=17)

In an attempt to understand more fully how concerns may be alleviated, the respondents were questioned on their perceptions of how a refuge area should be equipped. Figures 9 and 10 indicate, contrary to the McConnell and Boyce study the presence of seats does not seem to be important, neither a glazed panel to the inside. A window to the outside seems to be more important, instead. Also the provision of fire protection systems does not seem to be particularly important since these are the only sections with a “not at all” response, in fact one open answer reported “*I do not know what a sprinkler is and I do not know how to use a fire extinguisher*”, instead they seem to prefer devices to help with usability like “*an automated opening and closing system since I am very weak and rely on an electric wheelchair*”.

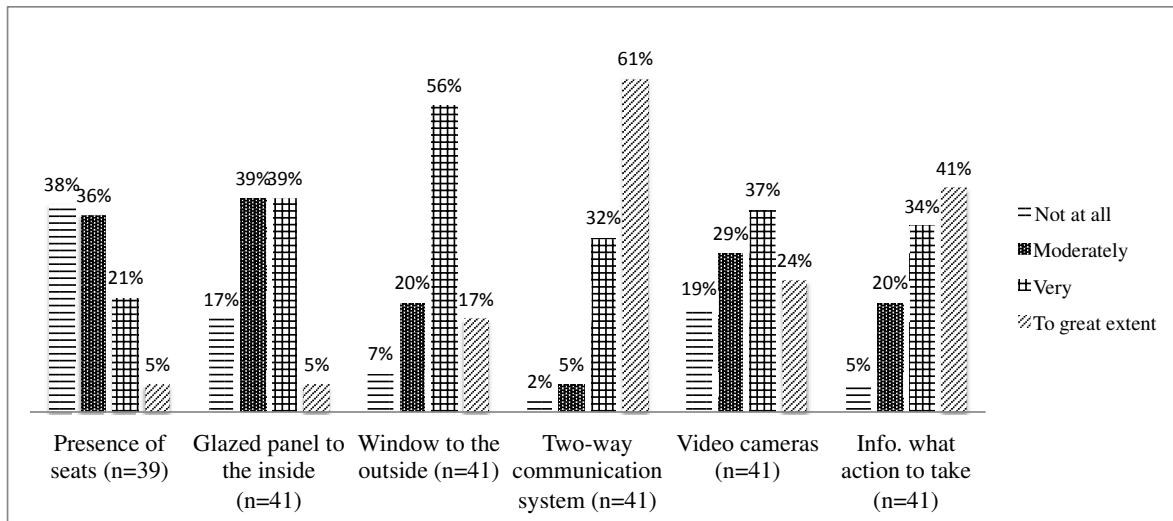


Figure 9. Importance of features reducing the concern with Using Refuge Areas (Disabled respondents)

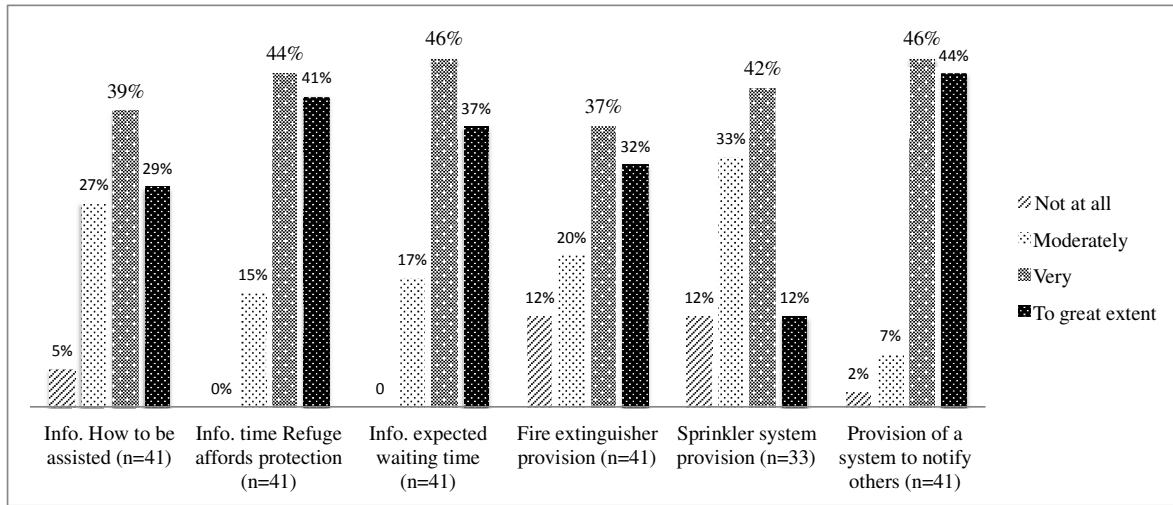


Figure 10. Importance of features reducing the concern with Using Refuge Areas (Disabled respondents)

The other most important factor is the possibility to have a system to notify others that they are inside of the AR, followed by communication to the outside, information and fire safety provisions.

Information, in particular, is a critical factor to let people stay inside of the AR. Indeed, being left alone or forgotten and lack of information were previously been addressed as major concerns. That said, the authors decided to assess the effect of proper information on the willingness to use the AR and the results are shown in Figure 11a and 11b.

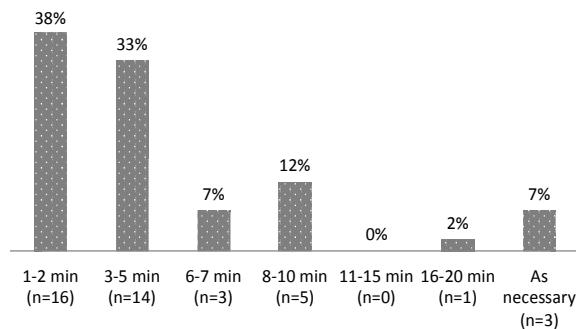


Figure 11a. Length of Time Prepared to wait in a Refuge Area without information.

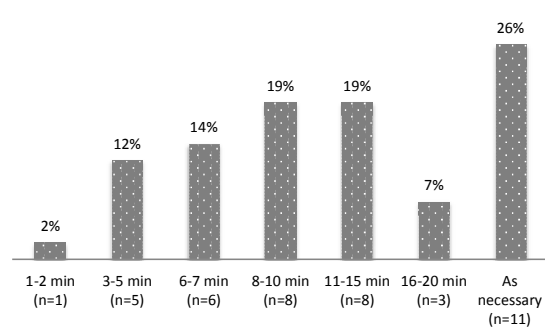


Figure 11b. Length of Time Prepared to wait in a Refuge Area with proper information.

The importance of information is confirmed by the fact that people would feel more comfortable to wait for a longer time inside of AR, if appropriate information is given.

Respondents were finally asked if it would be a problem for them to escape after others: only 20% (n=8) reported that 'it would not be a problem' whereas 'it would be a problem' for 32% (n=13), 49% (n=20) have 'no idea' or have 'not specified'.

As regards the preferred methods to be evacuated to ground floor (indicated as a first preference) the majority of respondents would prefer 'not to be carried down physically' 23% (n=8) and 'to be assisted in their own chair instead' 47% (n=15), while the remaining 53% (n=18) would prefer the 'provision of specific stairs like evacuation chairs and stairlifts. Most importantly 90% (n=38) of the disabled population interviewed stated they would 'prefer to have a person to stay and wait with them inside the AR'.

b) Workers

Having taken that into account, in the present study the workers of a multistorey office building were also tested since these people are expected to have to accompany disabled people to an AR and wait with them until rescued, therefore their willingness to use an AR is paramount. Out of 41 respondents, 90% (n=37) reported to work on the first floor, while 10% (n=4) declared to work at ground floor. When asked if they considered themselves to know their workplace's emergency plan the large majority of them 90% (n=37) responded 'yes' or 'moderately' whereas only 10% (n=4) reported 'not to be aware' of the workplace's emergency plan.

Knowledge and understanding of refuge areas

When asked if they had ever heard the term Refuge Areas 28% (n=11) reported they had 'never heard of AR', contrary to 72% (n=28) who were aware of it. All the workers that had not heard of the term AR worked on the first floor even if should require them to know it.

Of the respondents who had reported hearing of a refuge area, 33% (n=13) indicated that their perceptions of its use only loosely corresponded to the definition/explanation provided by the Italian regulatory guidance, that is matched the definition to 'somewhat', 'a little' or 'not at all'. Taking into consideration the full sample, 68% (n=27) reported that the definition matched their perception 'to a great extent'.

Willingness to use refuge areas and concerns

The questionnaire then asked respondents if they would be prepared to assist a disabled person inside a refuge area, taking into consideration that they would not know how long they may have to wait before they were assisted to evacuate the building. Out of all 38 respondents, the very largest majority indicated they would feel ready to assist a disabled person. In fact, 89% (n=34) stated that they would 'yes for sure' and 'yes probably' wait inside for rescuers inside of an AR without knowing the timing of the rescue service, whereas only 11% (n=4) indicated that would not wait in an AR. The fact that almost all of the workers were willing to use an AR is an important consideration but it can prove ineffective if the AR is not properly designed and presents the concerns reported below (Table 2) or as one respondent said "*since I know the materials and the way the building is designed I would not feel comfortable waiting in an AR*".

Table 2. Concerns regarding the use of Refuge Areas (Workers)

Concern	Level of concern			
	Not at all	Moderately	Very	To great extent
Lack of information/communication on what will happen next	13% (n=5)	67% (n=26)	15% (n=6)	5% (n=2)
Lack of information on who is going to assist	24% (n=9)	42% (n=16)	32% (n=12)	3% (n=1)
Lack of information/communication on waiting time prior to assistance arriving	0	51% (n=20)	28% (n=11)	21% (n=8)
Being left alone	26% (n=10)	45% (n=17)	26% (n=10)	3% (n=1)
Lack of proper illumination	26% (n=10)	46% (n=18)	21% (n=8)	8% (n=3)
Refuge Area is not safe	28% (n=11)	30% (n=12)	25% (n=10)	18% (n=7)
Being forgotten	13% (n=5)	36% (n=14)	23% (n=9)	28% (n=11)

Table 2 shows that for all respondents, the greatest concerns were 'being forgotten', followed closely by 'lack of information/communication on the waiting time prior to assistance arriving', very similarly to the

results obtained with the disabled respondents and with the previous research by McConnell et al. Figures 12 and 13 show the importance of features reducing the concern with Using Refuge Areas (INAIL workers).

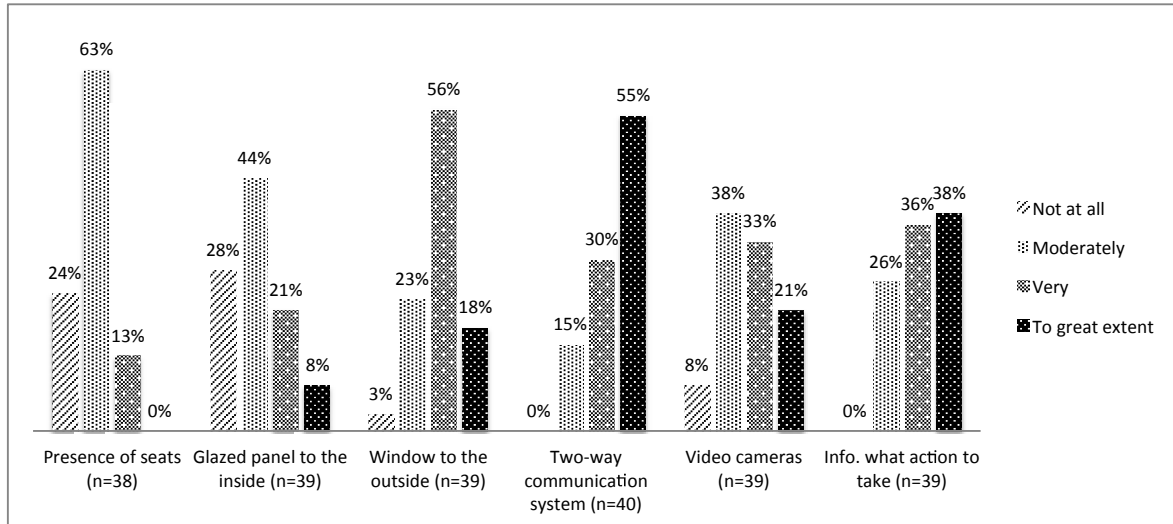


Figure 12. Importance of features reducing the concern with Using Refuge Areas (INAIL workers)

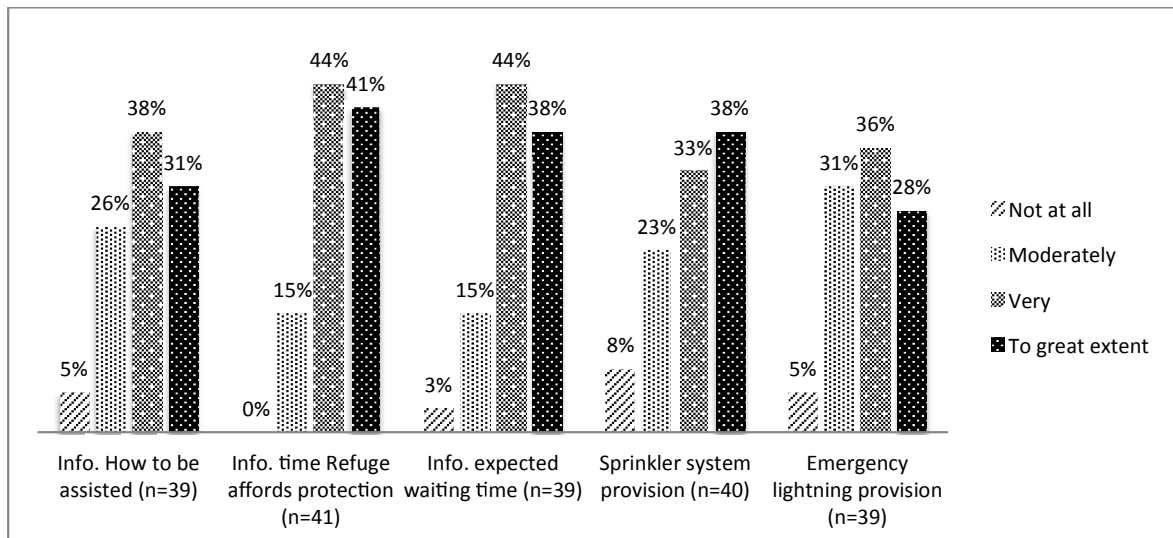


Figure 13. Importance of features reducing the concern with Using Refuge Areas (INAIL workers)

Also the workers would like to have a window to the outside. The presence of a seat does not seem to be that important even for them, they would prefer more functional things like “a dispenser of things to eat”, instead. Communication and information systems are the most important features. Unlike the disabled respondents, they seem to feel safer with the provision of sprinklers, probably because they are aware of their use.

When asked what they would do if rescuers did not appear with the timing expected, the majority of respondents 71% (n=27) indicated ‘I would remain in the AR and use my mobile phone to call for help’, instead 29% (n=8) would somehow get out from the AR, by undertaking actions like ‘I would abandon the AR and the disabled to look for help’ 5% (n=2), or ‘I would abandon the AR with the disabled to look for an

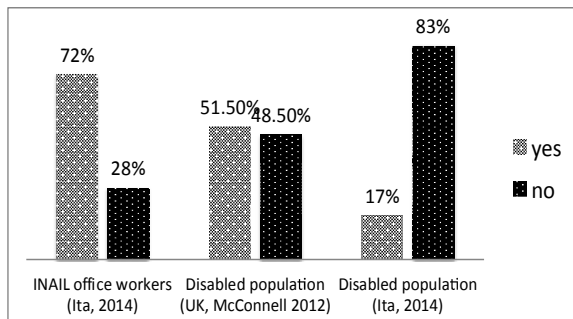
alternative means of escape' 11% (n=4) or 'I would start to escape, with the disabled, through the stairs' 13% (n=2).

Finally, when asked about the preferred way to assist a disabled person getting down the stairs even the workers indicated they would prefer not to physically carry down the disabled. Out of 49 responses, only 8% (n=3) indicated they would physically carry the disabled downstairs while the remaining respondents indicated they would 'assist the disabled person on an evacuation chair' 49% (n=19) or on an 'evacuation chair linked to stairlift' 44% (n=16) or, finally, 'assist the disabled on his own wheelchair' 28% (n=11). These responses suggest clearly the importance to make the disabled independent.

DISCUSSION

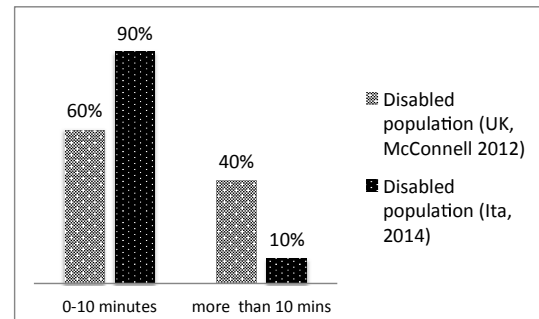
By the comparison with the previous studies^{4,5}, the results of questionnaires submitted to associations of people affected by mobility impairments in Italy and to a sample of office workers of the Italian Workers' Compensation Authority (INAIL) showed that out of all respondents affected by disability (100%, n=42), 83% (n= 34) have claimed to be completely unaware of the presence, and use, of AR inside of multistorey buildings. This result is even more critical than the one obtained from the study by McConnell et al. (2012), where 48.5% (n=50) of respondents had never heard the term Refuge Area (Figure 14). In addition, the design expectations (and concerns) that subjects expected to find inside of AR in the present study as regards, for example, factors that might make them wait more comfortably until rescued, are not usually met in many currently approved AR, making their use potentially completely ineffective in the event of a real emergency. Many disabled respondents reported, for example, as major concerns 'being left alone' (66% frequency of responses, n=26), 'being forgotten' (70% frequency of responses, n=27) and 'lack of information/communication to the outside' (75% frequency of responses, n=30). Concerns that seem to be confirmed by the answers reported to open questions, like: "*fear of the other people evacuating*" or "*claustrophobia*" or "*fear of being trapped and abandoned in a small limited place*". Other respondents reported concerns like "*not being sure of alternatives*" or "*absolute necessity to wait for rescuers*" and more importantly "*I would be caught by panic, I am very insecure and have poor vision*". Figure 14 shows also the importance of prior training and information to occupants since this factor has proven to be quite effective with office workers, with 72% (n=28) of them being aware of the AR. In addition to that, also the way building codes display their information seems to be effective on the design of AR and the end users' perspective. As a matter of fact, compared to the Italian codes, the British Standards provide more specific design information to designers (especially in terms of visual diagrams) and this may have led to a better design of AR and, consequently, a better performance of the British disabled population to recall AR¹⁰. Given the analysis of the case studies' critical elements, and the results about the present and past questionnaires⁴, it is expected that AR, as currently designed, are highly prone to failure, regardless of disabled people's prior knowledge and willingness to use it, especially in consideration with the short amount of time (no longer than 10 minutes for 60% of UK respondents and 90% of the Italian ones) are willing to stay inside of an AR without assistance (Figure 15).

Figure 14



Comparison between the responses to the question "Have you ever heard of the term Refuge Area"

Figure 15



Comparison between the responses to the question "How long would you stay in an AR without assistance"

The two questionnaires give us important inputs. First of all, there is still a lot of work to do on the design of AR, if the people directly involved (i.e. the disabled) still do not know them, and more importantly, training and information on AR could be very beneficial, as confirmed by INAIL workers responses.

But the answers to the questionnaires do not only give us management inputs but also design ones; it is clear, for example, that there is the need to re-think some of the characteristic of the AR, especially in consideration to the concerns and design expectations identified by the disabled, and to clearly address these issues. Just as an example, it should be better not to design AR in protected rooms separated from the stair's protected lobby, because such a layout may confer a feeling of segregation to the end users. Unfortunately this is a solution to which many designers have relied often, even if the codes give very generic indication on how to design AR and do not specifically address only this kind of design solution. For this reason, a better approach should rely on the location of AR directly on the stairs' enclosure (Figure 16).

Another problem, particularly specific of the Italian situation, relates to the way AR are identified. In Italy, at the moment, there is no requirement for specific symbols, therefore it is very likely to find very different kind of signage, therefore impeding a clear and easy identifiability by the disabled. Just as an example, the symbol for the "Evacuation temporary refuge" introduced by ISO 7010: 2011 *Graphical symbols. Safety colours and safety signs. Registered safety signs* has not yet been introduced in the Italian UNI EN ISO 7010: 2012 (the Italian Agency for Standardization), leaving the choice of signage to the designer. Instead, the use of a codified symbol is a paramount factor in order to have AR identifiable by everybody.

Italian building codes, for certain buildings, allow for the use of evacuation lifts to be used with the assistance of specific and trained building personnel, therefore without letting actual autonomy to the disabled people. This approach is appropriate for stairs, since they require the disabled to be assisted by trained staff and the use of specific devices (e.g.: evacuation chairs) but not for elevators, especially in consideration to the fact that they could represent a link between AR and vertical egress routes to reach a place of safety, even autonomously and by every person in the building (Figure 17).

Figure 16



Example of proper design of AR in Edinburgh. Inserted into vertical evacuation route with glazed panels and two-way communication systems. People who descends the stairs can see the disabled waiting for assistance easily.

Figure 17



Evacuation lift in a hospital in Italy for assisted egress. This lift could be used by everybody, if provided with proper signage and information.

This is actually what the authors mean with "inclusive fire safety design", an approach in which people with disabilities and people without have the same opportunity to reach a place of safety in the event of a fire¹¹. Design for all, Universal design and Inclusive design are different expression that define new approaches for accessibility for all and their principles can be linked to the ones of fire safety. Just as an example, the fourth principle, *Perceptible Information*, proposed by Universal design states: "The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities". This requirement should be translated into the design of areas of refuge, therefore being effective

for every kind of occupant. It is not a matter of writing new codes, as it usually happens especially in Italy, but to re-interpret the ones that already exist, under a new light, the light of inclusion (Figures 16 and 17).

CONCLUSION

There is still a lot of reasearch on AR that is required in order to clearly address the design and management of evacuation strategies for the disabled population.

Given the analysis of the case studies' critical elements and the results about the end users' perspective from the present and past questionnaires it is expected that many Areas of Refuge, as currently designed, are highly prone to failure, regardless of disabled people's prior knowledge about their use. Responses from the disabled population highlighted many critical elements, above all in relation to areas of refuge realized as confined protected rooms, a solution that requires the disabled to wait for rescuers while being completely segregated from the other people and the rest of the building. For this reason, in Italy and abroad, a more frequent approach should be to locate the AR directly on the stairs' enclosure, therefore giving a solution to many of the concerns highlighted by the respondents, especially as regards waiting time for rescuers and the fear of being left alone.

Given all the problems with the design and use of AR over the past 20 years, the authors' position is that the time has come to completely rethink the concept of evacuation for the disabled. We believe that the process of evacuation for mobility impaired occupants should not only be a matter of better information systems design, it should switch to an actual "inclusive design" mindset instead. We propose to tranfer the strategies currently used in tall buildings to every kind of multistorey building, in particular, by focusing on the design of staging areas to be put close to evacuation elevators, in order to let the disabled egress more autonomously and find evacuation ruote more easily by simple egressing the way they came in. More importantly, a system like that can be used also by the other people that may have some degree of disability at some point during their lifetime.

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