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EXAMINATION OF SEARCH PROCEDURES IN THE FIRE PROTECTION

Abstract

Although fire safety and prevention regulations got tightening in recent decades by fire departments rescue fire protection role has not diminished. Global warming, terrorism, industry its development poses new challenges for fire departments. Day by day we face the global warming associated with larger and more destructive vegetation fires. Aspect of structural and building fires, perhaps the growing risk is less pronounced in this area, but we face challenges we have never faced before. 35 years ago we had 17 minutes for escape until the flashover happened. Today, this time has been reduced to 3-4 minutes. The successful In addition to updating intervention tactics, it is essential to lay down new and modern procedures to victim detection.

Keywords: fire departments, firefighter, rescue, victim detection

KERESÉSI ELJÁRÁSOK VIZSGÁLATA A MENTŐ TŰZVÉDELEMBEN

Absztrakt

A megelőző tűzvédelmi előírások az elmúlt évtizedekben szigorodtak, azonban tűzoltóságok tűzoltási és műszaki mentési szerepe továbbra sem csökkent. A globális éghajlatváltozás, a terrorizmus és az ipar fejlesztése új kihívásokat jelent a tűzoltóságok számára. Az éghajlatváltozás nagyobb és pusztítóbb tüzeket eredményez. Az épülettüzek szempontjából talán a növekvő kockázat valamivel kisebb, azonban a beavatkozóknak olyan kihívásokkal kell szembe nézniük, amelyekkel korábban még nem találkoztak. A menekülés ideje 35 évvel



ezelőtt még 17 perc volt ma ez az idő már 3-4 percre csökkent. A beavatkozási taktikák kutatása mellett fontos az áldozatok felderítésekor az új és modern eljárások meghatározása is.

Kulcsszavak: tűzoltóság, tűzoltó, mentés, áldozatok keresése

1. SEARCH METHODS

The method of firefighting and technical rescue has changed constantly throughout our history [1]. One of the most challenging tasks of firefighting interventions is finding people in a burning building [2]. Searching and rescuing firefighters in trouble is different than searching and rescuing civilians. Incidents like this are the greatest challenge [3] and risk [4] for intervening firefighters. An important factor in this case is the current mental pressure of the rescuer [5]. The victim is not a stranger, but one of us. It is possible that they even came to the scene with same engine, maybe they were in a friendly relationship. Rescuing a close acquaintance, comrade, always puts great pressure on rescuers, jeopardizing even objective judgment and sound decision-making [6] [7] [8]. In addition to the emotional pressure, it is more physically demanding to rescue a firefighter who is overweight due to personal protective equipment than an average civilian [9]. Another problem could be that while civilians were probably trying to move away from the source of danger, firefighters were moving towards danger only because of their duty. The basic rule, then, is that only a firefighter with the same training and equipment as the one in trouble can be sent for rescue. Otherwise, it is conceivable that the rescued people will not even reach the person in trouble, or in the worst case they will put themselves in danger. The most important and basic requirement for a RIT unit is immediate deployment and rescue in the shortest possible time. An event that puts a firefighter in danger most often occurs without any sign or warning. Golden minutes is the period of time during which a person who needs to be saved has the best chance of survival in the event of a successful save. These gold minutes cannot be determined exactly due to the many variables. For example, it largely depends on how much air you had at the time of the adverse event. Also a critical factor can be the distance between the firefighters launched to the rescue and the person in trouble or even the nature of the incident [10].



The task of the RIT unit:

1. Locate a firefighter in trouble
2. Protect the life of the firefighter in trouble at the scene
3. Rescue a firefighter in trouble

Finding a firefighter in trouble

If the situation of the firefighter in trouble is not known, it is the job of the RIT to locate it.

The purpose of locating a firefighter in trouble is:

- perform a fast, organized, planned search
- approach to the distressed so that the approach can be traced and controlled from the point of entry
- the approach should also be allowed for additional rescue units
- removing obstacles to search

Thus, a RIT unit is a search and rescue unit consisting of 2 or more experienced firefighters who can be deployed immediately and who are trained in advanced search and rescue procedures and they have the special equipment needed for rescue [11]. Unlike the rescue team, their only and exclusive task is to search for and rescue troubled firefighters when needed.

Fire rescue unit may consist of:

- • on-site on-call firefighters with the sole responsibility of the fire rescue unit
- • on-site firefighters who perform other tasks related to firefighting but, if necessary, function as a fire rescue unit

4.2. Search procedures

1. Simple search
2. Oriented search
3. TIC guided search
4. Rope Assisted Search Procedure



A primary search is a quick but thorough and targeted search activity that is performed before or at the same time as firefighting begins. The most important factor in a primary search is the purpose of the search. Basically, our research can have two purposes: to locate victims or to locate the nest of fire. The task is defined after the primary reconnaissance. A determined and purposeful primary search activity can increase the safety of the intervener, reduce life-threatening impacts, and achieve a faster and more efficient search. When searching, we try to stay close to floor level. The reason for this is that the rooms are mostly filled up with smoke from top to bottom, so there is a good chance of better visibility conditions at low level and the temperature is also lower. In cases where we do not have to be afraid of breaking down (eg rooms without basement), it is advisable to move on all fours, as our hips and shoulders are perpendicular to the direction of travel, so it is easier to maintain our orientation in the event of an unexpected event (eg ceiling). Which search method is used is determined by the characteristic of the building and the situation [12]. What are the visual conditions in the room? Do we need to inspect a large interior, or should we expand the search area? If not, then the oriented search may be sufficient. If yes, a Rope Assisted Search Procedure should be used.

2. SIMPLE SEARCH

A simple search can be used in cases where there are good visibility conditions in the room. If you have entered the room through the window, close the room door as a first step, if it is open. This is necessary to prevent any smoke entering to the room, which would jeopardize the search or the rescue itself. If the door is open, we must assume that it was opened during the victim escape attempt, so check the immediate foreground of the door as well! During simple search, we can rely heavily on our vision. However, this should not make the inspection of the room superficial. We need to systematically inspect the room. When rescuing a firefighter, pay attention to the audible warning of the SCBA or the sound of the bodyguard, light signalled by a lamp, piles of debris, etc.

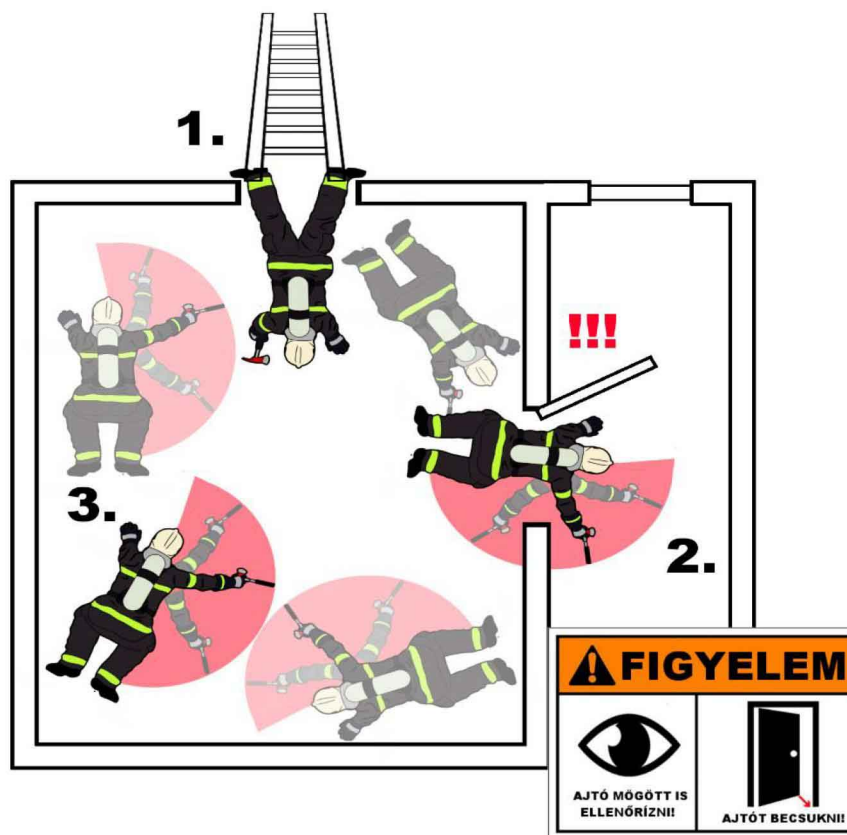


Figure 1 - The simple search. Created by the author.

3. ORIENTED SEARCH

In case of oriented search, we use the wall as orientation point. Oriented search can be ideal for checking smaller rooms if Thermal Imager Camera (TIC) not available or the size of the room allows, that the search firefighter (s) can be screened quickly and safely. The main basic rule is that we cannot lose physical contact with the wall! In each case, the search is performed by continuously contacting one of our body parts with the wall or a partner who is in contact with the wall. Oriented search can only be used to scan smaller rooms (eg rooms in residential buildings, smaller rooms in public buildings, panel flats, weekend houses, etc.). The search can be performed successfully by 1 + 1 or 1 + 2 people. It is important that they communicate with each other throughout the search. The search can be performed clockwise or counterclockwise. The experience is that it is advisable to go in the direction - if possible - of what kind of



guarantors we are. A search initiated accordingly will result in greater confidence and thus greater efficiency.

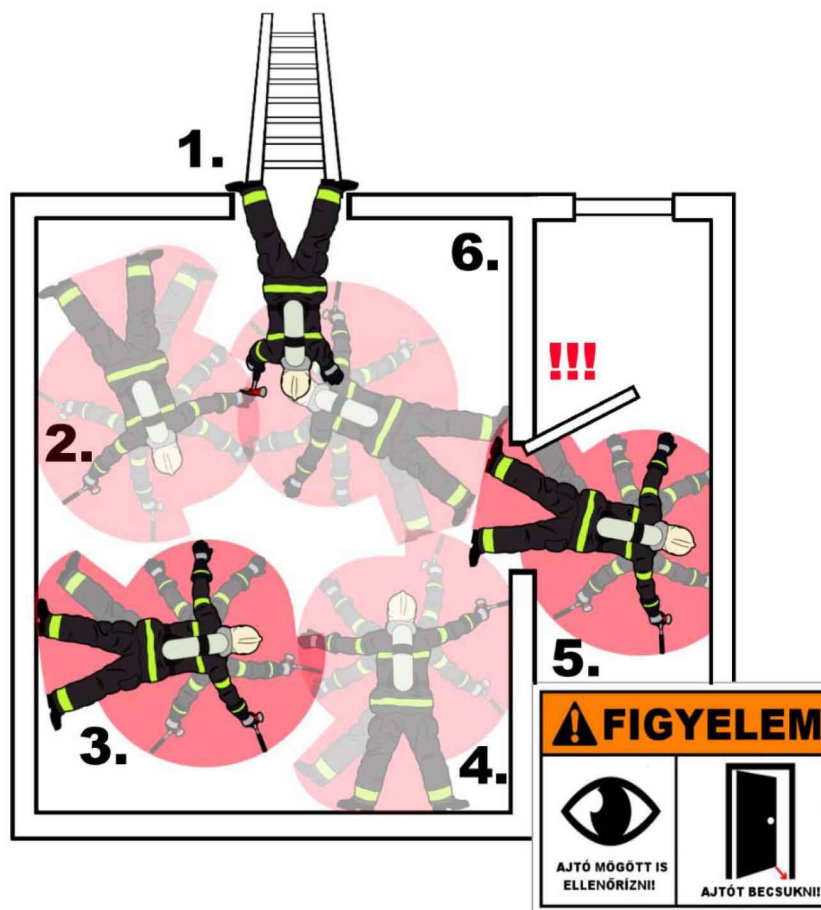


Figure 2 - The oriented search. Created by the author.

4. TIC SEARCH

Special tools can also be very useful in fire prevention [13] [14], firefighting [15] and detection [16]. During a search conducted by a thermal imager, a firefighter with a thermal imager surveys the room. He decides if it is necessary to search the room or move on. If you choose to search the room, the search unit will stay at the entrance while the firefighter with TIC will search the room. This search procedure is one of the fastest, as you only need to check separately the points that the thermal imager does not see. It is very important that while the viewfinder can



see the other members of the viewfinder with the thermal imager, they may not be able to see him because of the smoke. Continuous contact between the members of the unit is therefore of paramount importance.

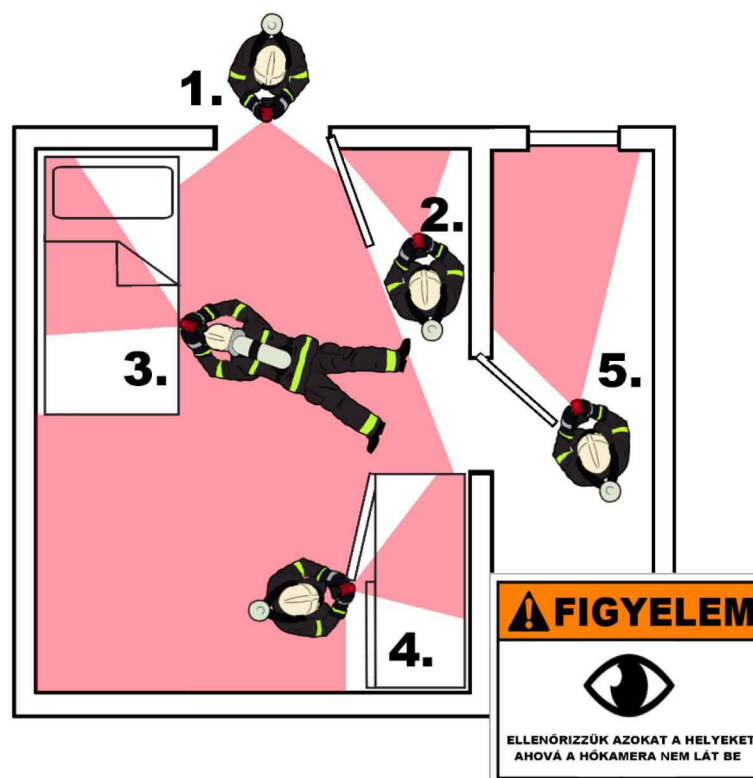


Figure 3 - The TIC search. Created by the author.

5. TIC GUIDED SEARCH

During a search with a thermal camera control, a firefighter with a thermal camera scans the room from the entrance. If necessary, it shall inform the other members of the unit which areas need to be examined more closely. At this point, one or more members of the search team will intrude and check the points in question. A firefighter at the entrance uses a thermal imager to control the search and monitor their safety. This search process is safer for the search team, but more time consuming. Communication is also a critical factor here, as viewfinders without a thermal imager perform the task almost blindly under the control of a thermal imager.

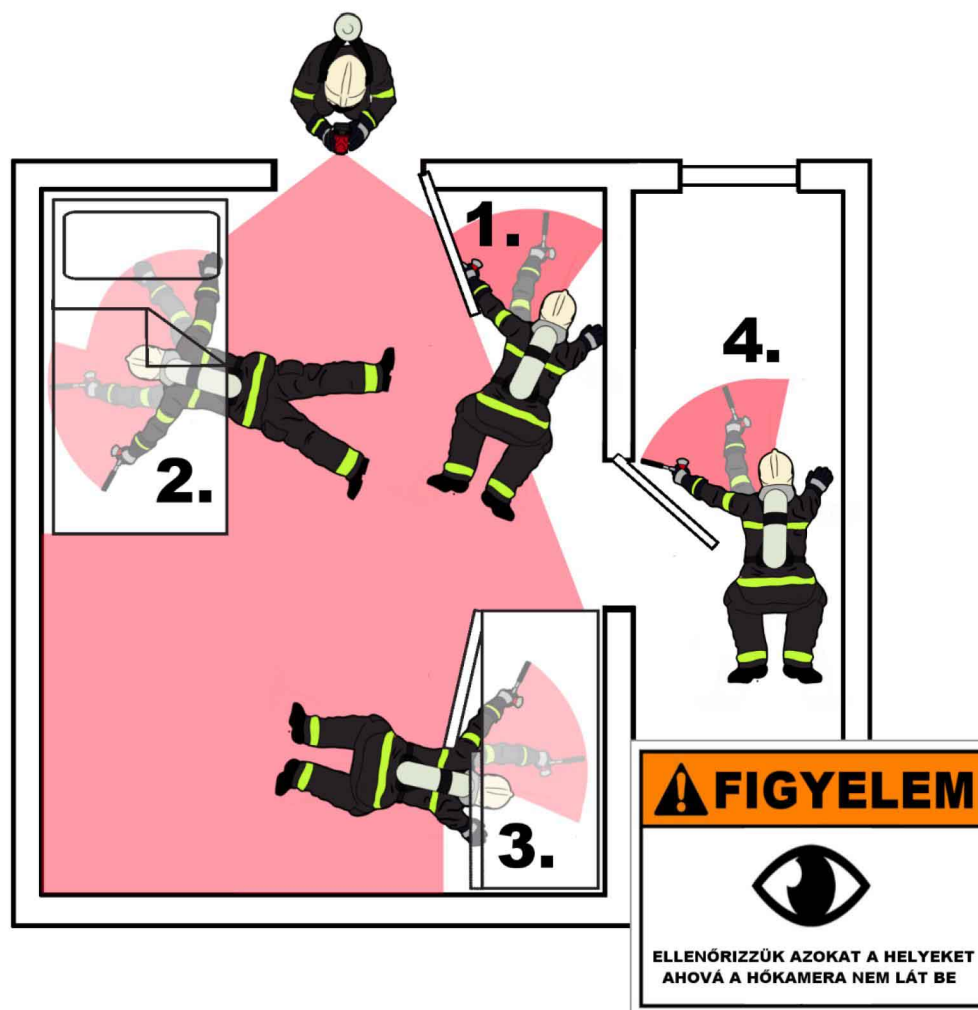


Figure 3 - The TIC guided search. Created by the author.

6. SHORTEST ROUTE SEARCH

The shortest route method is one of the least systematic search procedures. It is primarily applicable in situations where no information is available on the whereabouts of victims and there is no possibility to organize and carry out a more complex search. The method of the shortest route is based on the assumption that victims from the fire try to escape by the shortest possible path. The TIC is used to determine the shortest path to the fire nest and thus to find the most likely escape route, thus searching for potential victims located on it.



REFERENCES

- [1] Heszl József: A harangtól a számítógépig, avagy a tűzjelzés és riasztás története. *Belügyi Szemle*, LXVIII. 8. (2020), 51-66.o.
- [2] Kalamár Norbert - Pántya Péter: A magyar katasztrófavédelem által végzett beavatkozások. *Védelem Tudomány*, I.4. (2016), 88-99.o.
- [3] Bodnár László - Bérczi László: Beavatkozási biztonság vizsgálata a nagy kiterjedésű erdőtüzek kapcsán. *Műszaki Katonai Közlöny*, XXVIII. 4. (2018), 102-110.o.
- [4] Kátai-Urbán Lajos - Érces Gergő - Sibalin Iván - Vass Gyula: *Risk assessment in the field of disaster management in Hungary*. In: Branko, Savic (szerk.) 13. МЕЂУНАРОДНО САВЕТОВАЊЕ РИЗИК И БЕЗБЕДНОСНИ ИНЖЕЊЕРИНГ ЗБОРНИК РАДОВА Novi Sad, Szerbia : Visoka Technicka Skola (VTS), (2018) pp. 340-345.
- [5] Restás Ágoston: Pszichológia a tűz frontvonalában. *Védelem Tudomány*, I. 3. (2016), 46-56.
- [6] Restás Ágoston: *Decision making on the spot*. In: Grześkowiak, Ł et al: Proceedings of the 8th International Scientific Conference Wood and Fire Safety. Zilina, Szlovákia : EDIS Zilina University Publishers (2016) pp. 277-286.
- [7] Rácz Sándor: *Decision Making Support in Case of Large Scale Storage Fires*. In: 11th International Conference on "Environmental Legislation, Safety Engineering and Disaster Management" Elsedima : Building Disaster Resilience in a Changing Word (Book of abstracts) Cluj, Romania : Babes-Bolyai University, Faculty of Environmental Science and Engineering, (2016)
- [8] Pántya Péter: *Döntéstámogatás erő-eszköz számítás alapján*. In: Restás Ágoston-Urbán, Anett (szerk.): Tűzoltó Szakmai Nap 2016 Budapest, Magyarország: BM OKF (2016) pp. 168-172.
- [9] Kerekes Zsuzsanna - Kővágó Ádám: Fokozottan tűzveszélyes környezetben alkalmazott védőruhák réteg anyagainak tűzvédelmi minősítése. *Védelem Tudomány*, IV. 3. (2019), 1-26.o.



- [10] Kós György: Amikor a tűzoltó kerül bajba: kárhelyen alkalmazható újraélesztési eljárás. *Védelem Tudomány*, I. 4. (2016), 30-41.o.
- [11] Rácz Sándor: Tűzoltók kiképzésének fejlesztési lehetőségei. *Védelem Tudomány*, III. 4. (2018), 182-199.o.
- [12] Érces Gergő – Ambrusz József: A katasztrófák építésügyi vonatkozásai Magyarországon. *Védelem Tudomány*, IV. 2. (2019), 45-83.o.
- [13] Bodnár László: Erdőtűz megelőzés korszerű módszer segítségével. *Hadmérnök*, XII. 1. (2017), 59-69.o.
- [14] Érces Gergő – Vass Gyula: Okos épületek, okos városok tűzvédelmének alapjai I. *Védelem Tudomány*, VI. 1. (2021) 1-21.o.
- [15] Shwababa Siviwe - Restas Agoston: *Veld fire mitigation strategy: a vision for an innovative and integrated approach to managing risks in land reform farms, a case of land reform beneficiaries in South Africa*. In: Viegas, Domingos Xavier (ed.) *Advances in forest fire research 2018* Imprensa da Universidade de Coimbra, (2018) pp. 183-191.
- [16] Restás Ágoston-Dudás Zoltán: Az UAV katasztrófavédelmi alkalmazásának sajátosságai és humán feltételei. *Repüléstudományi Közlemények*, XXV. 1. (2013), 23-45.o.

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