

The Emergency-Urgency Network of Hand Surgery in Italy

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SUMMARY

This topic has been discussed on various occasions in the last 50 years and was first the subject of the European Consensus Conference (Modena, March 1999) organized by the SICM (Italian Society of Hand Surgery), SIM (Italian Society of Microsurgery) and FESUM (European Federation of Hand Emergency Services) ¹, with the patronage of FESSH (European Federation of Hand Surgery Societies) and subsequently of the State Regions Conference in Italy (Gazzetta Ufficiale No. 285 of 07/12/2001) who formalized the requirements of the emergency and trauma network of hand surgery in Italy. On 27 November 2018, a Ministerial Working Table was established to organize the network. In the last 4 years, the SICM has taken part in this working table, based on the re-elaboration of what was already stated and approved in the 1999 European Consensus Conference and in the 2001 State Regions Conference. This work resulted in a "Programmatic Document for paths of the Emergency-Urgency network in Hand Surgery". The draft agreement of the Emergency-Urgency paths for Hand Surgery was approved on 23/02/2022 (Regioni.it 4242 - 23/02/2022) ² and states that the system will be implemented through the integration of "high specialized complexity" and "low specialized complexity" centers, according to the HUB & SPOKE model.

Key words: hand, surgery, trauma, emergency, Italy

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Introduction

The need to organize a Hand Surgery Emergency-Urgency Network in Italy has arisen in the last 50 years, together with the development and growth of reconstructive methods and techniques which were carried out in an increasingly growing number of national centers. This topic was seriously faced for the first time by the European Consensus Conference which took place in Modena in March 1999, organized by SICM (Italian Society of Hand Surgery), SIM (Italian Society of Microsurgery) and FESUM (European Federation of Hand Emergency Services) ¹, with the patronage of FESSH (European Federation of Hand Surgery Societies) and later in 2001 by the State Regions Conference in Italy. The technical-organizational aspects were discussed and examined, together with the critical issues and the requirements that had to characterize the emergency and trauma network in hand surgery in Italy.

Despite the efforts made, not all the criticalities and problems were solved, the national network was incomplete, and hand emergencies were guaranteed only by some centers in virtuous regions that were able to work 24 hours a day, 365 days a year. Thanks to the SICM interest and through ministerial contacts, on the basis of the old document of the 2001 State-Regions Conference, on 27 November

2018 a Ministerial working table was established to organize the Emergency and Trauma Network of Hand Surgery in Italy. It was based on the re-elaboration of what had already been approved in the 1999 European Consensus Conference and in the 2001 State Regions Conference (Official Gazette No. 285 of 07.12.2001). After a long process and numerous meetings, the “Programmatic Document for paths of the Emergency-Urgency network in Hand Surgery” was born. The draft agreement of the Emergency-Urgency paths for Hand Surgery was approved on 23/02/2022 (Regioni.it 4242 - 23/02/2022) ² and states that the system will be implemented through the integration of “high specialized complexity” and “low specialized complexity” centers, according to the HUB & SPOKE model.

Materials and methods

Definition of hand trauma

Open or closed injury to the wrist and hand involving the skin, muscles, tendons, bones, joints, and nerves “FESSH HCT (Hand Trauma Committee) Definition”.

The Hand Trauma Committee defines the Hand Surgeon as a surgeon with specific skills and documented activities in trauma surgery, meeting the minimum training and experience requirements (technical training and microsurgical experience), pointing out the primary importance of Microsurgical Training ³ (Fig. 1).

Nomenclature in reimplantation (Biemer 1979) - VII International Society Reconstructive Microsurgery Symposium

- macro upper limb reimplantation: amputation proximal to the wrist (Fig. 2);
- micro reimplantation: amputation distal to the wrist (Fig. 3);
- total amputation: need for reimplantation (Figs. 4-5);
- sub-total amputation: requires revascularization (Figs. 6-7);
- complex Lesions (Figs. 8-9).

Preservation and transport of sub-amputated/amputated segments

First aid needs to stop bleeding using elastic compressive bandages and elevate the limb, avoiding disinfectants. The amputated segment must be wrapped in sterile gauze soaked in saline solution, put into a water-repellent plastic bag and then into a container with ice (+4°C) (Fig. 10).

In case of sub-amputations, it is important to stop the bleeding with compressive bandages, using tourniquets just in case of unstoppable bleeding (max 1 hour), and elevate the arm.

Indications and contraindications for upper limbs re-implantation (Tab. I).



Figure 1. Importance of microsurgical training.



Figure 2. Amputation proximal to the wrist.



Figure 3. Amputation distal to the wrist.

Maximum time limit to perform a reimplantation

In case of cold ischemia (+4°C), the limit is 8-10 hours for macro-segments and 24 hours for micro-segments. At room temperature ($\geq 20^{\circ}\text{C}$), for the reimplantation of large segments, the muscle suffers irreversible damage after 3-4 hours. After this time, reimplantation should not be performed.

Table I. Indications and contraindications for upper limbs reimplantation.

Absolute indications	Relative indications
Childhood Thumb Multiple digital amputations Trans-metacarpal amputations Amputations of the wrist and forearm	Individual requests (cosmetic, social etc.) Degloving without bone injury
Absolute contraindications	Relative contraindications
High surgical risk High risk anesthesia Impossibility due to bad local conditions	Age > 70 Severe polytrauma Important systemic pathologies Psychiatric patient Self-mutilation Smoking, alcoholism, drug abuse Multilevel lesion Crushing, avulsion Physical agents
Single finger reimplantation	
Indications	Contraindications
Childhood Individual request Clean cut amputation distal to the insertion of the flexor superficialis tendon Degloving without osteotendinous damage	Second finger in a manual worker Severe crushing involving the skeletal component Amputation proximal to flexor superficialis tendon insertion
Distal amputation	
Indications	Contraindications
Childhood Individual request Clean cut amputation distal to the insertion of the flexor superficialis tendon Degloving without osteotendinous damage	Severe crushing, avulsion with skin damage Absence of suturable vessels Possible anemia with high risk of transfusions

State-Regions Conference 2022 ⁴

The draft agreement of the Emergency-Urgency paths for Hand Surgery, established during the State Regions Conference, was approved on 23/02/2022 (Regioni.it 4242 - 23/02/2022) producing a “Programmatic Document for paths of the Emergency-Urgency network in Hand Surgery”.

This document states that the system will be implemented through the integration of “high specialized complexity” and “low specialized complexity” centers, according to the HUB & SPOKE model. This tool allows Italy and the single regions to be at the forefront of European and International models that are active in the field of Hand Surgery and Microsurgery.

It is the first formalized agreement that fully face the therapeutic pathway, the national organizational network, university training, and prevention plans.

According to this document, the regions and autonomous provinces of Trento and Bolzano must undertake to fully implement

the contents of the agreement within 6 months from the date of approval, fully implementing it within the following 18 months. The provisions of this agreement must be provided within the limits of the human, instrumental, and financial resources envisaged by current legislation and, in any case, without new or greater burdens on public finance.

The Emergency-Urgency Network of Hand Surgery and Microsurgery

The reference model for the definition of the Hand Surgery and Microsurgery network is the “HUB & SPOKE”, whose nodes are divided into I and II levels according to low or high complexity.

The criteria for identifying the HUB Center are:

- II LEVEL DEA Hospital Unit, site of High Specialization Center (CTS) of trauma network;



Figure 4. Total amputation.



Figure 5. Total amputation and reimplantation.



Figure 6. Sub-total amputation.



Figure 7. Sub-total amputation and revascularization.



Figure 8. Complex lesions.



Figure 9. Complex lesions.

- high complexity of documented cases;
- catchment area of 2-4 million habitants;
- appropriate activity and case history;
- specific training activity programs

The organizational and governance criticalities of the “HUB & SPOKE” system determine the need to establish a territorial\ regional SPOKE Hand Network and free the HUB from level I traumatic injuries.

The HUB Center's role

The HUB Centers must perform urgent reimplantations at the reference area, and, if possible, even those from other regions according to the inter-regional agreements. Moreover, it has to develop scientific and training activities in collaboration with the regional university system.

Complexity levels according to the HUB & SPOKE model

According to the “HUB & SPOKE” model, Hand Surgeries and Microsurgeries lesions can be classified in:

- **I LEVEL LESIONS:** low complexity lesions affecting the skin and osteo-ligament structures that require surgical treatment or specific treatment protocols (skin, tendon and capsular-ligament lesions, closed fractures, etc.);
- **II LEVEL LESIONS:** high complexity injuries that requires specialized services defined by the involvement of at least three different tissues: high-energy limb injuries, crushing injuries, complex substance losses, intra-articular lesions, nerve lesions, vascular lesions (ischaemic lesions) that require revascularization or reimplantation of amputated segments.

Network organization

In case of high complexity lesions (e.g.. amputations needing re-implantation), the patient needs to be sent directly to a II level Hand Center by the 118 emergency system. In the remaining cases, the patient should be directed to the nearest SPOKE center.

The transfer to the HUB center should be coordinated by the HUB on-call physician and then performed by plane/helicopter or 118 ambulance if the patient is hemodynamically instable or in case of macro segments amputation or polytrauma.

The communication between the HUB and SPOKE centers is handled by the Territorial Emergency System 118 according to the guidelines elaborated by the Italian Society of Hand Surgery (SICM) and by the regions with AGENAS (National Agency for Regional Health Services).

The communication between the suburban center and the specialist center must be precise about the site and level of amputation, about anamnestic aspects, type of trauma, ischemia time, local conditions of the amputated segment, presence of contaminants, age, gender, substance abuse status (alcohol, smoking, and drugs), work activity and site dominance, indications and possible relative or absolute contraindications to reimplantation.

Italian context

Currently in Italy, the management of the hand's emergency-urgency traumas and complex microsurgical injuries is run by Hand Centers identified by the regions on the basis of the last census made by the SICM Centers Accreditation Commission (ex CUMI) (Figs. 11-12).



Figure 10. The Emergency Urgency Network of hand surgery in Italy.

SICM MEDICI E PROFESSIONISTI	
Elenco Centri Mano	
ABRUZZO	
EMILIA-ROMAGNA	
FRIULI-VENEZIA GIULIA	
LAZIO	
LIGURIA	
LOMBARDIA	
MARCHE	
PIEMONTE	
PUGLIA	
SARDEGNA	
SICILIA	
TOSCANA	
TRENTINO-ALTO ADIGE	
UMBRIA	
VENETO	

Figure 11. Hand Centers regional list.



Figure 12. Italian Hand Centers.

At the moment, in the Italian territory, there is a lack of homogeneity due to the absence of specific dedicated structures in many regions and to the variability of ability of existing structures in managing elective and emergency hand pathologies.

The Hand Centers defined by the regional planning can identify the skills of existing centers to define a reference structure for designing the “HUB & SPOKE” network of Hand Surgery.

Critical issues

The main problem remains the regions that do not have a level II center. In these cases, it is necessary to indicate extra-regional Hand Centers and to formalize agreements between regions. The organizational model of the Hand Surgery and Microsurgery network refers to at least one regional/territorial HUB center. Furthermore, the lack of I level SPOKES centers leads to organizational and clinical issues that reduces the overall quality of the services guaranteed by the network.

The movement towards the HUB Center of patients with level I lesions, which could be treated in the level II centers after acquisition of adequate skills, and overcoming logistical, economic and social issues, in addition to the congestion of the HUB center.

Conflict of interest statement

The authors declare no conflict of interest

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Author contributions

The authors contributed equally to the work.

Ethical consideration

Not applicable.

References

- ¹ Dubert T, Merle M. The French initiated FESUM, historical development, experience and perspectives. *Handchir Mikrochir Plast Chir* 2013;45:323-325. <https://doi.org/10.1055/s-0033-1351278>
- ² Conferenza Stato Regioni: Documento Programmatico per percorsi della rete di emergenza-urgenza in Chirurgia della Mano in Italia. *Regioni.it* 4242 - 23/02/2022.
- ³ Moutet F, Haloua JP. Hand surgery training. *Chir Main* 2003;22:243-245. <https://doi.org/10.1016/j.main.2003.09.001>
- ⁴ Pajardi GE, Cortese PD. The Italian CUMI. *Handchir Mikrochir Plast Chir* 2013;45:332-334. <https://doi.org/10.1055/s-0033-1349132>