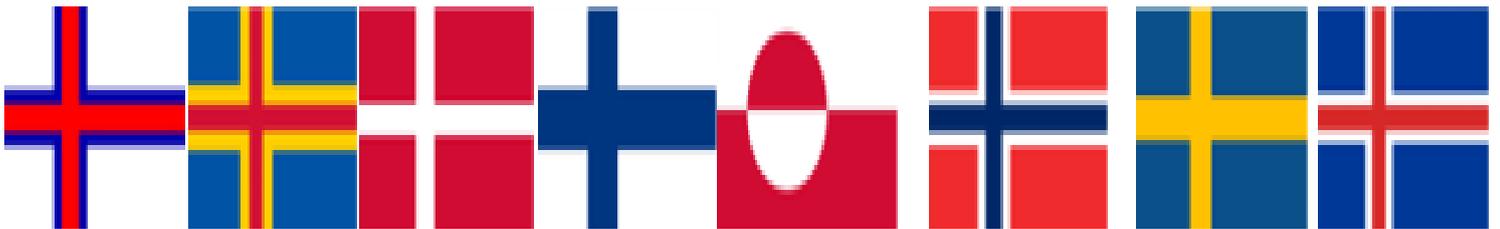


Nordic Mass Burn Casualty Incident Response Plan

January 2019- Version releasable to internet

Plan

IS-2793



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Glossary

B-team	Burn team
EBA	European Burns Association
ICU	Intensive Care Unit
MBCI	Medical Evacuation <i>Timely and efficient movement and en route care provided by medical personnel to injured patients being evacuated from the scene of an accident or from a primary hospital to secondary and tertiary medical facilities</i>
TBSA	Total Body Surface Area <i>Burn size in proportions to total body surface</i>

Introduction

This document describes the outline and practical details of a joint Nordic mass burn casualty incident (MBCI) and its response mechanism. This plan is the result of a conjoined effort by the national burn centers in Bergen, Norway; Linköping and Uppsala, Sweden; Helsinki, Finland; Copenhagen, Denmark, and the health authorities in the Nordic countries. The response mechanism is based on existing national response mechanisms and ones being developed in the participating countries, and the on-going work to establish a European MBCI response mechanism. The main outline is based on the suggested medical standards from the European Burns Association (EBA) in this regard. Therefore, this plan is focused on an MBCI situation where the affected country is overwhelmed, but where the situation is still manageable within our Nordic regional capacity. Our countries have a long history of mutual help and development in burn care, and a regional MBCI plan is a natural extension of this. Our countries have experiences with the same challenges of scattered settlements and long distances and seem well prepared for joint responses in these circumstances. The outline of this plan is made to be in line with national response mechanisms in our countries and with the European mechanism under way, thus being a natural step in this response ladder.

The MBCI response mechanism needs to be incorporated into general national mass casualty mechanisms in all participating countries, as a specialized plan for burn patients. In case of a larger mass casualty incident where the victims have combinations of other traumas and burns, the response mechanism and B-teams outlined in this document will be added to the normal trauma response to aid in burn assessment. However, the general trauma triage will apply to all patients and the burn assessment severity will be added to this triage, and the need for specialized burn care can then be evaluated.

Burn care is highly specialized care in all Nordic countries. The burn center referral criteria are similar in all Nordic countries (ref. section 9). Mortality has decreased in modern burn care[1], and MBCI events around the world in recent years have shown that high levels of care can successfully be met, even in a chaotic situation[2]. However, survival and function can only be ensured through a well-organized response that ensures the right level of care to all injured. A pre-defined protocol for actions regarding traumas, especially burn trauma, is clearly needed in our troubled times. Nonetheless, non-terrorist related accidents and fires continuously occur all over the world[3]. Typically, these large-scale incidents exceed the local capabilities, thus readily exceeding national capacities in our relatively small-scale capacity of the Nordic countries.

Common standards of care are practiced in the Nordic countries and all burn centers are members of the European Burns Association (EBA). The newly started EBA verification process for burn centers ensures that high standards of care are met in verified centers. All our burn centers are either verified or in the process of such verification.

This document describes when and how to activate a response, including the pre-agreed ways of communication in a response activation, and outlines the limits of our Nordic capacity and thereby the activation point of a larger European response. Furthermore, the function of professional burn triage teams, the Burn Teams (B-teams), is explained and a triage decision-making tool is provided.

The response mechanism focuses on the following principles:

- 1) Efficiency and timely intervention. An activation of the response mechanism should result in a final response plan within hours of the event. All communication should follow pre-agreed communication lines, without bureaucratic loops and delays.
- 2) Event-related disorganization must be expected to some extent in the affected country. The response mechanism is built to alleviate and share the burden of the affected country to all participating Nordic countries.

3) Emergency management of the injured should adhere to the principles of Prehospital Trauma Life Support (PHTLS), Emergency Management of Severe Burns (EMSB), Advanced Burn Life Support (ABLS), Advanced Trauma Life Support (ATLS), and European Trauma Course (ETC/ETLS).

4) Professional secondary assessment and triage in the primary hospital(s) by specialized teams (B-teams) is at the very core of the response mechanism. Extended primary triage at the scene of the event can and should not be the aim.

5) Practical implementation involves quick deployment of specialized teams (B-teams), whose mission is to (1) ensure expert secondary assessment and triage, (2) designate patient transfers to facilities with the level of care most appropriate to their condition, and (3) designate patients to the most secure transfer conditions.

6) All admissions to the Nordic Burn Centers should be temporarily closed until secondary assessment of all victims is completed. Thus, preventing faulty prioritization of patients for the highest level of care.

As we have learned from previous MBCIs in Europe[4], primary triage is unreliable and primary distribution of patients often chaotic[5-7]. Care must be taken not to let these early and unreliable evaluations provide the basis for early international patient transfers to burn centers, as this might lead to devastating misuse of resources in such events[3]. All injured should be transported the shortest possible distance to a nearby emergency hospital. The primary transfer of patients from the scene of the accident to hospital should be in accordance with details of national plans in every country. Further transfers should be organized on the basis of professional burn triage [3, 8].

Based on national plans for MBCI events, the following is suggested to indicate activation of the Nordic MBCI response mechanism:

Denmark: 8-25 severely burned

Finland: 8-25 severely burned

Iceland: 3-25 severely burned*

Norway: 8-25 severely burned

Sweden: 16-25 severely burned

If the number of victims exceeds 25, a European response mechanism should be activated.

**Iceland has the capacity to provide specialized treatment for 2 severely burned patients. Incidents involving three or more severely burned patients will require activation of the MBCI response mechanism.*

The legal basis for cooperation

The Nordic public health preparedness agreement [9] provides the basis for cooperation between the Nordic countries for the purpose of preparing and developing health and medical care preparedness so as to be prepared to deal with emergencies and disasters, such as natural disasters and other events (accidents and acts of terror) involving, for instance, radioactive emissions, biological substances, and chemical substances.

The agreement applies to cooperation between the responsible authorities in the area of health (and social services). According to article 3 of the agreement [9], the cooperation encompasses:

- a) Preparation of contingency measures and
- b) Assistance on occasions when one of the contracting states suffers an emergency or disaster.

The Nordic MBCI response mechanism is based on this agreement and acts as an operational plan for measures that can be taken in case of a large incident involving burns.

According to article 4 of the agreement [9], Nordic countries undertake to provide assistance to one another upon request, to the extent possible under the agreement.

In line with existing provisions and principles, the country seeking assistance will bear the costs of such assistance.

According to Article 3 of the agreement [9], the distribution of the administrative and financial consequences arising from cooperation on health and medical care preparedness shall be agreed on a case-by-case basis. In the case of cooperation (assistance) referred to in Article 3(b) (quoted above), the provisions of the “Nordic Rescue Services Agreement” (NORDRED) [10] concerning financial compensation shall be applied as far as possible.

According to article 4 of the said agreement, the country providing assistance is entitled to compensation from the aid-seeking country for costs related to actions, to the extent that these may be attributed to the assistance performed.

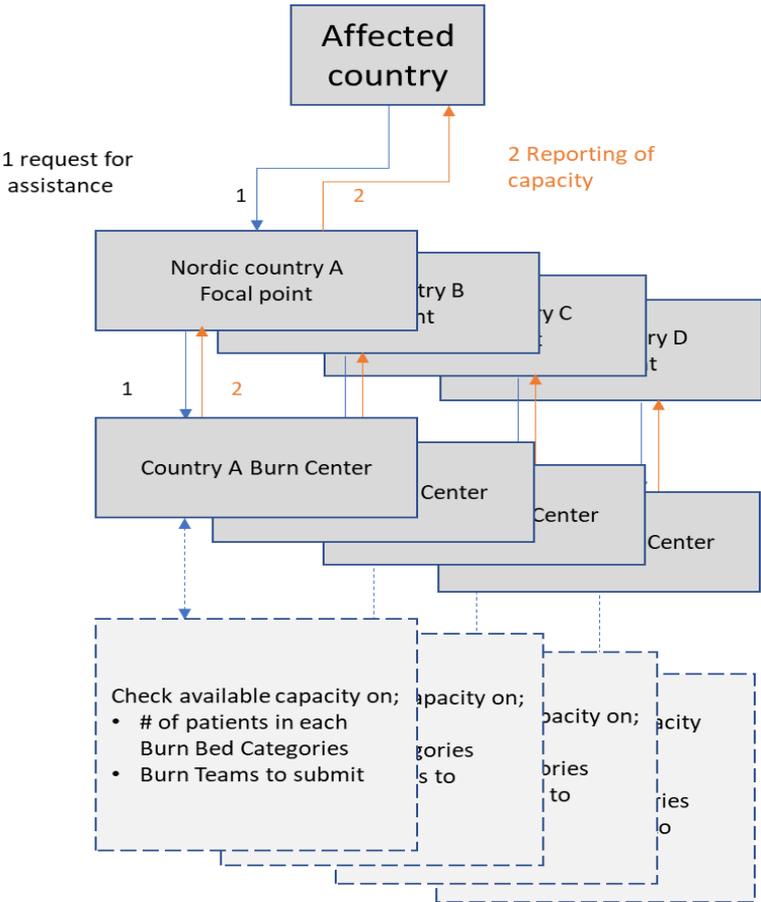
The health authorities in each of the Nordic countries should establish a national focal point and national processes for administrative and financial consequences to the bilateral reimbursement process described in NORDHELMS [9] and NORDRED [10].

Activation of the Nordic MBCI response mechanism

Operational Headquarters

The national focal point (see below) in the affected country will be the operational headquarter in case of a joint Nordic response to an MBCI. All communication on requests and offers of help and capacities will be addressed to the operational headquarter according to agreed lines of communication.

Lines of communication



In response to an MBCI in any of the participating countries, the affected country will alert and request activation of a joint Nordic response according to their national

response plan. Each country has a pre-agreed focal point (see below, chapter 3.4) for communication to participating countries. In requesting assistance from other countries, the request should be directed from the national focal point of the affected country to all national focal points of the participating countries. The national focal points receiving request for assistance are responsible for activation of their national response as part of the joint effort to activate the Nordic MBCI response mechanism.

Leadership and operational communication

The focal point of the country in which the incident takes place will serve as the organizational leadership in a joint Nordic response mechanism. The responsibilities of this coordinating role will be:

1. Activation of response mechanism
 - a. Requesting appropriate assistance from Nordic partners
 - b. Activate special logistic resources
 - c. Upscale to European response mechanism when necessary
2. Communication
 - a. Hosting teleconferences with B-teams, other Nordic focal points and burn centers
 - b. Update all field players at all times
3. Provide access to the Nordic victims' data sharing system
4. Logistics
 - a. Coordinate transportation of B-teams to local emergency hospitals
 - b. Conduct a patient transportation plan in coordination with B-teams' reports, agreements in teleconferences, and available resources
 - c. Provide B-teams with a liaison officer at scene to aid in communication, logistics, and reporting

National focal points of the participating countries

Denmark

Sundhedsstyrelsen (Danish Health Authority)

e-mail: SSTBeredskab@sst.dk

Finland

The Ministry of Social Affairs and Health

e-mail: paivystajat@stm.fi

Iceland

The Icelandic Directorate of Health

e-mail: Svl@landlaeknir.is

Norway

The Norwegian Directorate of Health

e-mail: beredskap@helsedir.no

Sweden:

Socialstyrelsen (National Board of Health and Welfare, NBHW)

e-mail: tib@socialstyrelsen.se

Requirements of Qualification from Participating Countries and Burn Centers

Burn Center Standards of Care

To ensure adequate standards of care and safety for patients treated internationally, all participating countries and burn centers should ensure that the minimum standards below are met.

Each participating burn center should:

- Be **verified** by the European Burns Association (EBA)
- Have a working National **burn registry**
- Participate in Nordic **burn center audits**

(To uphold the minimum standards verified burn centers must be re-verified every fifth year, as stipulated by the EBA. Participating burn centers must document their burn care through a national burn care quality registry. Participating burn centers must partake in recurrent Nordic burn center audits, in which morbidity and mortality is to be frankly presented and discussed.)

Burn Care Treatment Capacity Standards (Burn Bed Definitions)

ICU burn bed

Unrestricted intensive care treatment capacity within a specialized unit dedicated to acute burn care. The unit should be specially equipped and designed for the care of a major burn patient, i.e. high room temperature, climate control, total isolation facilities, adequate patient surveillance, and intensive care monitoring facilities. The burn ICU treatment capacity includes the designated care by a multidisciplinary burn team, including specially trained burn surgeons, intensivists/anesthesiologists, and nurses.

Medium care burn bed

Treatment capacity within a specialized unit dedicated to acute burn care provided by a multidisciplinary burn team, including specially trained burn surgeons, intensivists/anesthesiologists, and nurses. The unit should be specially equipped and designed for the care of a major burn patient, i.e. high room temperature, climate control, total isolation facilities, and adequate patient surveillance.

Surgical ward bed

Treatment capacity for burns within a surgical ward of a burn center hospital and in close connection to, but not necessarily within, a specialized unit dedicated to acute burn care.

Obligations from Participating Countries

All participating countries with verified burn centers are committed to develop and train B-teams for secondary assessment missions nationally and in other Nordic countries in a joint response. Countries that do not have verified burn centers will be offered B-teams through the Nordic MBCI response mechanism.

Referral criteria for specialized burn care

There are only minor differences in the referral criteria for specialized burn center care in the Nordic countries. The following list represents an agreed common summary of the different national criteria:

1. Deep dermal burns >10% TBSA
2. Burns in face, on feet, hands, genitalia, perineum, major joints
3. All full thickness burns in all age categories
4. Electrical burns
5. Chemical burns
6. Burns with inhalation injury
7. Burns with associated injuries of trauma
8. Burns in patients with comorbidities
9. Burn patients in need of ICU care

These referral criteria state the standard of care in a normal situation. In case of an MBCI the B-teams will assess and triage patients according to the triage guidelines stated later in this document. This system is constructed to ensure top level treatment for the most severely injured. Thereby, minor injuries that would in a normal situation be treated in a burn center, might be referred to other hospitals in their country with appropriate surgical capacity and competence. This will especially apply to patients designated as "outpatients" in the initial assessment.

Nordic Burn Center Capacity

The national MBCI plans indicate the following maximum capacity for specialized burn care in each country:

Denmark 8

Finland 8

Norway 8

Sweden 16 (Linköping 8 and Uppsala 8)

This would imply that there is a capacity to manage 40 burns after an MBCI.

However, this number would totally overwhelm the burn centers, as the simultaneous transfer of 8 patients to one burn center itself would be a full-scale incident response situation.

Secondly, the simultaneous overloading of all Nordic burn centers would leave all our Nordic citizens without burn service for several months. Thirdly, all centers have very few unoccupied beds in a normal day situation. The chance of all 40 beds being readily made available is unrealistic. An upscale of capacity in an emergency must of course be done, but there is a limit to this scalability if wanting to adhere to standards of care.

Considering published experience and recommendations, and in line with our inventory of realistic burn center capacity in our countries, we therefore recommend 25 burn patients to be the upper limit of a Nordic MBCI dispatch plan. Once this number is approached or exceeded, a European MBCI response mechanism should be activated.

Burn Team (B-Team) Terms of Reference

Nordic Mass Burns Casualty Incident Assessment Mission (Adapted from the EBA MBCD report version 1 February 2017)

Context

Put into effect in a case where a Mass Burn Casualty Incident (MBCI) in a Nordic country exceeds the national capacity of burn care or involves a large number of Nordic citizens affected by a MBCI abroad. The B-teams are deployed on request of the affected country and perform their mission in collaboration with the local staff and authorities. Local staff is responsible for the patients until evacuation.

Objectives

The objective of the Burns assessment mission is to:

1. Assess the situation of patients to support the competent authority of the affected country in performing the assessment
2. Perform secondary medical triage of burn victims in a hospital setting
 1. This includes giving sedation and initial scrub of victims (if indicated), assessment of all wounds, and provide dressing as needed.
 2. B-teams will need to carry a standard equipment kit (Appendix 3)
3. Assess fitness and priorities for transportation
4. Provide recommendations of *needed level of treatment*
5. Select, in cooperation with local authorities, patients for transport/MEDEVAC and treatment in the Nordic burn centers
6. Provide specific recommendations for MEDEVAC teams
7. Secondarily, assess any need for additional B-teams or further assistance, e.g. medication, equipment, etc.

Secondary assessment and triage in the primary hospitals is the core task of B-teams. These will be in close cooperation with the MBCI leadership (national focal point). The aim of the expert assessment by B-teams is to move burn victims with significant injuries from the country in question to burn facilities in the affected country and in neighboring countries. When planning such actions, a very important issue is when in the burn care timeline this transport will be undertaken. This is important due to the early and extensive effects the burn injury has on the patient and the significant changes that occur during the first week post burn [11].

Timeframe and Location

The envisaged duration of the mission is 2-4 days, starting from the time of the incident, as MEDEVAC is best performed in the short stable window between initial resuscitation and severe complications. Typically, 72 hours after trauma, burn patients begin to develop complications. The B-team will perform its tasks in the local hospitals where the victims are situated. Transportation of B-teams between involved hospitals will be conducted as necessary for the B-team(s) to assess all patients.

Deliverables and reporting

Under the overall guidance of the B-team leader, the team will:

1. Make standardized assessments of burn patients by filling out the assessment template for each patient
2. Make all assessments available to local authorities, and receiving burn centers, by providing relevant data in an incident database
3. Advise on the possible MEDEVAC by indicating patients fit for transport
4. Give relevant advice to optimize patient care in affected country (level of care, possible relocation etc.)
5. Provide standardized summary of assessments, including number of patients in need of evacuation and assign their priority level
6. Give reports of assessments and suggestions to local authorities and other involved counterparts
7. Join hosted teleconferences

8. Help develop further needs assessment. [e.g. skin bank/allografts]

[The specific scope and outputs of the mission, as well as the specific role and responsibilities of the various team members, will be discussed and agreed upon in coordination with the local authorities.]

The team will coordinate with local and national authorities to perform their task.

The team will report on a regular basis to emergency leadership/focal point in the host nation. Reporting must be done according to the standard B-Teams activity record template. A debriefing will be held at the end of the mission by the host nation.

Team Composition

The B-Team will consist of burn experts from the host country. However, B-teams from other Nordic countries could assist or replace the original B-team at the request of the host country. A B-team is composed of 4 burn experts and one liaison officer as follows:

No	Team Member	Profile	Organization
1	Team Leader Senior Burn Physician	Burn physician with seniority in the team (surgeon or anesthesiologist/intensivist)	Burn Center Personnel
1	Second Burn Physician	Burn surgeon or burn anesthesiologist/intensivist	Burn Center Personnel
2	Burn nurse	Burn nurse	Burn Center Personnel
1	Liaison officer	National Health Authority Expert in logistics and communications	National focal point/Health Authority Personnel
5	Total staff 5 Each team must have at least one surgeon and one anesthesiologist/intensivist		

Scalability of B-Team response

If the situation geographically or in numbers calls for more resources, several B-Teams can be deployed to aid in the situation. In a situation where several B-Teams are needed, one specific team is appointed to be the coordinating team by the host nation's coordinating leadership. Whether there is a need to add liaison officers to all teams will be dependent on the geographical proximity of the B-Teams at mission. If two B-Teams are performing their mission in the same hospital, they might be sufficiently assisted by one liaison officer.

The number of assessments by one B-team in a day is highly dependent on the situation. However, the maximum number of assessments possible to be expected from one B-Team, under any circumstances, in one day is 30. Thirty should therefore be the latest threshold to initially call for additional B-Teams. Local factors and geography may, however, necessitate to initially, or early on, call for more than one B-Team.

The first B-Team to arrive will also be responsible for assessing the needs for further B-Teams deployments (e.g. if the situational demands prove to be higher than expected in the initial response), according to agreements in section 7.2 and 7.4.

Team Member Profiles and Qualifications

Team Leader

Responsibilities

Have the medical responsibility for the mission

1. Coordinate the B-Team's mission with the national response mechanism leadership
2. Develop the mission Plan of Action and provide operational updates in cooperation with the liaison officer
3. Coordinate strategic planning and directions to the B-Team

4. Ensure cohesion within the team and connection to related assessments and activities
5. Be responsible for the development of a mission report, summarizing work conducted, findings, and recommendations

Qualifications

1. Ability to coordinate with international and local agencies involved in a disaster incident response
2. Long experience in burn treatment and profound knowledge of burn organization in Europe

Burn physicians

Responsibilities

1. Assess the state of patients and fill out the standard medical form [MBCD European Burn Assessment Template]
2. Perform secondary medical triage in a local hospital setting
3. Make recommendations for MEDEVAC indication and priority level
4. Assess further needs for assistance, e.g. medication, equipment, etc.

Qualifications

Education and Training

1. Certified anesthetist/intensivist or (plastic) surgeon
2. Solid burns background / minimum [3] years in a Burn Center;
3. Currently working in a Burn Center
4. Course requirements: Advanced Burns Life Support (ABLS) or Emergency Management of Severe Burns (EMSB) or the equivalent
5. B-Team Simulation Exercise is desirable

Knowledge, abilities and skills

1. Ability to rapidly assess basic needs and local capacities;
2. Proven knowledge and skills in triage [former experience];
3. Familiarity with standards of burn care;
4. Adaptability and experience with crisis situations;
5. Excellent interpersonal, organizational, and team skills;
6. Ability to work effectively in a multicultural environment and to assume authority as and when needed;
7. Knowledge of MS Windows and MS Office and ability to operate standard IT and communications equipment;

Burn nurse

Responsibilities

1. Assist with assessment and recommendations
2. Organize dressing changes and guide local teams in scrubs and dressings

Qualifications

Education and Training

1. Registered nurse
2. Solid burns background / minimum [3] years in a Burn Center;
3. Currently working in a Burn Center
4. Course requirements: Advanced Burns Life Support (ABLS) or Emergency Management of Severe Burns (EMSB) or the equivalent
5. B-Team Simulation Exercise is desirable

Knowledge, abilities and skills

1. Ability to rapidly assess basic needs and local capacities;
2. Proven knowledge and skills in triage [former experience];
3. Familiarity with standards of burn care;
4. Adaptability and experience with crisis situations;

5. Excellent interpersonal, organizational, and team skills;
6. Ability to work effectively in a multicultural environment and to assume authority as and when needed;
7. Knowledge of MS Windows and MS Office and ability to operate standard IT and communications equipment;

Liaison officer

Responsibilities

1. Facilitate the B-Team mission of medical assessment
2. Aid in communication, teleconference setup, and provide an access to the Nordic data sharing system for MBCI victims information
3. Logistics planning for the B-Team
 - a. Organize transportation, food, and housing for the B-Team
 - b. Organize transfer of needed equipment and personnel to primary hospital
4. Act as a link between the national response mechanism leadership, the B-Team leader, and local primary hospitals
5. In cooperation with B-Team medical leader, develop the mission plan of action and provide operational updates
6. Help team leader in strategic planning and aid in direction to the B-Team

Qualifications

1. Experienced personnel from the host nation's health authority or affected regional health trust
2. Ability to coordinate with international and local agencies involved in a disaster incident response
3. Knowledge, understanding and overview over local and national health services and resources
4. Knowledge about the Nordic MBCI Mechanism and information sharing system

Common requirements for all team members

Languages

- Fluency in English is required

Vaccinations

- Completion of required vaccinations, particularly for hepatitis B, and always in compliance with local requirements, is a prerequisite for deployment.

Authorization of Health Care Personnel

The Nordic countries should consider fully trained B-team personnel from other Nordic countries for authorization as health care personnel in their country. This is encouraged as a measure of preparedness to ease cross-border cooperation in the event of a mass burn casualty incident.

Transportation

Requesting transport resources

When the affected country has decided to activate the Nordic MBCI response mechanism, this country must also consider its own transport capacity. If in need of transport resources from participating countries, requests will be directed to the focal point of communication of each country (ref. section [0](#)) that has accepted to receive patients. The following information is to be provided by the affected country:

- Patient data (personal and medical condition)
- Contact data of medical staff responsible for treating the patient
- Contact data of authority responsible for coordination of ground transport etc. (e.g. Emergency Medical Coordination Center/AMK)
- Preferred time of transport

The focal point of communication of the receiving countries will hand this information over to its Air Ambulance Authority.

Air Ambulance Authorities:

Norway

Luftambulansetjenesten HF v/Flykoordineringssentralen

(Air Ambulance Services of Norway/Air Ambulance Coordination Center)

Finland

The Ministry of Social Affairs and Health

Sweden:

Socialstyrelsen (National Board of Health and Welfare, NBHW)

Tjänsteman i beredskap (TiB) NBHW is reached via SOS Alarm

Denmark:

Sundhedsstyrelsen (Danish Health Authority)
(beredskabsteamet)

Iceland:

Samhæfingarstöðin (National Crisis Coordination Center)

The country providing transport resources will report its' available resources to the requesting (affected) country's focal point as soon as possible.

Planning air ambulance transport

The Air Ambulance Authority in the country providing transport will plan for the mission in cooperation with the appropriate air ambulance base. The following issues should be considered:

- Type of aircraft (fixed wing or helicopter)
- Medical crew (competence, relevant experience)
- Medical equipment
- Medical supplies and medications

As part of the planning, the air ambulance medical crew will obtain detailed medical information from the medical staff responsible for treating the patient. The authority responsible for coordination of ground transport will also be contacted in line with national agreements. Aviation issues will be dealt with by the flight operator.

When the above-mentioned parties have agreed upon how and when the transport will be accomplished, the focal points of communication of both countries shall be informed and give the final approval.

Medical safety in air transfers

Long-distance air transportation of burn victims needs special attention. Burn patients differ considerably from other trauma and intensive care patients. Experience in dealing with burn victims is important when designating patients to levels of in-flight

care. Patients with extensive burns could be very complicated to deal with during air transportation, and burn specific expertise during in-flight care could be crucial to survival[12, 13]. Most importantly MEDEVAC must be performed before patients begin to suffer from severe complications, typically a window of 48-96 hours[11] post-trauma.

Even with the most optimal MBCI plan, there will remain limitations on the amount of available beds in specialized centers, as well as in the available assets and teams for air transportation. Furthermore, some burn victims are so severely injured that their evacuation would be futile in any situation. To aid the transfer priority decision-making triage guidelines based on available epidemiological data[14] is provided.

In-Flight Care and Staffing Guidelines

In constructing and developing guidelines for in-flight care, the underlying general operational procedures for these events needs to be defined and considered in detail. Therefore, this recommendation will first start with the description of the tasks to be undertaken by the in-flight teams and thereafter the rationale? for the details of the following guidelines will be explained.

Summarizing these effects, the following general changes may be pointed out. First, during the 2-4 hours post burn, the patients, if not very extensively injured, can be rather stable given that they are not the subject of very extensive burns or other injuries [15]. Later, and especially if fluid treatment is initiated, e.g., > 6 h, which is mandatory in larger injuries (>20% TBSA), the situation will become more critical [16]. Effects on the lung by the thermal injury and smoke as well as circulatory problems and infectious complications will emerge [11, 17]. In most countries early transfers are undertaken by transport trained anesthesiologists, nurses and/or paramedics (most often < 24/36 hours). In a normal day routine, most of these transfers will also have limited transport times to the national burn center and adequate triage has almost always been undertaken prior to such transport. However, the international experiences of larger transport distances (intercontinental), and later in the burn care process >36 h, has underlined the need for full intensive care support when transporting severe burn victims, involving specially trained burn anesthesiologists/intensivists [12, 13].

Examining the circumstances for the transport to be undertaken by the in-flight teams in a MBCI situation, it is anticipated that the transport would most probably occur after 48, 74 or even after 96 hours post burn. Depending on the location of the incident, receiving hospitals, the time needed to do proper triage, and discussions with the national focal point on transfer decisions, one will probably have to be prepared to do transfers even at the last time limit (94h). Complicating factors are also the quality and thoroughness of the triage made and the quality of burn care given in this early phase. It might be anticipated that the larger the need for B-teams, the less appropriate the previous treatment has been. The B-team(s) assessing victims will, as part of their assessment and triage mission, be indicating patients in need of special in-flight attention.

Economical issues related to air ambulance transport

According to existing principles, such as article 4 of the Nordic Rescue Agreement (NORDRED) [10], the affected country will cover the transport costs. Only the real transport costs will be covered (no profit added).

MBCI data sharing

NOT YET DEVELOPED

(This problem is currently on the agenda. We are in dialog with DG ECHO in Brussels to explore the possibilities within the existing systems in Europe. Updates on this will follow.)

As B-Teams perform their assessment task, the results of their work need to be safely and reliably communicated to participating countries focal points and burn centers.

Decisions in an on-going response will be done through teleconferences, hosted by the authorities in the affected country. However, a common accessible online patient database, with the assessment data from B-Teams, must be available for these meetings to be efficient. This would provide burn centers with reliable information on victims.

Depending on legal demands, this database could be de-identified through the designation of MBCI victim number or directly identifiable. Simplicity is important. Experiences from the Netherlands, where such databases for emergency was developed following the Volendam fire in 2001, might provide valuable templates for further development.

Social support

Work in progress- This chapter will be updated

Patients transported to treatment in another country in a situation where they might need long lasting specialized care, will need some special considerations concerning social support. Pre-agreed arrangements for such practical implications as linguistic support and accommodations for next of kin should be made. This is yet to be outlined.

European MBCI Burn Assessment Template

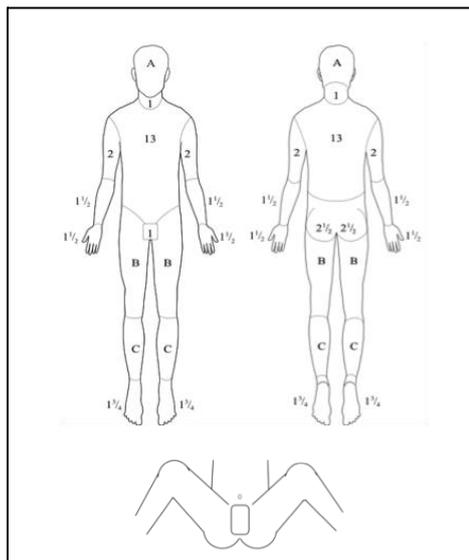
Front



BURN TRIAGE

DATE OF ASSESSMENT:
POST BURN DAY:

WOUND MANAGEMENT	
AGE	
WEIGHT	ADMISSION CURRENT
TBSA BURNED	
TBSA DEEP BURNED	
ASSOCIATED TRAUMA	CHEST ABDOMINAL HEAD LIMBS OTHER:
ESCHAROTOMY	YES NO NEEDED
SURGERY NEEDED	YES NO
EXCISION	YES NO
GRAFTING	YES NO
OTHER	YES NO
TYPE OF DRESSING	
BAUXr SCORE	
ABSI SCORE	



Sketch burns, surgery, trauma, drain and tubes

PEDIATRIC	ADULT
-----------	-------

PATIENT ID	
NAME	
LASTNAME	
BIRTH DATE	
SEX	

GENERAL STATUS	
----------------	--

SMOKE INHALATION	YES NO
INFECTION	SKIN LUNG BLOOD OTHER
ANTIBIOTICS	
RESPIRATORY	YES NO ETT TRACHEOST NONE
VENTILATED	
TRACHEAL TUBE	
FIO2/PEEP	
V _i / RR	
PIP / PFR	
SpO ₂	
CIRCULATION	PULSE BLOOD PRESSURE VASOPRESSORS AGENT/DOSE
	YES NO
NEUROLOGICAL	INITIAL CURRENT SEDATED
	A V P U A V P U YES NO
KIDNEY	URINARY OUTPUT Creatinine clearance Creatinine/urea RRT
	Hemofiltration Hemodialysis NO
COMORBIDITIES	YES NO
ALLERGY	
MEDICINES	
PAST MEDICAL HISTORY	
LAST MEAL	
EVENTS	

TRANSPORTATION	NOT NEEDED	NEEDED	FUTILE
FIT FOR TRANSPORTATION	YES	NO	REEVALUATION
EN ROUTE CARE	CRITICAL		STANDARD
DESTINATION	ICU	MEDIUM CARE	SURGICAL WARD
PRIORITY LEVEL	1	2	3 4
SIGN			

Back

Abbreviated burn severity index		
Variable	Patient Characteristic	Score
Sex	Female	1
	Male	0
Age in years	0-20	1
	21-40	2
	41-60	3
	61-80	4
	81-100	5
Inhalation injury		1
Full thickness burn		1
Total body surface area burned (%)	1-10	1
	11-20	2
	21-30	3
	31-40	4
	41-50	5
	51-60	6
	61-70	7
	71-80	8
	81-90	9
	91-100	10
Total Burn Score	Threat to Life	Probability of Survival (%)
2-3	Very low	≥ 99
4-5	Moderate	98
6-7	Moderately severe	80-90
8-9	Serious	50-70
10-11	Severe	20-40
12-13	Maximum	≤ 10

Tobiasen, J., Hiebert, J. M., & Edlich, R. F. (1982). The abbreviated burn severity index. *Annals of Emergency Medicine*, 11(5), 260–262.

Revised Baux Score Nomogram

$$\text{Revised Baux Score} = \text{Age (years)} + \text{TBSA (\%)} + 17 \text{ (if inhalation syndrome)}$$

Fig. 2 – Nomogram for the Revised Baux Score for mortality following burns.

Williams, D. J., & Walker, J. D. (2015). A nomogram for calculation of the Revised Baux Score. *Burns*, 41(1), 85–90.

BAUXr SCORE

$$\text{TBSA} + \text{Age} + 17 \text{ (if inhalation syndrome)}$$

Burn Triage Guidelines

(Adapted from the EBA MBCI report version 1 February 2017)

The following guidelines for secondary triage are provided to help B-Teams prioritize patient transfer in case of an MBCI with activation of the corresponding Nordic or European plans. They are not a substitute to clinical judgement of B-Team members. Assessments by B-Teams will lead to transport priorities in a three-step-ladder.

STEP 1 – Assess Probability of Survival

Following three criteria, total body surface area (TBSA) burned, associated inhalation injury, and patient age, patients are sorted in 6 groups (tables given in appendix 1):

Outpatients

Victims who do not usually require specialized in-hospital care

Very high

Victims with very high probability of survival

High

Victims with high probability of survival

Medium

Victims with medium probability of survival

Low

Victims with low probability of survival

Expectant

Victims with an expected very high mortality, indicating that specialized care is futile

STEP 2 – Assign Transfer Priority Level

According to adequacy of international help in regard to local needs.

	No international saturation (Resources available)	International saturation (Limited resources available)
Probability of survival	Priority level	
Outpatient	No EVAC	No EVAC
Very high	3	3
High	2	2
Medium	1	1
Low	1	4
Expectant	No EVAC	No EVAC

STEP 3 – Reassessment of Completed Triage

Reassessment is mandated if the situation evolves, especially regarding offer of international help in the form of available beds in burn centers or MEDEVAC capability.

Rationale

These guidelines are inspired from the primary triage table designed by Saffle et al. in 2005[18] and adopted by the ABA for its Incident plan[19], with inclusion of the refinements proposed by Taylor et al. in 2014 [14].

They are based on the following elements.

1. **B-Teams under European MBCI plan will perform secondary triage after H24 post-event.** Triage tables by Saffle [18] and Taylor[14] were designed for primary triage, performed inside the US territory before H24, hence necessary adaptations.
2. **Only patients likely to benefit from specialized care should be transferred,** hence the recommendation not to transfer patients without treatment difficulty («outpatients»), or patients bound to die of their injuries («expectant»).
3. **The higher the complexity of patient condition, the bigger the potential benefit** of early optimal treatment, hence the recommendation to give the highest priority to the evacuation of the most severe patients.
4. **If even international help does not meet local needs, proper allocation** of available resources demands more stringent patient selection, hence the recommendation that patients with the lowest probability of survival («low») be assigned to lower priority level (P4).
5. **Initial triage should be minimally disrupted** by evolutions of the logistical situation, hence the recommendation to always assign the same priority level to the «very high», «high» and «medium» classes, and to modify priority level only for patients with the heaviest care load for the most uncertain success («low»).

Finally, all triage systems have limitations, and this one is no exception, with the main one being the absence of consideration for associated traumatic injuries. Classical military or civilian triage rules for mass trauma casualties can be better suited if a majority of patients have associated trauma and burns.

Triage tables: Survival probability

TRIAGE TABLE (patients without inhalation injury)

Age (yr)	Body surface area burned (%TBSA)									
	0-9,9	10-19,9	20-29,9	30-39,9	40-49,9	50-59,9	60-69,9	70-79,9	80-89,9	90-100
0-1,99	Very high	Very high	High	High	High	High	Medium	Medium	Medium	Medium
2-4,99	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Medium
5-19,9	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Low
20-29,9	Outpatient	Very high	High	High	High	Medium	Medium	Medium	Medium	Low
30-39,9	Outpatient	Very high	High	High	High	Medium	Medium	Low	Low	Expectant
40-49,9	Outpatient	Very high	High	High	High	Medium	Medium	Low	Low	Expectant
50-59,9	Outpatient	Very high	High	High	Medium	Low	Low	Expectant	Expectant	Expectant
60-69,9	Very high	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant
≥ 70	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant

TRIAGE TABLE (patients WITH INHALATION INJURY)

Age (yr)	Body surface area burned (%TBSA)									
	0-9,9	10-19,9	20-29,9	30-39,9	40-49,9	50-59,9	60-69,9	70-79,9	80-89,9	90-100
0-1,99	High	Medium	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant
2-4,99	High	High	High	High	High	Medium	Medium	Medium	Low	Low
5-19,9	High	High	High	High	Medium	Medium	Medium	Medium	Low	Low
20-29,9	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
30-39,9	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
40-49,9	Very high	High	Medium	Medium	Medium	Low	Low	Low	Low	Expectant
50-59,9	High	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69,9	Medium	Medium	Medium	Low	Low	Low	Expectant	Expectant	Expectant	Expectant
≥ 70	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant	Expectant

Adapted from : Taylor S et al., J Burn Care Res 2014 ; 35(1) : 41-45

Appendix 1 – European MBCI Burn Assessment Template (full size version)

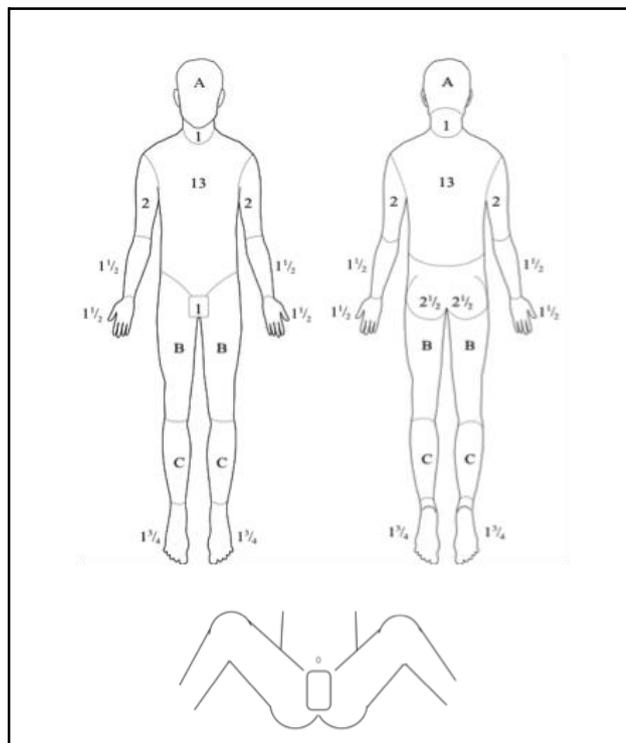
**Next two pages are front and back of the
suggested template for B-team assessments**



BURN TRIAGE

DATE OF ASSESSMENT:
POST BURN DAY:

WOUND MANAGEMENT	
AGE	
WEIGHT	ADMISSION CURRENT
TBSA BURNED	
TBSA DEEP BURNED	
ASSOCIATED TRAUMA	CHEST ABDOMINAL HEAD LIMBS OTHER:
ESCHAROTOMY	YES NO NEEDED
SURGERY NEEDED	EXCISION YES NO GRAFTING YES NO OTHER YES NO
TYPE OF DRESSING	
BAUXr SCORE	
ABSI SCORE	



Sketch burns, surgery, trauma, drains and tubes

PEDIATRIC	ADULT
-----------	-------

PATIENT ID
NAME
LASTNAME
BIRTH DATE
SEX

GENERAL STATUS	
SMOKE INHALATION	YES NO
INFECTION	SKIN LUNG BLOOD OTHER
ANTIBIOTICS	
RESPIRATORY	VENTILATED YES NO TRACHEAL TUBE ETT TRACHEOST NONE FIO2/PEEP V _i / RR PIP / PFR SpO ₂
CIRCULATION	PULSE BLOOD PRESSURE VASOPRESSORS YES NO AGENT/DOSE
NEUROLOGICAL	INITIAL A V P U CURRENT A V P U SEDATED YES NO
KIDNEY	URINARY OUTPUT Creatinine clearance Creatinine/urea RRT Hemofiltration Hemodialysis NO
COMORBIDITIES	YES NO
ALLERGY	
MEDICINES	
PAST MEDICAL HISTORY	
LAST MEAL	
EVENTS	

TRANSPORTATION	NOT NEEDED	NEEDED	FUTILE
FIT FOR TRANSPORTATION	YES	NO	REEVALUATION
EN ROUTE CARE	CRITICAL		STANDARD
DESTINATION	ICU	MEDIUM CARE	SURGICAL WARD
PRIORITY LEVEL	1	2	3 4

Abbreviated burn severity index

Variable	Patient Characteristic	Score
Sex	Female	1
	Male	0
Age in years	0-20	1
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	61-80	4
	81-100	5
Inhalation injury		1
Full thickness burn		1
Total body surface area burned (%)	1-10	1
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	21-30	3
	31-40	4
	41-50	5
	51-60	6
	61-70	7
	71-80	8
	81-90	9
	91-100	10
Total Burn Score	Threat to Life	Probability of Survival (%)
2-3	Very low	≥ 99
4-5	Moderate	98
6-7	Moderately severe	80-90
8-9	Serious	50-70
10-11	Severe	20-40
12-13	Maximum	≤ 10

Tobiasen, J., Hiebert, J. M., & Edlich, R. F. (1982). The abbreviated burn severity index. *Annals of Emergency Medicine*, 11(5), 260–262.

Revised Baux Score Nomogram

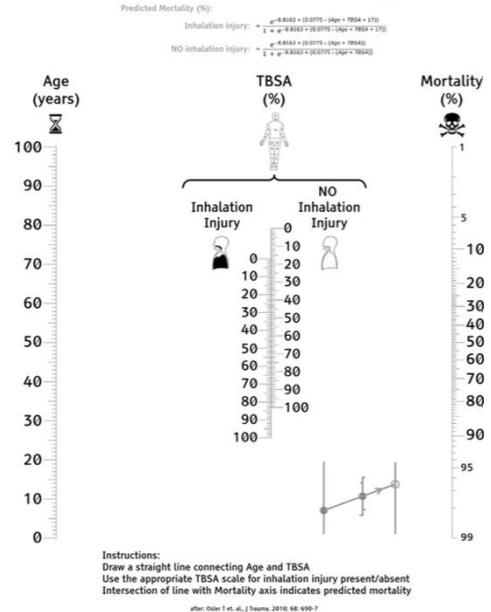


Fig. 2 – Nomogram for the Revised Baux Score for mortality following burns.

Williams, D. J., & Walker, J. D. (2015). A nomogram for calculation of the Revised Baux Score. *Burns*, 41(1), 85–90.

BAUXr SCORE

TBSA + Age + 17 (if inhalation syndrome)

Appendix 2 – Triage guide (field version)

**Next two pages are front and back of a
suggested laminated guide sheet for
convenient on-site use by B-teams**

Mass burn casualty disaster (MBCD) triage guidelines

The following guidelines for secondary triage are provided to help B-teams prioritize patient transfer in case of a MBCD with activation of the corresponding EU plan.

They are not a substitute to clinical judgement of B-team members.

STEP 1 : ASSESS PATIENT PROBABILITY OF SURVIVAL

Following three criteria, total body surface area (TBSA) burned, association of inhalation injury, and patient age, patients are sorted in 6 groups (tables given in the appendix) :

- « **Outpatients** » are those who do not usually require specialized in-hospital care.
- « **Very high** », « **high** », « **medium** » and « **low** » denote patients with the according probability of survival until discharge from burn center.
- « **Expectant** » denotes patients with such high mortality that specialized care is futile.

STEP 2 : ASSIGN PRIORITY LEVEL

According to adequacy of international help to local needs.

	No international saturation (Resources available)	International saturation (Limited resources available)
Probability of survival	Priority level	
Outpatient	No EVAC	No EVAC
Very high	3	3
High	2	2
Medium	1	1
Low	1	4
Expectant	No EVAC	No EVAC

STEP 3 : REASSESS WHEN TRIAGE IS COMPLETED

Reassessment is mandated if the situation evolves, especially regarding offer of international help in the form of available beds in burn centres or MEDEVAC capability.

Triage tables: Survival probability

TRIAGE TABLE (patients without inhalation injury)

Age (yr)	Body surface area burned (%TBSA)									
	0-9,9	10-19,9	20-29,9	30-39,9	40-49,9	50-59,9	60-69,9	70-79,9	80-89,9	90-100
0-1,99	Very high	Very high	High	High	High	High	Medium	Medium	Medium	Medium
2-4,99	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Medium
5-19,9	Outpatient	Very high	High	High	High	High	High	Medium	Medium	Low
20-29,9	Outpatient	Very high	High	High	High	Medium	Medium	Medium	Medium	Low
30-39,9	Outpatient	Very high	High	High	High	Medium	Medium	Low	Low	Expectant
40-49,9	Outpatient	Very high	High	High	High	Medium	Medium	Low	Low	Expectant
50-59,9	Outpatient	Very high	High	High	High	Low	Low	Expectant	Expectant	Expectant
60-69,9	Very high	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant
≥ 70	High	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant

TRIAGE TABLE (patients WITH INHALATION INJURY)

Age (yr)	Body surface area burned (%TBSA)									
	0-9,9	10-19,9	20-29,9	30-39,9	40-49,9	50-59,9	60-69,9	70-79,9	80-89,9	90-100
0-1,99	High	Medium	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant
2-4,99	High	High	High	High	High	Medium	Medium	Medium	Low	Low
5-19,9	High	High	High	High	Medium	Medium	Medium	Medium	Low	Low
20-29,9	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
30-39,9	Very high	High	High	Medium	Medium	Medium	Medium	Low	Low	Expectant
40-49,9	Very high	High	Medium	Medium	Medium	Low	Low	Low	Low	Expectant
50-59,9	High	Medium	Medium	Medium	Medium	Low	Low	Expectant	Expectant	Expectant
60-69,9	Medium	Medium	Medium	Low	Low	Low	Expectant	Expectant	Expectant	Expectant
≥ 70	Medium	Medium	Low	Low	Expectant	Expectant	Expectant	Expectant	Expectant	Expectant

Adapted from : Taylor S et al., J Burn Care Res 2014 ; 35(1) : 41-45

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Nordic Mass Burn Casualty Incident Response Plan

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Utgitt av

Helsedirektoratet

Postadresse

Pb 220 Skøyen, 0213 Oslo,

Besøksadresse

Vitaminveien 4 , Oslo

Telefon 810 20 050

Faks 24 16 30 01

Heftet kan bestilles hos

Helsedirektoratet

v/ Trykksaksekspedisjonen

e-post trykksak@helsedir.no

Telefon 24 16 33 68

Faks 24 16 33 69

Ved bestilling, oppgi bestillingsnummer:

IS-2793

www.helsedirektoratet.no