College van geneesheer-specialisten in de urgentiegeneeskunde[1] (M.B. dd. 10.06.99)

Collège des Médecins Spécialistes en Soins d'Urgence (A.M. du 10.06.99)

VERSLAG VAN DE ACTIVITEITEN VAN HET COLLEGE KWALITEIT URGENTIEGENEESKUNDE 2008

Het college kwaliteit urgentiegeneeskunde vergaderde 6 maal in plenaire zitting tijdens 2008.
De verslagen vindt U in bijlage 1.
De activiteiten spitsen zich vooral toe op de MUG-registratie projecten.

1. Analyse van de rapporten MUG-reg
   Op vraag van de heer Decoster van de FOD volksgezondheid werden de resultaten van de MUG-registratie besproken. Zoals bekend zegde het college zijn medewerking toe om via een afgevaardigde te zetelen in elk van de vijf pathologie-groepen (quintet pathologie). Tijdens de zitting van 1 september werden de resultaten overlopen samen met de heer Luc Van Camp en dr. Agnes Meulemans, expert van het college en belast met de analyse van de MUG-reg door de FOD.
   Er wordt in het algemeen vastgesteld dat het niet steeds eenvoudig is om relevante vraagstellingen te kunnen formuleren die een antwoord kunnen krijgen via analyse van de databanken. De registratiegegevens blijven beschrijvend en een doorgedreven statistische analyse met vraagstellingen zijn niet altijd eenvoudig te beantwoorden. Er is immers geen vergelijkingsgroep, ook de volledigheid van de gegevens en de betrouwbaarheid is niet altijd evident. Het gaat dus niet op om wetenschappelijk onderzoek te proberen uitvoeren op deze databases.
   Er wordt afgesproken dat de heer Luc Van Camp de werkgroepen terug zal contacteren en hierbij aandringen op het stellen van concrete vragen. Er wordt bijvoorbeeld gedacht aan een soort bench marking voor bvb. de opvolging van de behandeling van het acute coronaire syndroom waarbij men de vraag kan stellen in hoeverre PTCA bvb. 's nachts en in de weekenddagen zich verhoudt t.o.v. fibrinolyse in de verschillende centra waar de patiënten met de MUG naartoe worden gebracht.

2. Studie in verband met de middelen en aanpak voor acute intoxicaties door de MUG
   Voortbouwend op de MUG-reg i.v.m. acute intoxicaties heeft het college kwaliteit, en meer bepaald prof. Philippe Lheureux die zich hier speciaal op toelegde, zich geïnteresseerd voor de concrete vraag welke kwaliteit geleverd werd door de MUG-diensten in verband met de opvang van acute intoxicaties.
   Meer bepaald werd hiervoor een specifieke enquête opgesteld waarbij o.a. vragen gesteld werden i.v.m. de aanwezigheid van antidoten en hun dosering, de aanpak van koolstof-monoxide intoxicaties i.v.m. het beleid voor toediening van hyperbare zuurstof in daartoe ingerichte centra en het beleid van de MUG-diensten in geval van psychiatrische problemen als oorzaak van acute auto-intoxicaties.

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[1] Buylaert Walter (voorzitter a.i.), de Soir Ria (voorzitter), *D'Orio Vincent (exp.)*, Gillet Jean-Bernard, Hachimi Idrissi Said, Lheureux Philippe (secretaris), *Meulemans Agnes (exp.), Stamatakis Lambert (exp.), Stroobants Jan (exp.)*, Vergnion Michel, Vroonen Marie-Christine (adjunct-secretaris).

Het formulier dat hiervoor gebruikt werd en met een bijgeleidend schrijven werd opgestuurd is weergegeven in bijlage 2. Het formulier werd rondgestuurd zowel naar de hoofdgeneesheer van de ziekenhuizen als naar de diensthoofden van de spoedgevallen-diensten met een MUG-functie. Aanvankelijk was het aantal antwoorden beperkt en werd een herinneringsbrief gestuurd. Een aantal fouten berustend op een verkeerd nummer van de MUG-diensten werden eruit gehaald.

De resultaten van de enquête werden verwerkt door prof. Lheureux en voorgesteld op de vergaderingen van het college. Interpretaties werden er door de leden aan toegevoegd. Uiteindelijk werd een finaal rapport in het Engels (bijlage 3) opgesteld dat voor een laatste controle circuleerde bij de leden. Dit rapport zal aan de diverse deelnemende centra worden bezorgd. Ook zal voor de centra die dit wensten een individuele feedback gegeven worden naar de centra i.v.m. hun antwoorden. Dit steeds met absoluut respect voor de confidentialiteit van de gegevens.
We mogen stellen dat door deze enquête en met het opstellen van dit rapport een kwaliteitsbewaking gebeurde van de MUG-diensten en dit met een goede response rate. Het is de bedoeling en ook de afspraak om dezelfde enquête binnen enkele jaren te herhalen en dan na te gaan of er hierdoor een verbetering is opgetreden.

3. Ministerieel besluit i.v.m. de DIR-MED en het document i.v.m. de de noodplanning
Door de heer Van Hoegaerden werd gevraagd naar het advies van het college ivm het KB over de DIR-MED dit in het kader van de problemen die rijzen in de verschillende provincies om de wachten rond te krijgen. Ook werd een lijvig document in het algemeen i.v.m. noodplanning opgestuurd ter beoordeling. Door de individuele leden van het college werden verschillende opmerkingen gemaakt en deze werden gebundeld door prof. Vincent d'Orio. Deze zullen in het jaar 2009 onder een synthesevorm bezorgd worden aan het FOD.

4. Studie bij kinderen opgenomen na ernstig trauma in Vlaanderen
Dr. Patrick Van de Voorde stelde zijn PENTA-studie voor die in 2008 in samenwerking met een groot aantal Vlaamse ziekenhuizen werd uitgevoerd. Hierin werd de kwaliteit bekeken van de opvang van ernstige trauma's. Hieruit kunnen heel wat verbeterpunten naar voor gebracht worden. De reden voor het voorstellen van de studie op het college kwaliteit urgentiegeneeskunde is dat de urgentieartsen die de wachtdiensten verzekeren hier een cruciale rol kunnen spelen. Na de voorstelling en de constructieve gedachten-wisseling werd gevraagd aan dr. Van de Voorde om een document op te stellen met voorstellen voor concrete verbetering bvb. in verband met opleiding artsen-specialisten. Dit document zal dan door het college bestudeerd worden en kan een nuttig instrument zijn voor het voeren van een beleid ter zake door de overheid.

5. Niet-invasieve beademing
Het college wijdde een studie aan het gebruik van niet-invasieve ventilatie. Dit is een techniek die zijn plaats heeft bij bepaalde patiënten met respiratoire insufficiëntie. Hiervoor werd dr. Frédéric Thys uitgenodigd om een voordracht te komen geven. Probleem is dat de techniek nog niet wordt terugbetaald en het college steunt de logische vraag voor terugbetaling.

6. UREG

Het college werd op de hoogte gehouden van de vorderingen van de registratie in het kader van UREG. Er werd van gedachten gewisseld over de mogelijke items die nuttig zouden kunnen zijn voor analyse door het college kwaliteit urgentiegeneeskunde zodra de registratie op punt staat.

7. Verdere planning onderwerpen voor 2009

Er werd reeds een selectie gemaakt van onderwerpen die zouden bestudeerd worden in 2009.

Hierbij was er vooral interesse voor de kwaliteit van de opvang van met alcohol gerelateerde problemen op een spoedgevallendienst, alsook voor het probleem van ontslag op tegenadvies. Prof. Ph. Lheureux verrichtte studiewerk als voorbereiding voor deze onderwerpen.

Verslag opgemaakt door prof. dr. Walter Buylaert, voorzitter a.i.

Bijlage 2

College van geneesheer-specialisten in de urgentiegeneeskunde[1] (M.B. dd. 10.06.99)

Collège des Médecins Spécialistes en Soins d'Urgence (A.M. du 10.06.99)

Gent, 9 juli 2008

Aan de artsen verantwoordelijk voor de MUG-centra
Cc: aan de hoofdgeneesheren van de ziekenhuizen met MUG-centra

Geachte collega's,

In het kader van het project "MUG-registratie" heeft de FOD volksgezondheid, veiligheid van de voedselketen en leefmilieu besloten om de pathologiegroep 'acute intoxicaties' op te nemen in de analyse van de registratie van de MUG-gegevens zoals die tot op heden gebeurde. Hieruit is gebleken dat het gebrek aan specifieke items die karakteristiek zijn voor deze pathologiegroep het moeilijk maakten om een nauwkeurig beeld te krijgen van de zorgverlening in de prehospitaal fase bij deze patiënten .

Bijgevolg werd door de overheid een opdracht gegeven aan het College van geneesheer-specialisten in de urgentiegeneeskunde om een enquête uit te voeren over de klinische praktijk . De coördinatie hiervan zal gebeuren door Prof. dr. Philippe Lheureux, die auteur was van het hogervermeld rapport over de totnogtoe geregistreerde MUG-gegevens over acute intoxicaties. Het college heeft hiervoor volgende werkwijze vooropgesteld:

- een enquête over de klinische praktijkvoering (zie bijlage 1) bij alle MUG-centra[2] .
- analyse van de bekomen gegevens.
- feed-back van de globale (geanonimiseerde) gegevens naar alle MUG-centra. Een gepersonaliseerde feedback kan op vrijwillige basis worden aangevraagd en dient vermeld op het einde van het enquête-formulier.
- voorstel van richtlijnen die zullen opgemaakt worden op basis van literatuurgegevens en waarbij een samenwerking beoogd wordt met de wetenschappelijke verenigingen (BeSEDiM, BLT) en met het federaal antigifcentrum.

.../...

[1] Buylaert Walter (voorzitter a.i.), de Soir Ria (voorzitter), *D'Orio Vincent (exp.)*, Gillet Jean-Bernard, Hachimi Idrissi Said, Lheureux Philippe (secretaris), *Meulemans Agnes (exp.), Stamatakis Lambert (exp.), Stroobants Jan (exp.),* Vergnion Michel, Vroonen Marie-Christine (adjunct-secretaris).

[2] We willen terloops opmerken dat de deelneming aan deze enquête een wettelijke verplichting is in het kader van de erkenning van de dienst.

.../...

- wijziging van het MUG-registratieformulier om het volgen van de richtlijnen te kunnen documenteren en vervolgens het uitvoeren van een nieuwe enquête.

De vragenlijsten van de eerste enquête dienen zorgvuldig ingevuld teruggestuurd te worden met de ingesloten gefrankeerde omslag ten laatste op 15 augustus naar het volgende adres:

Prof. Philippe Lheureux
c/o Secrétariat du Services des Urgences-CUB Hôpital Erasme
808, route de Lennik
1070 Bruxelles

We danken U bij voorbaat voor de medewerking en verblijven

Met de meeste hoogachting,

Namens het college,

Prof. dr. Walter Buylaert
Voorzitter ad interim

Dr. Ria de Soir
Voorzitter

STUDIE MUG-REG
PATHOLOGIEGROEP "INTOXICATIES"

Gegevensverzameling in de Belgische MUG-centra inzake de klinische praktijk

Nr MUG-centrum: .....

1. Gebruik van actieve kool prehospitaal:

- Actieve kool is ter beschikking in de MUG O JA O NEEN
- Zo ja, wordt deze gebruikt: O dikwijls O soms O zelden O nooit
- Indien **neen**, **zelden** of **nooit** hierboven werden aangeduid, welke is de reden (kruisje plaatsen, meerdere antwoorden mogelijk in de eerste kolom, één enkele hoofdreden in de tweede kolom):

	Reden	**Hoofdreden**
Er is geen specifiek gestandaardiseerd protocol voor prehospitaalzorg		
Ik ben niet overtuigd van het klinisch nut inzake evolutie of prognose		
De tussenkomst van de MUG is te traag om enig nut te bekomen		
De tijd van transfer naar het ziekenhuis is te kort en het nut te verwaarlozen inzake tijdwinst		
De duur van de MUG interventie wordt verlengd en de opname in het ziekenhuis vertraagd.		
Ik vrees het risico op complicaties te verhogen, meer bepaald op aspiratie.		
Ik vrees braken uit te lokken tijdens het transport. De tijd nodig om de ziekenwagen te reinigen zou de beschikbaarheid ervan verminderen.		
De bemanningsleden zijn onvoldoende getraind om adequaat indicaties te stellen en tegenindicaties af te wegen.		
In elk geval zijn de patiënten terughoudend voor deze behandeling.		

- Zou u het gebruik van actieve kool in de prehospitaalfase overwegen indien specifieke aanbevelingen zouden bestaan? O JA O NEEN
- Denkt u dat een specifiek opleidingsprogramma op dit vlak noodzakelijk is? O JA O NEEN

2. Beschikbaarheid van specifieke antidota in de MUG

Over welke onderstaande antidota kan u **permanent** beschikken in de MUG-wagen.
Preciseer de aanwezige hoeveelheid (in gewogen massa en niet in aantal ampullen).

	Kruisje zetten indien het antidotum beschikbaar is in de MUG	**Aanwezige hoeveelheid (gewogen)**
Naloxone		
Flumazenil		
Atropine		
Pralidoxime		
Obidoxime		
Fab - antidigoxine		
NaBicarbonaat		
CaChloraat		
CaGluconaat		
Ethanol		
Fomepizole		
Hydroxocobalamine		
Amylnitriet		
NaNitriet		
NaThiosulfaat		
diCobalt EDTA		
Diméthylaminophénol		
Methyleenblauw		
N-acetylcysteine		
Hypertoon Glucose		
Glucagon		
Octréotide		
Phytomenadione		
PPSB		
Protamine		
Pyridoxine		
Physostigmine		
Zuurstof in hoge concentratie		
Zuurstof + CPAP		

3. Specifieke verwijzing van patiënten

Voor welke situaties in het kader van een intoxicatie zou u een onmiddellijke verwijzing naar een specifiek centrum overwegen, andere dan het "aangewezen dichtstbijzijnde ziekenhuis"?

	ja	**soms**	**neen**
Koolmonoxide intoxicatie met mogelijke indicatie voor hyperbare zuurstoftherapie			
Coma of diepe bewustzijnsdaling			
Respiratoire insufficiëntie waarvoor noodzaak tot geassisteerde ademhaling			
Circulatoire choc die niet reageert op vulling en klassieke vasoactieve behandeling			
Noodzaak tot extracorporele dialyse (hemodialyse, hemoperfusie, hemofiltratie...)			
Zelden voorkomende intoxicaties			
Intoxicaties die een antidotum behoeven dat weinig beschikbaar is of zelden gebruikt wordt			

4. Bijkomende vragen

- Bent U op de hoogte van speciale risicosituaties voor toxiciteit in de zone waar uw MUG operationeel is (industrieel risico, scholen, stockering van toxische produkten, transporten, ...)?
  Heeft U contacten en overeenkomsten met de verantwoordelijken hiervoor om voorbereid te zijn op de hulpverlening bij eventuele ongevallen met deze risicosituaties (verstrekking van informatie, interventie procedures, stockeren van specifieke antidoten...)?

  _____

  _____

  _____

  _____

- Is het personeel betrokken bij MUG-interventies uitgerust met alarm detectoren voor koolstofmonoxide (CO)?

  O Ja O Neen

- Beschikt u over een middel voor bepaling van HbCO in de prehospitaal fase?
  - CO uitgeademd door de patënt O Ja O Neen
  - Gecombineerd met een oxymeter O Ja O Neen

- In geval van een vergiftiging met koolstofmonoxide wordt de interventie door de MUG gevolgd door het in werking stellen van een procedure ter preventie van nieuwe accidenten?
  - O altijd
  - O zo dikwijls mogelijk
  - O soms
  - O meestal niet
  - O nooit

- Welke procedure volgt U in geval een geïntoxiceerde patiënt weigert vervoerd (opgenomen) te worden en er een reëel lichamelijk en/of psychiatrisch gevaar vastgesteld wordt door de MUG-equipe?

  _____

  _____

  _____

  _____

  _____

- Ik wil een gepersonaliseerde feed-back naast de algemene resultaten van de enquête.

  O Ja O Neen

Bijlage 3

federal public service
HEALTH, FOOD CHAIN SAFETY AND ENVIRONMENT

Quality College of Emergency Medicine Physicians

Acute poisoning: Report of the survey about clinical practices in the management of acute poisoning by mobile emergency care units (MECU) in Belgium.

Final report (v4.0): February 13, 2009

Prepared by Philippe E. R. Lheureux, MD, PhD
on behalf of the Quality College of Emergency Medicine Physicians[1]

Address: Department of Emergency Medicine, Acute Poisoning Unit & Mobile Emergency Care Unit
Erasme University Hospital, Brussels
plheureu@ulb.ac.be

[1] Buylaert Walter (président), de Soir Ria (vice-présidente), *D'Orio Vincent (exp.)*, Gillet Jean-Bernard, Hachimi Idrissi Said, Lheureux Philippe (secrétaire), *Marion Eric (exp.), Meulemans Agnes (exp.), Stroobants Jan (exp.),* Vergnion Michel, Vroonen Marie-Christine (adj.-secrétaire).

Background

In a previous report[2], there was an attempt to evaluate the practice of medical emergency care units (MECU) regarding acute poisoning conditions on the basis of the registration of the MECU's activity in Belgium.
It was concluded that the data registered until now were not useful to evaluate the patient's management in this specific field. Therefore, a literature review was conducted, focusing on some specific points:
- Practice of gastrointestinal (GI) tract decontamination in the prehospital setting, especially in the form of activated charcoal administration;
- Antidotes that are usually embarked in the prehospital intervention vehicles and made available at scene for immediate use by the intervention team;
- Certain poisoning conditions that would need to admit the patient in a specific hospital structure for specialized diagnostic or therapeutic procedures.
The conclusions of this literature review are summarized in the previous report mentioned above[2].
The purpose of the present survey is to compare practices of Belgian MECUs with data from the literature, especially if obtained in similar prehospital emergency medical systems.

Methods

At the begining of July 2008, a questionnaire (attachments 1 and 2) was sent to all the 84 Belgian MECU centers, both to the emergency physician in charge of the MECU and to the medical director of the hospital. Questionnaire was in Dutch or in French, according to the regional language, or to the main language of the hospital in Brussels. The questionnaire was elaborated by the Quality College of Emergency Physicians.
Beside questions concerning the topics evoked above, some questions were added about the awareness and preparedness of MECU centres regarding the risk of chemical accidents in the vicinity of their hospital. Some questions were also added regarding the protective equipment of the engaged personnel against carbon monoxide (CO) poisoning, the availability of CO measurements at scene and the procedure used facing incompliant patients who refused to be treated or transported by the MECU.
Filled questionnaires had to be sent back to the reporter before August 15, 2008. As only 60% of responses had been obtained at this time, a second questionnaire was sent to non responding centres in early September, 2008. Filled questionnaires had to be sent back before September 25, 2008. Data collection was closed on September 30, 2008. Results were presented to the College members in October 2008, and a prepared preliminary report was produced for amendment in December 2008.

[2] P. Lheureux : Rapport SMUR-REG : groupe de pathologies « intoxications aiguës », SPF Santé Publique, Environnement et Chaîne alimentaire, Août 2007.

Results

Although participation to such a survey is legally requested for all 84 centers, only 67 centres responded (79,8%). However, 11 responses were additionally received but were not identified either by the number of the MECU center, either by the hospital name. These unidentified responses were excluded from the results.

Use of activated charcoal by MECU

Activated charcoal (AC) is embarked in only 19% of MECU vehicles. Among the centers that have embarked AC, 59.2 % reported using it "sometimes" and 40.9 % reported using it "rarely". None of these centers declared using it "frequently" or "never".
The reason for not having AC available in the prehospital setting or for using AC rarely are presented in table 1 (more than one reason was possible in the first column and only one main reason in the second column).

Table 1 – Motivations for limited use of AC by MECUs

	Reasons	Main reason
There is no specific protocol for use in prehospital care	45.2 %	10.8 %
I am not convinced of the usefulness regarding clinical evolution or outcome	21.4 %	3.5 %
MECU intervention is to late to be of any usefulness	9.0 %	0 %
The transfer delay to the hospital is short and the benefit would be negligible regarding the saved time	92.4 %	76.4 %
The duration of MECU interventions would be prolonged and hospital admission would be delayed	39,7%	0 %
The risk of complications would be increased, especially inhalation	48.6 %	9.1 %
Vomiting could be induced during transport and the cleaning of the ambulance could impair its turnaround time	24.9 %	0 %
The members of the MECU staff have not sufficient skills to adequately evaluate indications and contraindications of activated charcoal	3.1 %	0 %
In any case the patient does not accept this treatment	8.7 %	0 %

Finally, 79.4 % of centres would recommend the use of AC by their MECU if specific recommendations for its use in the prehospital setting are made available in the future. Only 27.1 % of centres think that a specific training is required for using AC by the intervention teams in the prehospital management of the poisoned patient.

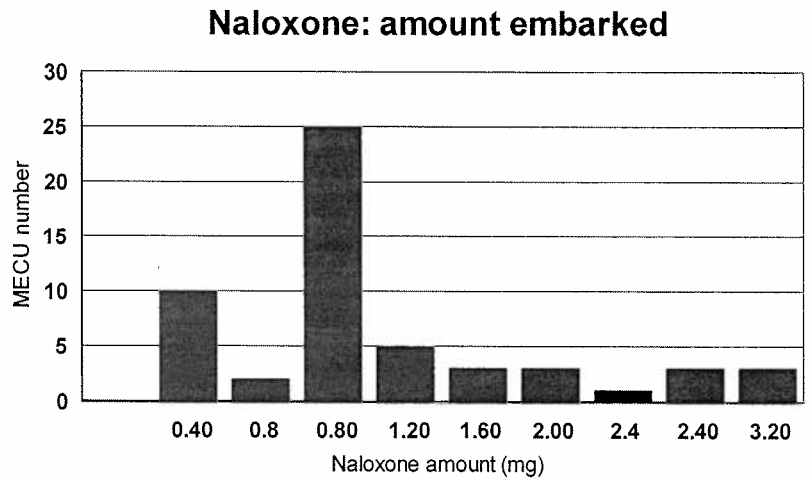
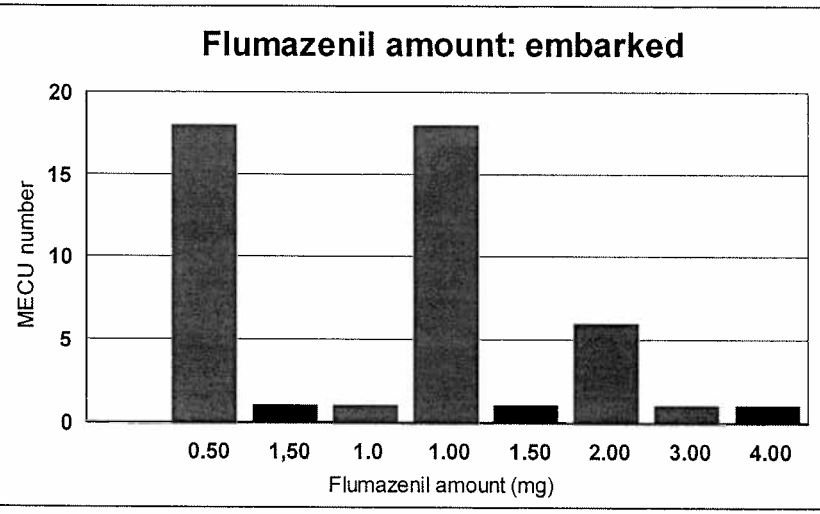
Availability of antidotes

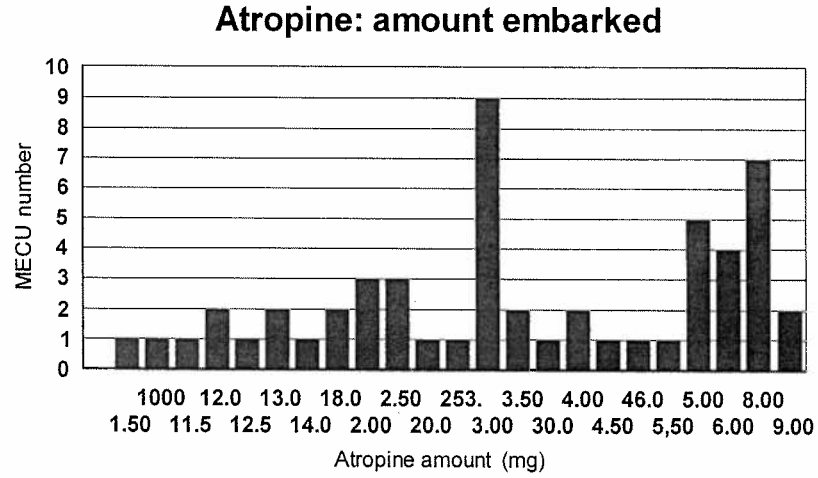
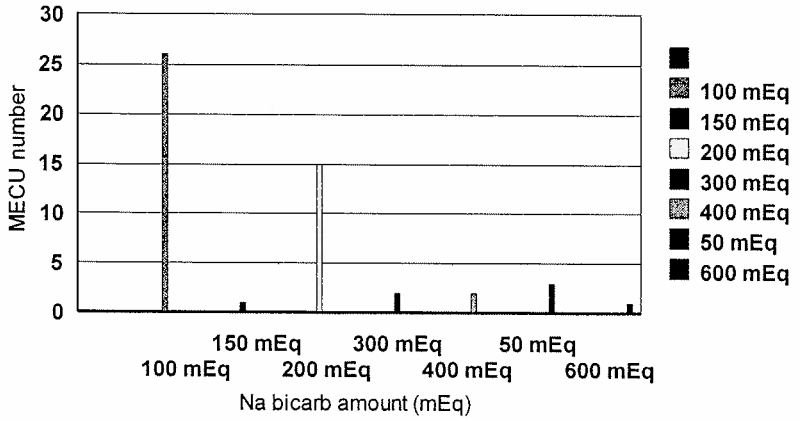
Availability of antidotes is summarized in Table 2.
Note that some centres respond having embarked the antidote without mentioning the amount. This centres are included in the percentage (column 2) but not in the graph (column 3).

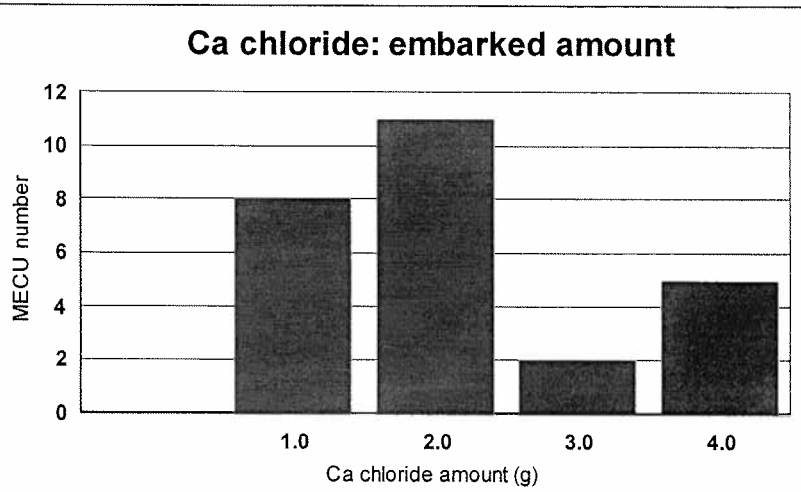
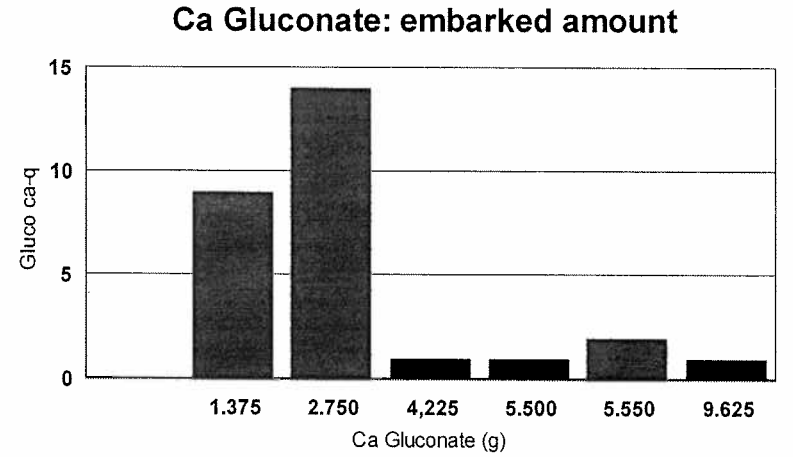
Need for specific treatment centers

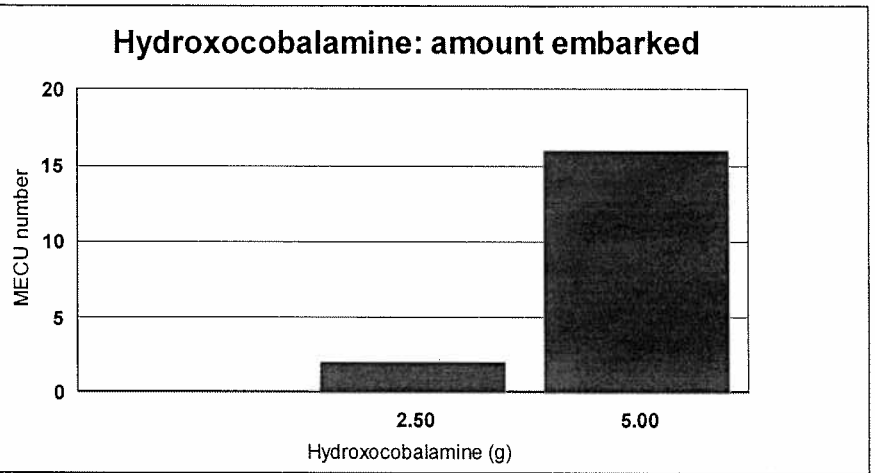
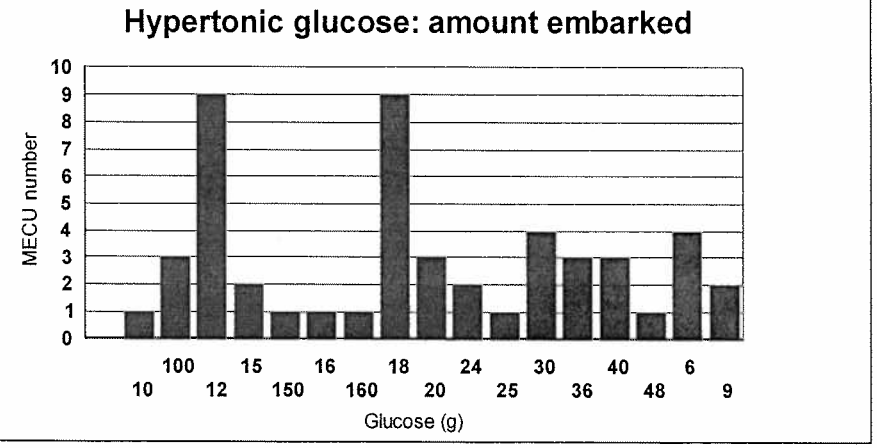
Answers regarding questions about admission of poisoned patients in specific centers, rather than the nearest "specialized emergency service" are summarized in Table 3.

Tables 2 - Embarked antidotes

	Embarked	Amount
Naloxone	95.1 %	
Flumazenil	78.6 %	

Atropine	99.5 %	
Pralidoxime	0 %	
Obidoxime	0 %	
Antidigoxin Fab – fragments	Only 1 centre	
Sodium bicarbonate	93.4 %	

Calcium chloride	47.1 %	
Calcium gluconate	48.2 %	
Ethanol	0 %	
Fomepizole	0 %	

Hydroxocobalamine	26.9 %	
Amyl nitrite	0 %	
Sodium nitrite	0 %	
Sodium thiosulfate	0 %	
EDTA-diCobalt	0 %	
Dimethylaminophenol (4-DMAP)	0 %	
Methylene Blue	2 centres	20 mg
N-acetylcysteine	2 centres	12 and 48 g, respectively
Hypertonic glucose	93.4 %	

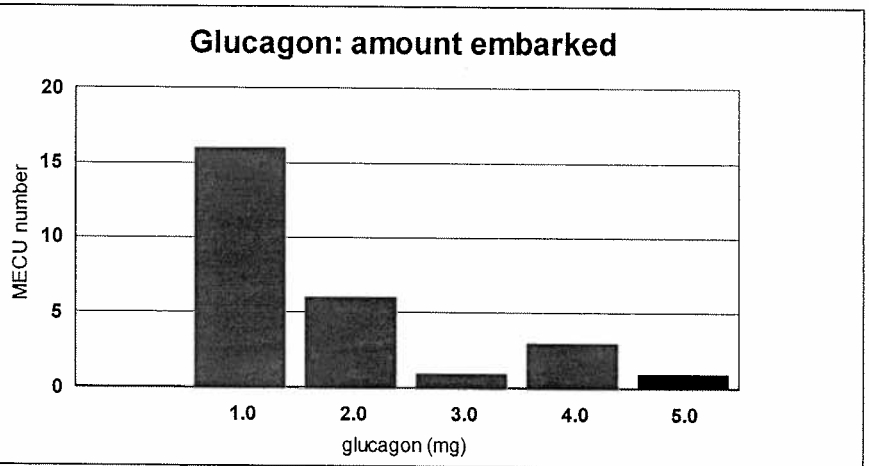
Glucagon	52.7 %	
Octreotide	0 %	
Phytomenadione	Only 1 centre	
PPSB	2 centres	
Protamine	3 centres	
Pyridoxine	Only 1 centre	
Physostigmine	2 centres	
Oxygen in high concentration	98.2 %	
Oxygen + CPAP	54.3 %	

Table 3 - Admission of patients in specific centers, rather than in the nearest "specialized emergency service"

	Yes	Sometimes	No
Carbon monoxide poisoning with possible indication for hyperbaric oxygen therapy	62.3 %	36.0 %	1.7 %
Coma or deep impairment of consciousness	8.6 %	30.2 %	61.2 %
Respiratory failure with need for ventilatory assistance	6.6%	14.5 %	78.9 %
Circulatory shock resistant to fluids and classical vasoactive treatments	14.1 %	28.5 %	57.4 %
Need for extracorporeal elimination (haemodialysis, haemoperfusion, haemofiltration...)	47.6 %	14.2 %	38.2 %
Rare intoxications	27.1 %	44.4 %	28.5 %
Intoxications requiring administration of antidotes with limited availability or unfrequent use	42.7 %	30.1 %	27.2 %

Awareness and preparedness regarding the risk of chemical accidents in the surroundings of the centre

75.4 % of centers confirmed being aware of chemical risks in the surroundings of their hospital. However, only 55.1 % had developed specific contacts or planning to prepare a medical response to an accident. Please note that a response simply referring to the unspecific application of the "Seveso law" was not considered as positive.

Carbon monoxide (CO) poisoning

Personnel equipment included CO detectors in 72.1 % of centers. Devices intended to quantify CO poisoning at scene, either in the form of exhaled air detectors or in the form of oximeters including carboxyhaemoglobin (HbCO) measurement were embarked in 36.1 % and 25.2 %, respectively. Some centers had both devices available. 36 MECUs (54.9 %) have no device available at all for prehospital HbCO evaluation.

After a call for a CO poisoning condition, most centers reported initiating frequently a procedure to prevent a new accident (Table 4). Only clear positive responses were taken into account: for example answers referring to procedures initiated by fire services or police were not considered as positive.

Table 4 – Initiation of a procedure after intervention of the MECU team for CO poisoning

Always	48.9 %
As often as possible	35.3 %
Sometimes	7.1 %
Most often no	7.4 %
Never	1.3 %

Specific procedures for incompliant patients

Responses simply referring to general principles such the need to help endangered people or the law about the right of patients were not considered as positive. As this question was open to free responses, answers were analyzing some "key word" items.

Table 5 – Procedures used by the MECU team regarding incompliant patients

Discussion with the patient	23.1 %
Search for help from family, relatives or family practitioner	15.6 %
Chemical sedation	18.5 %
Call for police intervention	56.9 %
Legally forced hospital admission	38.5 %
Written and signed discharge	13.5 %
No procedure	15.4 %

Discussion and recommendations

Prehospital administration of activated charcoal

Guidelines for the administration of a single dose of activated charcoal as a decontamination procedure of the gastrointestinal tract have been jointly produced by the European Association of Poison Centres and Clinical Toxicologists (EAPCCT) and the American Academy of Clinical Toxicology (AACT) in 1997 and revised in 2004[3]. According to these recommendations:

- Single-dose activated charcoal should not be administered routinely in the management of poisoned patients.
- Based on volunteer studies, the administration of activated charcoal may be considered if a patient has ingested a potentially toxic amount of a poison (which is known to be adsorbed to charcoal) up to one hour previously. Although volunteer studies demonstrate that the reduction of drug absorption decreases to values of questionable clinical importance when charcoal is administered at times greater than one hour, the potential for benefit after one hour cannot be excluded.
- There is no evidence that the administration of activated charcoal improves clinical outcome.
- Unless a patient has an intact or protected airway, the administration of charcoal is contraindicated.

Some contraindications to the administration of AC are also well recognized: caustics, organic acids, hydrocarbons, alcohols and glycols, salts (cyanides, iron, potassium, lithium...), low-risk conditions, previous significant vomiting.
Since their first publication, these recommendations have been endorsed by many emergency departments, although the application by medical and nursing staff may still remain variable.
The value of prehospital administration of a single dose of AC has been widely discussed in the scientific literature.
Karim et al.[4], as well as other authors have reported difficulties in administering AC within the one hour delay according to international guidelines in patients admitted in hospital after toxic ingestion. Even if the ambulance arrives at scene within the hour after ingestion, delays related to transport, triage procedures and medical evaluation, followed by the prescription of AC by the ED physician and administration by the nursing staff are responsible for a significant time loss. Administration of AC in the prehospital phase would thus result in significant time saving and probable better efficacy.

Thakore and Murphy[5] have studied ambulance and emergency department charts of 201 patients admitted after intentional acute poisoning. The mean interval between toxic ingestion and ambulance arrival was 77 minutes, while evaluation by the physician in the hospital only occurred after a mean delay of 140 minutes. In this study, ambulance intervention time was lower than one hour after toxic ingestion for 73 patients, while only

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[3] http://www.clintox.org/Pos_Statements/SingleDoseActivatedCharcoal.pdf

[4] Karim A, Ivatts S, Dargan P, et al. How feasible is it to conform to the European guidelines on the administration of activated charcoal within one hour of an overdose? Emerg Med J 2001;18:390–2.

[5] S Thakore, N Murphy. The potential role of prehospital administration of activated charcoal. Emerg Med J 2002;19:63–5

11 patients were evaluated by the physician within the same interval. Taking indications and contraindications into account, two third of these patients could have received AC in the prehospital phase. The advantage of early administration of AC in the prehospital phase has been emphasized by multiples authors.[6 7 8 9 10]

The retrospective review by Crockett et al.[6] analyzed the ambulance and emergency department charts of patients admitted for acute poisoning in two hospitals during a six month period. After identification of patients who could have received AC in the prehospital setting, it appeared that only 14 patients received it before admission in the emergency department while 22 others received AC after admission. The mean delay of AC administration was 5 min in the first group (1-16, SD 3.86), but 51.4 min in the second group ($p<0.0001$). There was no significant difference between groups regarding the duration of transport or the tolerance of the treatment.

Based on the retrospective analysis of a standardized database, Ibister et al.[9] have shown that the interval between prehospital management and arrival to the hospital is very significant, but that risks (especially respiratory complications) related to the inappropriate administration of AC in low risk ingestion (i.e. sedatives) must also be taken into account. The conclusion of the authors was that efforts and expenses needed to implement the use of AC in prehospital care would be disproportionate, regarding the limited number of patients who would have an actual benefit from prehospital administration of AC. Such a conclusion could not be applicable in Belgium because personnel involved in the MECU teams are usually the same than personnel working in emergency departments. These professionals are very familiar with indications, contraindications and practical procedure related to the use of AC, as they use it on an everyday base. There is also no need for recommendations that would be more specific of the prehospital setting. It is significant to observe that a wide majority of the responders to the present survey think that a specific training would not be required to implement the use of AC in prehospital care in our country. In the United-Kingdom, prehospital administration of AC has been implemented in the management protocols for NHS ambulance crews. Greene et al.[11] have evaluated the attitude of ambulance crews regarding these recommendations through a postal questionnaire (92 % response). Actually no ambulance service used AC in the prehospital phase. Reasons evoked for not observing the protocols are various: lack of scientific data demonstrating the clinical benefit, lack of specific protocol for prehospital use, fear of potential complications, time loss in the turnaround time of ambulances (more time at scene, time

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[6] Crockett R, Krishel SJ, Manoguerra A, et al. Prehospital use of activated charcoal: a pilot study. J Emerg Med 1996;14:335–8.

[7] Allison TB, Gough JE, Brown LH, et al. Potential time savings by prehospital administration of activated charcoal. Prehosp Emerg Care 1997;1:73–5.

[8] Wax PM, Cobaugh DJ. Prehospital gastrointestinal decontamination of toxic ingestions: A missed opportunity. Am J Emerg Med 1998;16:114–6.

[9] G K Isbister, A H Dawson, I M Whyte. Feasibility of prehospital treatment with activated charcoal: Who could we treat, who should we treat?. Emerg Med J 2003;20:375–8.

[10] Alaspaa AO, Kuisma MJ, Hoppu K, et al. Out of hospital administration of activated charcoal by emergency medical services. Ann Emerg Med 2005;45:207–12

[11] S L Greene, M Kerins, N O'Connor. Prehospital activated charcoal: the way forward. Emerg Med J 2005;22:734–7.

needed for cleansing of the ambulance if the patient vomit), lack of AC availability, lack of financial support, especially for training programs.
In our study, the most frequent main motivation evoked for not using AC in prehospital care is that the transfer delay to the hospital is short and that the benefit would be negligible regarding the saved time. It is however likely that an evaluation similar to Crockett's study[5] would produce similar results in our country.

Recommendation
Prehospital administration of AC should be recommended in the management of acute poisoning by oral ingestion. It is likely to shorten the delay to AC administration and thereby to improve its efficacy of the procedure. Skills of personnel involved in MECU team in Belgium (emergency physicians, emergency and intensive care nurses) theoretically allows them to control perfectly the procedure for administration, and the indications or contraindications of AC which are the same that when AC used in the emergency department. Efforts must however be made to improve knowledge and compliance to international guidelines (like EAPCCT/AACT Position Statements[3]) in both emergency departments and MECU teams. This is all the more true as a promotion for early AC administration by relatives of the patient and on telephone advice of a poison center has been started in some countries. The specific risks related to the use of the AC in the prehospital environment remain however to be evaluated with more precision. This goal could be achieved in the future through an improvement of MECU activity registration.

Antidotes

By definition, antidotes are pharmacological agents that improve the prognosis of poisonings (mortality, morbidity resulting from immediate complications or long term sequelae), or make the management easier. Antidotes are often classified according to their mechanism of action. From a practical standpoint, clinicians have usually more interest in a classification based on availability.
Recommendations regarding availability have been produced by several scientific authorities : WHO (through IPCS, International Program on Chemical Safety)[12], American College of Emergency Physicians[13], British Emergency Medicine Association and Guy's Hospital Toxicology Unit[14] and more recently by a group of French and Belgian experts[15]. None of these guidelines specifically applies to prehospital care. On the other hand, many works have shown that observance of these recommendations by emergency departments or even hospital pharmacies is poor, especially for antidotes

[12] Pronczuk de Garbino J, Haines J, Jacobsen D, Meredith T. Evaluation of antidotes: Activities of the International Programme on Chemical Safety. J Tox Clin Toxicol 1997;35:333-43.

[13] Dart RC, Goldfrank LR, Chyka PA, Lotzer D, Woolf AD, McNally J, Snodgrass WR, Olson KR, Scharman E, Geller RJ, Spyker D, Kraft M, Lipsy R. Combined evidence-based literature analysis and consensus guidelines for stocking of emergency antidotes in the United States. Ann Emerg Med. 2000;36:126-32.

[14] British Association for Emergency Medicine & Guys and St Thomas' Poisons Unit Guideline on Antidote Availability for Accident and Emergency Departments, www.emergencymed.org.uk/.../downloads/cec_antidote_availability_emerg_depts.pdf

[15] Danel V, Tournoud C, Lheureux P, Saviuc P, Hantson P, Baert A, Nisse P. Antidotes. EMC (Elsevier Masson SAS, Paris), Médecine d'urgence, 25-030-A-30, 2007.

that are seldom used, that are expensive or that are difficult to obtain from a regular source.

One of the most complete and recent guidelines are those produced by the BAEM and the Guy's Hospital Toxicology Unit[14]. Antidotes are grouped into 3 categories:

- Immediate availability required within the emergency department ;
- Availability within the hospital (central hospital pharmacy, for example) and that should be obtainable within a maximal 1 to 4 hours delay.
- Antidotes with less urgent indications, that are rarely used and that can be stored in regional hospital centers or poison control centers. Procedures ensuring rapid transport of the antidote in the hospital where the patient has been admitted or transfer of the patient in a specialized treatment center should be planned. For several poisoning conditions, transfer in a specialized unit is highly recommended.

These guidelines also provide information regarding amounts of antidotes required to treat a « mean adult » during the first 24 hours to help hospitals in determining the useful storage according to the local epidemiology.

In any case, it seems reasonable to consider that antidotes that should be embarked in the MECU vehicles consist of a subset of those that are considered for immediate availability in the emergency department.

The list should be adapted according to several criteria:

- Their potential lifesaving value, and the absence of alternative, at least temporary measures that would allow to delay antidote administration;
- The distance and time for transport to hospital ;
- The frequency of use of the agent, or the probability of its use:
    - Local incidence of poisonings requiring administration of the antidote;
    - Local or regional industrial activities that could be associated with a risk of poisoning.
- Ad hoc conditions for storage and shelf life of the agent (it must be taken into account that MECU vehicle can be exposed to large variations of ambient temperature);
- Costs, including those resulting from discarding unused and outdated products;
- Particular risks of multiple casualties (chemical accident, terrorist attack) must also be evaluated: need for treatment at scene, strategic storage...

In France, certain specific recommendations have been produced for MECUs in 1997[16]. Agents with recommended availability in MECU may be classified into 2 groups:

- group 1 includes agents that are frequently used in the management of poisonings, but that are not true antidotes or that have many other indications : their availability should not be a specific problem in the management of acute intoxications. This group includes adrenaline, atropine, dobutamine, hypertonic glucose, calcium gluconate or chloride, isoprenaline, propranolol, glucagon. However, it must be mentioned that the amount required in the treatment of a poisoning case may be much larger than classical doses. Typical examples are atropine in the treatment of anticholinesterase or glucagon in poisonings involving betablockers or calcium channel blockers, as well as calcium gluconate use for decontamination of chemical burns due to hydrofluoric acid. In our survey for example, only 1/3 of centers had embarked sufficient amount of atropine to safely treat one poisoned patient during the first 15 – 20 min (doses as high as 8 to 10 mg may be required). The initial antidotal dose of glucagon is 5 mg in

[16] Petit P. Antidotes, antagonistes et épuration des toxiques en préhospitalier. 7ème Symposium de Réanimation Préhospitalière de Montluçon, Rev. SAMU:1997:61-7.

adults. Only one of the Belgian MECU has such a dose embarked in its vehicle. Surprinsingly, a small proportion of MECU center declare not transporting hypertonic glucose, sodium bicarbonate, calcium salts or even oxygen!
- Group 2 includes substances that are exclusively used as antidotes: naloxone, flumazenil, hydroxocobalamine, thiosulfate.
- AC is also included in these recommendations.

In any case, a study by Lapostolle et al.[17] evaluating the practices in 102 MECU in France in 2001, has shown the poor observance of these recommendations.

Another potential approach consists of analyzing which antidotes are actually used in the MECU daily practice. As the use of these agents is not included in the MECU registration, no data are available in Belgium. Three studies have been conducted in France[18 19 20], in an prehospital emergency medical help system roughly similar to the Belgian MECUs. They suggest that antidotes are used in about 10% of MECU interventions. The most frequently used agents are hypertonic glucose, naloxone, flumazenil, sodium bicarbonate or lactate, hydroxocobalamine, and oxygen. The prehospital use of other agents such as atropine, glucagon, Fab antidigoxin fragments, fomepizole or ethanol, adrenaline/diazepam (protocol for early management of chloroquine poisoning) or N-acetylcysteine remains anecdotal.

Recommendation

Based on all these data, it seems reasonable to recommend embarking at least the following agents in MECU vehicles:

- *oxygen (early application of a continuous positive pressure by a Boussignac system for example may be useful in smoke inhalation injuries);*
- *hypertonic glucose: correction of hypoglycaemia in insulin or oral antidiabetic agents overdosage;*
- *naloxone: opiate and opioid poisoning, diagnostic value, improvement of consciousness and respiratory depression;*
- *flumazenil: benzodiazepine overdosage, diagnostic value. Benzodiazepine poisoning is rarely a life threatening condition. The frequency of these intoxications could however justify the presence of this antidote in MECU vehicle, although the actual indications for its use are very limited.*
- *hydroxocobalamine : cyanide poisoning, especially in the context of exposure to smoke in fires. The set up of a strategic storage must be considered to be able to treat multiple victims. Although much more expensive than other antidotal approaches (methemoglobin inducers, EDTA dicobalt), hydroxocobalamine is undoubtfully easier to use in the prehospital setting and has the safest profile. The use of methemoglobin inducers must especially be avoided when cyanide poisoning results from smoke inhalation, because they markedly impair oxygen*

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[17] Lapostolle F. et al. Disponibilité des antidotes dans l'aide médicale urgente. Presse Med 2001; 30: 159-62.

[18] Dherbecourt V. Indication d'administration des antidotes sur les lieux d'intervention ou pendant les transferts par le SAMU. Thèse Université de Lille, 1993

[19] Lardeur et al. Régulation et prise en charge des intoxications volontaires par un SAMU. Presse Medicale 2001;30:626-30.

[20] Labourel et al. Analyse épidémiologique des intoxications médicamenteuses volontaires aiguës: prise en charge par un SMUR. Rev Med Liège 2006:61:3:185-9.

transport (in victims with possibly associate CO poisoning) and hemodynamic status (hypotension).

- *atropine: rapidly required in the management of intoxications due to anticholinesterase insecticides (organophosphates, carbamates) or by neurotoxic agents (bioterrorist threat). The dose required to treat a patient during the first 20 to 30 minutes is commonly 8-10 mg and may reach 15 mg. The set up of a strategic storage must also be considered for management of multiple casualities. Information about such storage and procedure to mobilize it should be made available for every MECU center.*
- *sodium bicarbonate: treatment of conduction defects, myocardial depression or hypotension in poisonings due to membrane stabilizing agents (blockade of the sodium channel).*

It should be noted that even in the US, the empirical and systematic use of « coma cocktails » consisting of the rapid and sequential injection of various agents (glucose, naloxone, thiamine and sometimes flumazenil) to every unconscious patient is strongly challenged. A more selective use of each agent, in a better understanding of the patient's condition and diagnostic orientations should not be a problem in Belgium, taking into account the high professional skills of personnel engaged in MECU teams.

Specific orientation of patients

The place of hyperbaric oxygen therapy (HBO) for the treatment of carbon monoxide (CO) poisoning was first discussed by Haldane in the 1890s and remains a controversial issue from this time, although mechanisms and potential treatments (mainly HBO versus NBO) for CO poisoning has been an area of active research. CO toxicity was thought initially to result entirely from the relative anemia and hypoxia imposed by the formation of carboxyhemoglobin (COHb)[21]; however, the pathophysiology of CO poisoning is now considered much more complex, involving direct toxicity at the cellular level.[22] It is also known that CO toxicity is not limited to acute functional features but may result in permanent and debilitating lesion known as delayed neurologic sequelae (DNS). The exact cause and incidence of DNS remains elusive as does a precise definition: it usually develops 2 weeks after CO poisoning and is characterized by behavioural and/or neurologic deterioration[23] [24] [25] [26]. A Cochrane review concluded that HBO for CO poisoning is not proven to reduce the incidence of adverse neurologic outcomes[27]. However, there are multiple clinical trials evaluating the use of HBO for CO poisoning[28] [29] [30] [31] [32] [33] [34] and they have yielded conflicting results

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[21] Haldane J. Medicolegal contributions of historical interest. The action of carbonic oxide on man. Forensic Sci. 1972;1:451-483.

[22] Kao LW, Nanagas KA. Carbon monoxide poisoning. Med Clin North Am. 2005;89:1161-1194.

[23] Thom SR, Keim LW. Carbon monoxide poisoning: a review. Epidemiology, pathophysiology, clinical findings, and treatment options including hyperbaric oxygen therapy. J Toxicol Clin Toxicol. 1989;27:141-156.

[24] Min SK. A brain syndrome associated with delayed neuropsychiatric sequelae following acute carbon monoxide intoxication. Acta Psychiatr Scand. 1986;73:80-86.

[25] Choi IS. Delayed neurologic sequelae in carbon monoxide intoxication. Arch Neurol. 1983;40:433-5.

[26] Myers RA, Snyder SK, Emhoff TA. Subacute sequelae of carbon monoxide poisoning. Ann Emerg Med. 1985;14:1163-7.

[27] Juurlink DN, Buckley NA, Stanbrook MB, Isbister GK, Bennett M, McGuigan MA. Hyperbaric oxygen for carbon monoxide poisoning. Cochrane Database Syst Rev. 2005(1):CD002041.

[28] Raphael JC, Elkharrat D, Jars-Guincestre MC, et al. Trial of normobaric and hyperbaric oxygen for acute carbon monoxide intoxication. Lancet. 1989;2:414-9.

which may be explained by significant variations in study design (population studied and outcomes measured) and probably differences in the sources involved in CO poisoning, so that it is it is difficult to draw firm conclusions based on the evidence.
Recently, the American College Emergency Physicians (ACEP) has produced a clinical policy that concluded that HBO is a "therapeutic option" for CO poisoning but that its use "cannot be mandated" at this point given the current data[35]. However, not all experts agree with these conclusions, and it contributes once again to the controversy surrounding this issue[36] [37].
According to the 2004 European Conference Consensus on Hyperbaric Medicine (ECHM)[38] carbon monoxide intoxications must be treated with NBO as a first aid treatment (Type 1 recommendation[39]). HBO is recommended in patients with diagnosed carbon monoxide poisoning when at high risk of immediate or long term complications (Type 1 recommendation).
High risk includes:
- Unconsciousness at or before admission (even a transient loss of consciousness);
- Clinical neurological or psychological symptoms or signs;
- Clinical cardiac, respiratory symptoms or signs (due to CO poisoning or exacerbation of previous problems);
- Pregnant women.
Treatment delayed beyond 24 hours after the last exposure to poison is not recommended if the patient has become symptom-free (Type 3 recommendation[40]). In carbon monoxide poisoned patients not at high risk, there is a choice between NBO for 12 hours and HBO. As far as HBO is concerned, various protocols (number and durations of sessions) have been used. Until the results of further randomized studies are available, HBO remains optional in these patients (Type 3 recommendation).
In addition to high risk patients, many experts suggest that HBO may be considered when the absolute COHb levels is ≥ 25%.
There is currently no strong recommendation for the direct orientation of CO poisoned victims by prehospital teams towards hospitals with hyperbaric chamber facilities.
Beside the rational indications of HBO evoked above, risks as well as logistical and financial considerations regarding the need for patient primary or secondary transfer

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[29] Ducasse JL, Celsis P, Marc-Vergnes JP. Non-comatose patients with acute carbon monoxide poisoning: hyperbaric or normobaric oxygenation. Undersea Hyperb Med. 1995;22:9-15.
[30] Thom SR, Taber RL, Mendiguren, II, Clark JM, Hardy KR, Fisher AB. Delayed neuropsychologic sequelae after carbon monoxide poisoning: prevention by treatment with hyperbaric oxygen. Ann Emerg Med. 1995;25:474-80.
[31] Mathieu D, Wattel F, Mathieu-Nolf M, et al. Randomized prospective study comparing the effect of HBO versus 12 hours NBO in non comatose CO poisoned patients: Results of the interim analysis. Undersea Hyperb Med. 1996;23:7-8
[32] Scheinkestel CD, Bailey M, Myles PS, et al. Hyperbaric or normobaric oxygen for acute carbon monoxide poisoning: a randomised controlled clinical trial. Med J Aust. 1999;170:203-10.
[33] Weaver LK, Hopkins RO, Chan KJ, et al. Hyperbaric oxygen for acute carbon monoxide poisoning. N Engl J Med. 2002;347:1057-67.
[34] Weaver LK, Valentine KJ, Hopkins RO. Carbon monoxide poisoning: risk factors for cognitive sequelae and the role of hyperbaric oxygen. Am J Respir Crit Care Med. 2007;176:491-7.
[35] Wolf SJ, Lavonas EJ, Sloan EP, Jagoda AS. Clinical policy: critical issues in the management of adult patients presenting to the emergency department with acute carbon monoxide poisoning. Ann Emerg Med. 2008;51:138-52.
[36] Logue CJ. An inconvenient truth? Ann Emerg Med. 2008;51:339-40.
[37] Thom SR. Hyperbaric oxygen therapy for carbon monoxide poisoning: is it time to end the debates. Toxicol Rev. 2005;24:157-8.
[38] http://www.achobel.be/Download/ECHM_Summary.pdf
[39] Strongly recommended. The ECHM Jury considers the implementation of the recommendation of critical importance for final outcome of the patient/quality of practice/future specific knowledge.
[40] Optional. The ECHM Jury considers the implementation of the recommendation as an option.

must be taken into account; an efficient distribution of patients in mass causalities conditions should also be the goal as not all hospital have hyperbaric chambers allowing simultaneous treatment of several victims or assistance by accompanying staff. It must be note however that all "high risk criteria" are easily available in the prehospital phase and that the "COHb ≥ 25%" criteria can be made easily available by using devices that measure CO in exhaled air or pulse oximeters with HbCO determination capabilities.
For other conditions, the survey suggests that practices in Belgium are highly variable according to the development or the lack of units with special interest in clinical toxicology, usually within the emergency department of the intensive care unit. The situation may be different in other countries. In France for example, specialized treatment centers, usually integrated to intensive care units are associated to most of the *Centres Antipoisons et de Toxicovigilance* (CAPTV). In the United States, both the Acute and Intensive Care Section of the American Academy of Clinical Toxicology (AACT) and the American College of Medical Toxicology (ACMT) have developed the concept of regional toxicology treatment centers (RTTCs) or centers for poison treatment (CPTs), as well as guidelines for such facilities. The goals of such centers are to achieve excellence in medical care, teaching and research in medical toxicology while minimizing unnecessary cost, as it has been developed in the trauma center system by gathering of a "critical mass" of victims of severe or unusual poisonings. CPTs that serve as regional referral centers are intended to work with poison centers and other hospital on a regional basis[41].

Recommendation
On theoretical and empirical bases, it seems useful to recommend to index locoregional resources regarding several treatment modalities and to consider a specific primary orientation of the patient in certain circumstances listed below (nonexhaustive). According to legal principles, such primary specific orientation of patients should receive an agreement within the regional (Brussels) or provincial Commission for Emergency Medical Help.

- *Carbon monoxide poisoning : hyperbaric oxygen therapy: see indications above*
- *Potential need for active elimination techniques (haemodialysis, haemofiltration, haemoperfusion, molecular absorbent recirculating system - MARS...)[42] ;*
- *Potential need for heavy supportive therapies :*
  - *Severe respiratory failure ;*
  - *Acute renal failure ;*
  - *Circulatory failure unresponsive to fluid or vasoactive agents : potential need for extracorporeal circulatory assistance[43];*
  - *Hepatic failure: use of MARS, possible indication for liver transplantation;*
- *Caustic ingestions: possible need for urgent oesogastrectomy...*
- *Extensive or severe chemical burns: care in burn units;*
- *Certain antidotal treatments: availability in reference centers, expertise in their practical use.*

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[41] Center for Poison Treatment Facility Assessment Guidelines. American College of Medical Toxicology, http://www.acmt.net/resources_guidelines.html

[42] de Pont AC. Extracorporeal treatment of intoxications.. Curr Opin Crit Care. 2007 Dec;13(6):668-73.

[43] Baud FJ, Megarbane B, Deye N, Leprince P. Clinical review: aggressive management and extracorporeal support for drug-induced cardiotoxicity. Crit Care. 2007;11(2):207

Protection against carbon monoxide (CO) poisoning, at scene measurement of COHb and preventive procedures

Personnel equipment includes CO detectors in 69.2 % of centres.
Devices intended to quantify CO poisoning at scene, either in the form of exhaled air detectors or in the form of oximeters including COHb measurement are embarked in 35.4 % and 24.6% of MECU vehicles, respectively. Some centres have both devices available, but 36 MECU centers (55.4 %) have no device available at all for prehospital HbCO evaluation.
After a call for a CO poisoning condition, most centres report initiating frequently a procedure to prevent a new accident (Table 4). Only clear positive responses were taken into account: for example answers referring to procedures initiated by fire services or police were not considered as positive.

Recommendation
To ensure security of engaged teams, CO detectors should be included in the personal equipment of every member of the intervention teams.
Although treatment of CO poisoning (NBO vs HBO) is mainly bases on clinical features, availability of exhaled air CO detectors or oximeter allowing COHb determination is desirable, both for diagnostic purpose and to detect high COHb levels. Systematic blood sampling at scene before oxygen administration when possible could also help to a better evaluation of each case.

Awareness and preparedness regarding the risk of chemical accidents in the surroundings of the centre

Although 76.9 % of centres confirmed being aware of chemical risks in the surroundings of their hospital, only 53.8 % had developed specific contacts or planning to prepare a medical response to an accident. This fact probably reflects several problems:
- it is impossible for emergency departments to detect all the risks that may be encountered in their surroundings;
- declaration of chemical risk is only legally required for companies that have been classified "Seveso";
- even if every risk would be notified, most emergency department don't have staff, infrastructure and financial resources to support the needs of adequate response planning.

Recommendation
1) It would be better to set up a proactive procedure, requiring the notification of any significant risk, even out of the context of "Seveso" criterias.
2) The additional costs related the response planning (meetings with companies, storage of specific antidotes, need for special protective equipment, training exercises...) should be financially supported. The MECU staff must be adapted to allow the development of proactive actions.

Specific procedures for incompliant patients

Variability and multiplicity of responses observed in the present survey probably reflects the difficulties encountered by field practitioners in such situations, as well as the lack of clearly established guidelines.

When facing such situations, the MECU team must take multiple considerations into account, including legal (legal obligation to help endangered people, law on patient's rights), ethical and deontological principles. Such problems are neither specific to acute poisoning conditions nor specific to MECU activity, but are also frequently encountered in emergency departments. However, acute poisoning often involving patients with psychiatric problems, drug abusers or heavy alcohol consumers, as well as the less secured context of out-of-hospital interventions encountered by MECU teams, certainly adds difficulties, including the risk of conflicts with the patients, relatives or third people that may turn into verbal or even physical violence.
According to the result of the present survey (Table 5), the most frequent responses to such situation are the call for help by police (near 57%) which may be in opposition with the principle of medical secrecy if police has not been alerted by other ways, and legally forced hospital admission (near 39%), a judicial procedure that may have heavy consequences for the patient and that is rarely justified when problems are mainly acute and circumstantial. Moreover, legally forced admission procedure requires a diagnosis of mental disease that will be rarely confirmed by a psychiatrist in chronic drug abusers, acute or chronic alcohol consumers or circumstantial suicidal attempts.
It must also be taken into account that police intervention does not always facilitate the intervention, from the medical standpoint.

Recommendation
The Quality College of Emergency Medicine Physicians suggests setting up a multidisciplinary working group to elaborate specific guidelines for staffs of emergency departments and MECUs, taking legal, ethical, deontological and practical aspects into account. Such recommendations could help the teams to manage such situation in a much uniform way in the future.
Procedures and practices regarding the management of incompliance should also be integrated in the MECU and emergency department registrations in the future.

ATTACHMENTS

ETUDE SMUR-REG
GROUPE DE PATHOLOGIE "INTOXICATIONS"

Collecte de données auprès des Centres SMUR belges concernant les pratiques cliniques

N° du centre SMUR:

1. Utilisation du charbon activé en pré hospitalier:

- Du charbon activé est disponible dans le SMUR O OUI O NON
- - Si **oui**, il est utilisé: O SOUVENT O PARFOIS O RAREMENT O JAMAIS
- Si **non, rarement ou jamais** ont été cochés ci-dessus, quelles sont les raisons (mettre une croix, plusieurs réponses possibles dans la première colonne, une seule motivation principale):

	Motivations	**Motivation principale**
Il n'y a pas de protocole standardisé spécifique à la médecine pré hospitalière		
Je ne suis pas convaincu de l'utilité clinique en terme d'évolution ou de pronostic		
L'intervention du SMUR est trop tardive pour qu'il y ait une utilité quelconque		
Le temps de transfert à l'hôpital est court et le bénéfice serait négligeable en terme de gain de temps		
La durée des interventions SMUR serait prolongée et l'admission hospitalière retardée		
Je crains d'augmenter le risque de complications, en particulier d'inhalation		
Je crains de provoquer des vomissements pendant le transport. Le temps nécessaire au nettoyage de l'ambulance diminuerait sa disponibilité		
Les membres de l'équipe sont insuffisamment entraînés pour poser adéquatement les indications et juger des contre-indications		
De toute façon, les patients sont réticents à ce traitement		

- Préconiseriez vous plus l'usage du charbon activé en pré hospitalier si des recommandations spécifiques existaient ?
  O OUI O NON
- Pensez-vous qu'un programme de formation spécifique soit nécessaire dans ce domaine ?
  O OUI O NON

2. Disponibilité des antidotes spécifiques en SMUR

Parmi les antidotes suivants, desquels disposez-vous **en permanence** dans le véhicule du SMUR. Précisez la quantité embarquée (en masse pondérale et non en nombre d'ampoules).

	Mettez une croix si l'antidote est disponible en SMUR	**Quantité disponible (pondérale)**
Naloxone		
Flumazenil		
Atropine		
Pralidoxime		
Obidoxime		
Fab - antidigoxine		
Bicarbonate de Na		
Chlorure de Ca		
Gluconate de Ca		
Ethanol		
Fomépizole		
Hydroxocobalamine		
Nitrite d'amyle		
Nitrite de soude		
Thiosulfate de soude		
EDTA-diCobalt		
Diméthylaminophénol		
Bleu de méthylène		
N-acétylcystéine		
Glucose hypertonique		
Glucagon		
Octréotide		
Phytomenadione		
PPSB		
Protamine		
Pyridoxine		
Physostigmine		
Oxygène à haute concentration		
Oxygène + CPAP		

3. Orientation spécifique des patients

Parmi les situations suivantes dans le cadre d'intoxication, quelles sont celles que vous considérez actuellement relever d'une orientation d'emblée vers un centre spécifique, autre que l' « hôpital adapté le plus proche ».

	OUI	**PARFOIS**	**NON**
Intoxication oxycarbonée avec indication possible d'oxygénothérapie hyperbare			
Coma ou altération profonde de la conscience			
Insuffisance respiratoire nécessitant une assistance ventilatoire			
Choc circulatoire réfractaire au remplissage et aux traitements vasoactifs classiques			
Nécessité d'épuration extracorporelle (hémodialyse, hémoperfusion, hémofiltration...)			
Intoxications rarement rencontrées			
Intoxications nécessitant l'utilisation d'antidotes peu disponibles ou rarement utilisés			

4. Questions complémentaires

Connaissez vous certains risques toxiques particuliers dans la zone d'action de votre SMUR (risque industriel, écoles, stockage, transport...) ?
Avez-vous des contacts et des accords avec les responsables pour faciliter la gestion d'accidents liés à ces risques (information, procédures d'intervention, stockage d'antidotes spécifiques,...) ?

- Le personnel d'intervention de votre SMUR est-il équipé d'un dispositif d'alerte CO ?

O OUI O NON

- Disposez-vous d'une évaluation de l'HbCO en préhospitalier ?

- CO exhalé par le patient	O OUI	O NON
- Combiné à un oxymètre	O OUI	O NON

- En cas d'intoxication au CO, la mission SMUR est suivie de la mise en œuvre d'une procédure préventive d'accidents ultérieurs

O Toujours
O Le plus souvent possible
O Parfois
O Le plus souvent non
O Jamais

- En cas de refus de prise et charge par le patient intoxiqué et de réel danger somatique et/ou psychiatrique évalué par l'équipe SMUR, quelle procédure utilisez-vous ?

- Je souhaite avoir un feed-back personnalisé, en plus des résultats globaux de l'enquête

O OUI O NON

STUDIE MUG-REG
PATHOLOGIEGROEP "INTOXICATIES"

Gegevensverzameling in de Belgische MUG-centra inzake de klinische praktijk

Nr MUG-centrum: .....

1. Gebruik van actieve kool prehospitaal:

- Actieve kool is ter beschikking in de MUG O JA O NEEN
- Zo ja, wordt deze gebruikt: O dikwijls O soms O zelden O nooit
- Indien **neen**, **zelden** of **nooit** hierboven werden aangeduid, welke is de reden (kruisje plaatsen, meerdere antwoorden mogelijk in de eerste kolom, één enkele hoofdreden in de tweede kolom):

	Reden	**Hoofdreden**
Er is geen specifiek gestandaardiseerd protocol voor prehospitaalzorg		
Ik ben niet overtuigd van het klinisch nut inzake evolutie of prognose		
De tussenkomst van de MUG is te traag om enig nut te bekomen		
De tijd van transfer naar het ziekenhuis is te kort en het nut te verwaarlozen inzake tijdwinst		
De duur van de MUG interventie wordt verlengd en de opname in het ziekenhuis vertraagd.		
Ik vrees het risico op complicaties te verhogen, meer bepaald op aspiratie.		
Ik vrees braken uit te lokken tijdens het transport. De tijd nodig om de ziekenwagen te reinigen zou de beschikbaarheid ervan verminderen.		
De bemanningsleden zijn onvoldoende getraind om adequaat indicaties te stellen en tegenindicaties af te wegen.		
In elk geval zijn de patiënten terughoudend voor deze behandeling.		

- Zou u het gebruik van actieve kool in de prehospitaalfase overwegen indien specifieke aanbevelingen zouden bestaan? O JA O NEEN
- Denkt u dat een specifiek opleidingsprogramma op dit vlak noodzakelijk is? O JA O NEEN

2. Beschikbaarheid van specifieke antidota in de MUG

Over welke onderstaande antidota kan u **permanent** beschikken in de MUG-wagen.
Preciseer de aanwezige hoeveelheid (in gewogen massa en niet in aantal ampullen).

	Kruisje zetten indien het antidotum beschikbaar is in de MUG	**Aanwezige hoeveelheid (gewogen)**
Naloxone		
Flumazenil		
Atropine		
Pralidoxime		
Obidoxime		
Fab - antidigoxine		
NaBicarbonaat		
CaChloraat		
CaGluconaat		
Ethanol		
Fomepizole		
Hydroxocobalamine		
Amylnitriet		
NaNitriet		
NaThiosulfaat		
diCobalt EDTA		
Diméthylaminophénol		
Methyleenblauw		
N-acetylcysteine		
Hypertoon Glucose		
Glucagon		
Octréotide		
Phytomenadione		
PPSB		
Protamine		
Pyridoxine		
Physostigmine		
Zuurstof in hoge concentratie		
Zuurstof + CPAP		

3. Specifieke verwijzing van patiënten

Voor welke situaties in het kader van een intoxicatie zou u een onmiddellijke verwijzing naar een specifiek centrum overwegen, andere dan het "aangewezen dichtstbijzijnde ziekenhuis"?

	Ja	**soms**	**neen**
Koolmonoxide intoxicatie met mogelijke indicatie voor hyperbare zuurstoftherapie			
Coma of diepe bewustzijnsdaling			
Respiratoire insufficiëntie waarvoor noodzaak tot geassisteerde ademhaling			
Circulatoire choc die niet reageert op vulling en klassieke vasoactieve behandeling			
Noodzaak tot extracorporele dialyse (hemodialyse, hemoperfusie, hemofiltratie...)			
Zelden voorkomende intoxicaties			

Intoxicaties die een antidotum behoeven dat weinig beschikbaar is of zelden gebruikt wordt			

4. Bijkomende vragen

- Bent U op de hoogte van speciale risicosituaties voor toxiciteit in de zone waar uw MUG operationeel is (industrieel risico, scholen, stockering van toxische produkten, transporten, ...)? Heeft U contacten en overeenkomsten met de verantwoordelijken hiervoor om voorbereid te zijn op de hulpverlening bij eventuele ongevallen met deze risicosituaties (verstrekking van informatie, interventie procedures, stockeren van specifieke antidoten...)?

- Is het personeel betrokken bij MUG-interventies uitgerust met alarm detectoren voor koolstofmonoxide (CO)?

  O Ja O Neen

- Beschikt u over een middel voor bepaling van HbCO in de prehospitaal fase?
  - CO uitgeademd door de patënt O Ja O Neen
  - Gecombineerd met een oxymeter O Ja O Neen

- In geval van een vergiftiging met koolstofmonoxide wordt de interventie door de MUG gevolgd door het in werking stellen van een procedure ter preventie van nieuwe accidenten?
  O altijd
  O zo dikwijls mogelijk
  O soms
  O meestal niet
  O nooit

- Welke procedure volgt U in geval een geïntoxiceerde patiënt weigert vervoerd (opgenomen) te worden en er een reëel lichamelijk en/of psychiatrisch gevaar vastgesteld wordt door de MUG-equipe?

- Ik wil een gepersonaliseerde feed-back naast de algemene resultaten van de enquête.

  O Ja O Neen