

*The North American Malignant Hyperthermia Registry of MHAUS*

**Report of Acute**

**ADVERSE METABOLIC OR MUSCULAR REACTION TO ANESTHESIA**

**(AMRA Report)**

**INSTRUCTIONS**

*This form is to be filled out by an anesthesiologist or other health care provider.*

1. Complete this form each time you **suspect** a patient may have experienced an adverse metabolic reaction to anesthesia or exercise, possibly related to malignant hyperthermia (MH).

Examples: hypercarbia, acidosis, tachycardia, rigidity, hyperkalemia, myoglobinuria, arrhythmias, unexplained fever, etc.

2. Please fill out as soon as patient is stable, preferably within 48 hours of the event.
3. The attending anesthesiologist, or other physician, should review the completed form.
4. The patient's name should **not** be recorded on the form sent to the NAMH Registry. If a patient wishes to be registered by name, they may contact the Registry directly. The toll free telephone # of the NAMHR is 888-274-7899
5. Please make **one (1)** photocopy of the completed form, and send the forms as follows:

Original.....*NAMH Registry*  
Copy 1.....*MH Diagnostic Center (if referred)*

The North American Malignant Hyperthermia Registry  
UPMC Mercy Hospital  
8<sup>th</sup> Floor, Ermire Building (B)  
Room 8522-3  
1400 Locust Street  
Pittsburgh, PA 15219

For **FULMINANT MH** cases refer the patient and their physician to the genetic counselor, Deanna Steele at # **800-454-8155** for consideration of the blood test that can help diagnose MH susceptibility in other family members. The patient should call # **888-274-7899**, the MH Registry, to discuss joining this research registry.

AMRA Report Version 9.6  
June 2011

**DEMOGRAPHIC INFORMATION**

1. Sex  
*check one*  
 male       female
  
2. Weight  
\_\_\_\_.\_\_\_\_ kilograms OR \_\_\_\_ lbs
  
3. Height  
\_\_\_\_\_ cms OR \_\_\_\_ ft \_\_\_\_ inches
  
4. Year of patient's birth  
\_\_\_\_\_
  
- 4a. Age when MH event occurred?  
\_\_\_\_ years \_\_\_\_ months
  
5. Race:  
*check as many as apply*  
 Caucasian                                       African  
 Hispanic     East Asian  
 African-American                                       South Asian  
 Native American                                       Middle Eastern  
 Hawaiian or Pacific Islander  
 other (*specify*): \_\_\_\_\_
  
6. Body Build  
*check one*  
 Normal     Lean  
 Muscular     Obese  
 Postpartum  
 Other (*specify*): \_\_\_\_\_
  
7. State or province of patient's residence  
\_\_\_\_\_
  
8. State or province of facility in which anesthesia was given  
\_\_\_\_\_
  
- 8a. Country  
\_\_\_\_\_
  
9. Reporting physician's name: (*optional*)  
\_\_\_\_\_
  
10. Facility type:  
 Hospital  
 Ambulatory Surgical facility located on hospital campus  
 Free-standing ambulatory surgical facility  
 Dental Office  
 Surgical Office                                      other \_\_\_\_\_
  
- 10a. Facility name: (*optional*)  
\_\_\_\_\_
  
11. Anesthesia department telephone number and/or email address: (*optional*)  
(\_\_\_\_)-\_\_\_\_-\_\_\_\_ @ \_\_\_\_\_

**FAMILY HISTORY**

12. Before this episode, was the patient's family history positive for:

*check all applicable*

- malignant hyperthermia
- masseter spasm
- intraoperative death not thought to be MH
- sudden infant death syndrome or cot death
- sudden death from unknown cause at < 45 year >1.5 years
- heatstroke
- neurolept malignant syndrome
- intolerance to heat
- chronic muscle pain
- frequent muscle cramps
- chronic muscle weakness
- exercise intolerance due to muscle pain, weakness or fever
- episodes of dark urine and muscle pain
- myopathies *specify type; write unknown if not known:* \_\_\_\_\_
- idiopathic creatine kinase elevation
- diabetes
  - Type 1
  - Type 2
- Other (*specify*): \_\_\_\_\_
- none of the above
- unknown

## MEDICAL HISTORY

13. Has the patient had any of the following?

*check all applicable*

- muscle weakness interferes with daily activity at least once/week
- muscle cramps or pain that interfere with daily activity at least once/week
- cola colored urine
- heat stroke or heat prostration
- oral (or rectal/axillary equivalent) fever  $>38.8^{\circ}\text{C}$  or  $101.4^{\circ}\text{C}$  at least 6 times/year without medical cause
- recent generalized infection  
If there was infection, how long ago was it? \_\_\_ (days)
- recent use of cholesterol lowering drugs  
If so, which drug \_\_\_\_\_, and when was it last ingested? \_\_\_ (days)
- a regular regimen of physical activity?  
If so, when was the last work-out? \_\_\_ (days)
- ingestion of any medicine to improve muscular performance
- intolerance to heat
- exercise intolerance due to muscle pain, weakness or fever
- diabetes
  - Type 1
  - Type 2
- Other (*specify*): \_\_\_\_\_
- none of the above
- unknown

14. Has the patient ever had physical findings of:

*check all applicable*

- increased muscle tone
- decreased muscle tone
- generalized muscle weakness
- myopathy *specify type; write unknown if not known*: \_\_\_\_\_
- ptosis
- strabismus
- hiatal hernia
- inguinal hernia
- umbilical hernia
- undescended testes
- clubbed foot
- joint hypermobility
- kyphoscoliosis (moderate or severe; curve  $> 45^{\circ}$ )
- pectus carinatum
- winged scapulae
- skeletal fractures (more than 2)
- gallstones
- kidney stones
- laryngeal papillomas
- other (*specify*): \_\_\_\_\_
- none of the above
- unknown

**ANESTHETIC HISTORY**

15. How many times was this patient anesthetized prior to this event?

\_\_ \_\_  
 unknown, but greater than zero       Unknown  
*Skip to question 20 if zero*

16. How many were general anesthetics?

\_\_ \_\_  
 unknown, but greater than zero       Unknown

17. Year of most recent anesthetic (excluding present episode)?

\_\_ \_\_ \_\_ \_\_       unknown  
Year

18. Were unusual metabolic or muscular responses noted during prior anesthetics?

*check one*  
 no  
 yes  
 unknown

19. Was there delayed awakening from previous general anesthetics?

*check one*  
 no  
 yes  
 unknown

**ADVERSE METABOLIC REACTION TO ANESTHESIA**

20. Year of adverse metabolic or muscular reaction.

\_\_ \_\_ \_\_ \_\_       unknown

21. Type of procedure scheduled

*check all applicable*  
 cardiothoracic       thoracoscopic surgery (thoracic)  
 dental       oral surgery  
 ear, nose, or throat       orthopedic  
 eye       plastic surgery  
 general surgery       radiology  
 laparoscopic surgery       obstetrics  
    a) abdominal  
    b) pelvic  
    c) other (specify) \_\_\_\_\_  
 gynecology       urology  
 neurosurgery       vascular  
 transplant       unknown  
    transplant type \_\_\_\_\_  
 other (specify): \_\_\_\_\_

22. Was the procedure an emergency?  
*check one*  
 no  
 yes  
 unknown
- 22a. Did this adverse reaction occur without exposure to anesthetic?  
*check one*  
 no  
 yes add details \_\_\_\_\_
- 22b. Was the environment hot when this reaction occurred?  
*check one*  
 no  
 yes  
 unknown  
If yes how hot? \_\_\_ . \_\_\_ C or \_\_\_ . \_\_\_ F
23. Was any infection present at the time of this reaction?  
*check one*  
 no  
 yes  
 unknown
24. If infection was present, what organisms were known to be present?  
*specify:* \_\_\_\_\_
25. After adverse metabolic or muscular reaction was noted, the surgical procedure was:  
*check one*  
 deferred  
 terminated before all scheduled procedures completed  
 completed in spite of reaction  
 not applicable - patient in recovery or intensive care area at time of reaction  
 patient was in transport at time reaction occurred

26. Premedication and anesthetic agents utilized (before reaction occurred):

*check all applicable*

- |  |   |
|--|---|
| <input type="checkbox"/> sodium citrated citric acid (Bicitra) | <input type="checkbox"/> sevoflurane (Ultane)                 |
| <input type="checkbox"/> cimetidine (Tagamet)                  | <input type="checkbox"/> desflurane (Suprane)                 |
| <input type="checkbox"/> famotidine (Pepcid)                   | <input type="checkbox"/> halothane (Fluothane)                |
| <input type="checkbox"/> lansoprazole (Prevacid)               | <input type="checkbox"/> enflurane (Ethrane)                  |
| <input type="checkbox"/> ranitidine (Zantac)                   | <input type="checkbox"/> isoflurane (Forane)                  |
|  | <input type="checkbox"/> nitrous oxide                        |
| <input type="checkbox"/> metoclopramide (Reglan)               |   |
| <input type="checkbox"/> omeprazole (Prilosec)                 | <input type="checkbox"/> nalbuphine (Nubain)                  |
|  | <input type="checkbox"/> naloxone (Narcan)                    |
| <input type="checkbox"/> atropine                              |   |
| <input type="checkbox"/> glycopyrrolate (Robinul)              | <input type="checkbox"/> atracurium (Tracrium)                |
| <input type="checkbox"/> scopolamine (Hyoscine)                | <input type="checkbox"/> cisatracurium (Nimbex)               |
|  | <input type="checkbox"/> mivacurium (Mivacron)                |
| <input type="checkbox"/> dolasetron (Anzemet)                  | <input type="checkbox"/> rocuronium (Zemuron)                 |
| <input type="checkbox"/> droperidol (Inapsine)                 | <input type="checkbox"/> vecuronium (Norcuron)                |
| <input type="checkbox"/> hydroxyzine (Vistaril)                | <input type="checkbox"/> curare                               |
| <input type="checkbox"/> ondansetron (Zofran)                  | <input type="checkbox"/> metocurine (Metubine)                |
| <input type="checkbox"/> promethazine (Phenergan)              | <input type="checkbox"/> pancuronium (Pavulon)                |
|  | <input type="checkbox"/> pipecuronium (Arduan)                |
| <input type="checkbox"/> methohexital (Brevital)               | <input type="checkbox"/> other NMB                            |
| <input type="checkbox"/> pentobarbital (Nembutal)              | <input type="checkbox"/> <b>IM</b> succinylcholine (Anectine) |
| <input type="checkbox"/> thiamylal                             | <input type="checkbox"/> <b>IV</b> succinylcholine (Anectine) |
| <input type="checkbox"/> thiopental (Pentothal)                | <input type="checkbox"/> <b>NO succinylcholine</b>            |
|  |   |
| <input type="checkbox"/> clonidine (Duraclon)                  | <input type="checkbox"/> edrophonium (Tensilon)               |
| <input type="checkbox"/> dexmedetomidine                       | <input type="checkbox"/> neostigmine (Prostigmin)             |
| <input type="checkbox"/> diazepam (Valium)                     | <input type="checkbox"/> physostigmine (Antilirium)           |
| <input type="checkbox"/> lorazepam (Ativan)                    | <input type="checkbox"/> pyridostigmine (Mestinon)            |
| <input type="checkbox"/> midazolam (Versed)                    |   |
|  | <input type="checkbox"/> bupivacaine (Marcaine)               |
| <input type="checkbox"/> etomidate (Amidate)                   | <input type="checkbox"/> levo-bupivacaine                     |
| <input type="checkbox"/> ketamine (Ketalar)                    | <input type="checkbox"/> chlorprocaine (Nesacaine)            |
| <input type="checkbox"/> propofol (Diprivan)                   | <input type="checkbox"/> cocaine                              |
|  | <input type="checkbox"/> etidocaine (Duranest)                |
| <input type="checkbox"/> alfentanil (Alfenta)                  | <input type="checkbox"/> lidocaine (Xylocaine)                |
| <input type="checkbox"/> fentanyl (Sublimaze)                  | <input type="checkbox"/> mepivacaine (Carbocaine)             |
| <input type="checkbox"/> fentanyl and droperidol (Innovar)     | <input type="checkbox"/> prilocaine (Citanest)                |
| <input type="checkbox"/> meperidine (Demerol)                  | <input type="checkbox"/> procaine (Novocain)                  |
| <input type="checkbox"/> morphine                              | <input type="checkbox"/> ropivacaine (Naropin)                |
| <input type="checkbox"/> remifentanyl (Ultiva)                 | <input type="checkbox"/> tetracaine (Pontocaine)              |
| <input type="checkbox"/> sufentanil (Sufenta)                  |   |
|  | <input type="checkbox"/> epinephrine                          |
| <input type="checkbox"/> unknown                               | <input type="checkbox"/> ephedrine                            |
| <input type="checkbox"/> <b>NO potent volatile anesthetic</b>  | <input type="checkbox"/> neosynephrine                        |
| <input type="checkbox"/> other ( <i>specify</i> ): _____       |   |

27. Anesthesia induction time  
\_\_ \_\_: \_\_ \_\_ (military time)
28. General anesthetic induction method  
*check one*  
 inhalation  
 intravenous  
 other (*specify*): \_\_\_\_\_
29. Anesthesia duration  
\_\_ \_\_ . \_\_ (in hours, express parts of an hour using decimal points)  
(example – 3 minutes = 0.05)
30. Type of anesthetic prior to adverse metabolic or muscular reaction  
*check all applicable*  
 monitored anesthesia care (local standby)  
 regional anesthesia  
 spinal anesthesia  
 epidural anesthesia  
 general anesthesia **without** endotracheal intubation  
 general anesthesia **with** endotracheal intubation  
 tourniquet use  
    elapsed time after the start of anesthesia tourniquet was inflated  
    \_\_ \_\_. \_\_ (in hours, express parts of an hour using decimal points)  
    (example – 3 minutes = 0.05)  
    elapsed time after final release of tourniquet  
    \_\_ \_\_. \_\_ (in hours, express parts of an hour using decimal points)  
    (example – 3 minutes = 0.05)  
 general anesthesia with a face mask  
 general anesthesia with a laryngeal mask airway



**PATIENT MONITORING UTILIZED BEFORE THE REACTION**

31. Monitoring utilized (before reaction occurred):

*check all monitoring used*

- |  |   |
|--|---|
| <input type="checkbox"/> blood pressure monitor    | <input type="checkbox"/> end-tidal PCO <sub>2</sub> |
| <input type="checkbox"/> electrocardiograph        | <input type="checkbox"/> pulse oximeter             |
| <input type="checkbox"/> stethoscope               | <input type="checkbox"/> bladder (Foley) catheter   |
| <input type="checkbox"/> arterial catheter         |   |
| <input type="checkbox"/> central venous catheter   |   |
| <input type="checkbox"/> pulmonary artery catheter |   |

temperature probes:

- axillary
- bladder
- esophageal
- nasopharyngeal
- rectal
- skin - electronic
- skin - liquid crystal
- tympanic
- other (*specify*): \_\_\_\_\_

32. If a liquid crystal temperature probe was used, did it accurately trend with core temperatures?

*check one*

- no
- yes
- unknown

33. Was a forced air or I.V. warming device in use?

*check one*

- no
- yes  
\_\_\_\_\_ temperature used
- unknown

**SIGNS NOTED DURING THE REACTION**

34. Abnormal signs judged to be inappropriate by the attending anesthesiologist or other physician:  
**RANK in order of appearance. NUMBER do not check. WRITE ZERO if sign did not occur.**  
*(a number may be used more than once if signs were noted simultaneously)*

- masseter spasm: mouth cannot be fully opened, but direct laryngoscopy possible
- masseter spasm: jaw clamped shut, intubation via direct visualization impossible
- generalized muscular rigidity
- cola colored urine
- tachypnea
- hypercarbia
- cyanosis
- skin mottling
- sinus tachycardia
- ventricular tachycardia
- ventricular fibrillation
- elevated temperature
- rapidly increasing temperature
- sweating
- excessive bleeding
- hypertension > 20% of baseline
- other (specify): \_\_\_\_\_

35. Signs: Maximum values and times

*fill in the blanks*

- time first adverse sign noted (**after induction**)  
*(in hours, express parts of an hour using decimal points)*  
*(example – 3 minutes = 0.05)*
- time second adverse sign noted (**after induction**)  
*(in hours, express parts of an hour using decimal points)*  
*(example – 3 minutes = 0.05)*
- maximum temperature noted (°C) **OR**
- maximum temperature noted (°F)
- time maximum temperature noted (**after induction**)  
*(in hours, express parts of an hour using decimal points)*  
*(example – 3 minutes = 0.05)*
- maximum end-tidal PCO<sub>2</sub> noted (mmHg)
- time noted (**after induction**)  
*(in hours, express parts of an hour using decimal points)*  
*(example – 3 minutes = 0.05)*

36. Type of ventilation used at the time hypercarbia was first observed:

*check one*

- ( ) spontaneous    liters/minute
- ( ) assisted    ventilation
- ( ) controlled    at the time of this
- ( ) not applicable    blood gas
- ( ) unknown

**LABORATORY TESTS UTILIZED**

37. Laboratory Evaluation

Fill in the blanks for all lab tests obtained. Write unknown if results are not known.

Most abnormal arterial blood gas after MH was suspected:

\_\_. \_\_ \_\_      FiO<sub>2</sub>  
 \_\_. \_\_ \_\_      pH  
 \_\_ \_\_ \_\_      PCO<sub>2</sub>                      \_\_ \_\_ \_\_ liters/minute  
 \_\_ \_\_ \_\_      PO<sub>2</sub>                              ventilation  
 \_\_ \_\_. \_\_      BE (mEq/L) (specify ±)              at the time of this  
 \_\_ \_\_      Bicarbonate (mEq/L)                      blood gas  
 \_\_ \_\_. \_\_      time (**after induction**)  
                   (in hours, express parts of an hour using decimal points)  
                   (example – 3 minutes = 0.05)

peak lactic acid  
\_\_ . \_\_      mmol/L

peak K<sup>+</sup>  
\_\_ \_\_. \_\_ mEq/L or mmol/L

peak post-op creatine kinase*	first creatine kinase*	last creatine kinase*
__ __ __, __ __ __ U/L	__ __ __, __ __ __	__ __ __, __ __ __
__ __ hours after induction	__ __ hrs after induction	__ __ hrs after induction

\* recommended intervals for creatine kinase determination are 0, 6, 12, 24 hours after the adverse reaction

serum myoglobin  
\_\_ \_\_, \_\_ \_\_ \_\_ ng/ml  
\_\_ \_\_ hours after induction

urine myoglobin  
\_\_ \_\_ \_\_, \_\_ \_\_ \_\_ mg/L  
\_\_ \_\_ hours after induction

fibrinogen  
\_\_ \_\_ \_\_ mg/dl

PT (prothrombin time)  
\_\_ \_\_ seconds  
laboratory upper limit of normal  
\_\_ \_\_ \_\_ seconds

PTT (partial thromboplastin time)  
\_\_ \_\_ seconds  
laboratory upper limit of normal  
\_\_ \_\_ \_\_ seconds

platelet count  
\_\_ \_\_ \_\_, \_\_ \_\_ \_\_

INR  
\_\_ . \_\_

**PATIENT MONITORING UTILIZED AFTER THE REACTION**

38. Monitoring utilized (after reaction occurred):

*check all monitoring used*

- |  |   |
|--|---|
| <input type="checkbox"/> blood pressure monitor    | <input type="checkbox"/> end-tidal PCO <sub>2</sub> |
| <input type="checkbox"/> electrocardiograph        | <input type="checkbox"/> pulse oximeter             |
| <input type="checkbox"/> stethoscope               | <input type="checkbox"/> bladder (Foley) catheter   |
| <input type="checkbox"/> arterial catheter         |   |
| <input type="checkbox"/> central venous catheter   |   |
| <input type="checkbox"/> pulmonary artery catheter |   |

temperature probes:

- axillary
- bladder
- esophageal
- nasopharyngeal
- rectal
- skin – electronic
- skin - liquid crystal
- tympanic
- other (*specify*): \_\_\_\_\_

**TREATMENT GIVEN**

39. Treatment given for possible or fulminant MH

*Check all treatments utilized.*

*Fill in the blanks.*

( ) Volatile anesthetics discontinued

\_\_\_ \_\_\_ \_\_\_ time (*after induction*)

(*in hours, express parts of an hour using decimal points*)

(*example – 3 minutes = 0.05*)

( ) Anesthesia circuit changed

( ) Hyperventilation with 100% oxygen

( ) Dantrolene (Dantrium)

\_\_\_ \_\_\_ \_\_\_ Initial dose (mg)

\_\_\_ \_\_\_ \_\_\_ Time of first dose (*after induction*)

(*in hours, express parts of an hour using decimal points*)

(*example – 3 minutes = 0.05*)

\_\_\_ \_\_\_ \_\_\_ Total dose (mg) - including maintenance therapy

\_\_\_ \_\_\_ \_\_\_ Time of last dose (*after induction*)

(*in hours, express parts of an hour using decimal points*)

(*example – 3 minutes = 0.05*)

( ) Active cooling

Method (specify) \_\_\_\_\_

( ) Fluid loading

\_\_\_ \_\_\_ \_\_\_ ml/kg

Fluid type (specify) \_\_\_\_\_

( ) Furosemide

( ) Calcium

( ) Mannitol

( ) Bicarbonate

( ) Glucose, insulin

( ) Amrinone

( ) Bretylium

( ) Vasopressor

( ) Lidocaine

( ) Procainamide

( ) CPR

( ) Defibrillation

( ) other ( *specify*): \_\_\_\_\_

( ) none of the above

40. Mark any of the following that were noted after dantrolene was given:

( ) Decrease in heart rate.

( ) Decrease in end-tidal carbon dioxide or carbon dioxide tension in blood.

( ) Decrease in temperature.

*If none were noted, please skip to question 42*

41. How many minutes after dantrolene administration was the maximum change in this sign noted and what was the magnitude of the maximum change?

Heart rate

( \_\_\_ ) minutes

( \_\_\_ ) (change in beats/min)

Carbon dioxide

( \_\_\_ ) minutes

( \_\_\_ ) (change in mmHg or torr)

Temperature

( \_\_\_ ) minutes

( \_\_\_ °C) or ( \_\_\_ °F ) (change in temperature)

42. Were any problems noted with the dantrolene administration?

*check one*

no

yes

*If no, please skip to question 44*

43. What were the observed dantrolene complications?

*check all applicable*

phlebitis

excessive secretions

gastrointestinal upset

hyperkalemia

muscle weakness

respiratory failure

other (*specify*): \_\_\_\_\_

44. Anesthetic Agents Utilized **After** Adverse Metabolic or Muscular Reaction was noted:

*check all applicable*

- sodium citrated citric acid (Bicitra)
  - cimetidine (Tagamet)
  - famotidine (Pepcid)
  - lansoprazole (Prevacid)
  - ranitidine (Zantac)
  - metoclopramide (Reglan)
  - omeprazole (Prilosec)
  - atropine
  - glycopyrrolate (Robinul)
  - scopolamine (Hyoscine)
  - dolasetron (Anzemet)
  - droperidol (Inapsine)
  - hydroxyzine (Vistaril)
  - ondansetron (Zofran)
  - promethazine (Phenergan)
  - methohexital (Brevital)
  - pentobarbital (Nembutal)
  - thiamylal
  - thiopental (Pentothal)
  - clonidine (Duraclon)
  - dexmedetomidine
  - diazepam (Valium)
  - lorazepam (Ativan)
  - midazolam (Versed)
  - etomidate (Amidate)
  - ketamine (Ketalar)
  - propofol (Diprivan)
  - alfentanil (Alfenta)
  - fentanyl (Sublimaze)
  - fentanyl and droperidol (Innovar)
  - meperidine (Demerol)
  - morphine
  - remifentanyl (Ultiva)
  - sufentanil (Sufenta)
  - unknown
  - NO** potent volatile anesthetic
  - other (specify): \_\_\_\_\_
- nitrous oxide
  - nalbuphine (Nubain)
  - naloxone (Narcan)
  - atracurium (Tracrium)
  - cisatracurium (Nimbex)
  - mivacurium (Mivacron)
  - rocuronium (Zemuron)
  - vecuronium (Norcuron)
  - curare
  - metocurine (Metubine)
  - pancuronium (Pavulon)
  - pipecuronium (Arduan)
  - other NMB
  - succinylcholine
  - NO** succinylcholine
  - edrophonium (Tensilon)
  - neostigmine (Prostigmin)
  - physostigmine (Antilirium)
  - pyridostigmine (Mestinon)
  - bupivacaine (Marcaine)
  - levo-bupivacaine
  - chlorprocaine (Nesacaine)
  - cocaine
  - etidocaine (Duranest)
  - lidocaine (Xylocaine)
  - mepivacaine (Carbocaine)
  - prilocaine (Citanest)
  - procaine (Novocain)
  - ropivacaine (Naropin)
  - tetracaine (Pontocaine)
  - epinephrine
  - ephedrine
  - neosynephrine

**PATIENT OUTCOME**

45. Did the patient develop any of the following complications?

*check all that apply*

- cardiac dysfunction
- change in consciousness level and/or coma
- disseminated intravascular coagulation
- hepatic dysfunction
- pulmonary edema
- renal dysfunction
- compartment syndrome
- other (*specify*): \_\_\_\_\_
- none
- unknown

46. Did the patient survive the initial reaction?

*check one*

- no                                       unknown because of transfer of case during treatment
- yes

*If no, please skip to question 51*

47. Did the patient develop additional signs or symptoms after initial adequate treatment (recrudescence)?

*check one*

- no                                       unknown because of transfer to another facility
- yes

*If no, please skip to question 54*

48. What was the time of the recrudescence?

\_\_\_ \_\_. \_\_\_ hours after anesthetic induction  
*(in hours, express parts of an hour using decimal points)*  
*(example – 3 minutes = 0.05)*



49. Signs of recrudescence that were judged to be inappropriate by the attending anesthesiologist or other physician:

***RANK in order of appearance. NUMBER do not check. WRITE ZERO if sign did not occur*** A number may be used more than once if signs were noted simultaneously.

- masseter spasm: mouth cannot be fully opened, but direct laryngoscopy possible
- masseter spasm: jaw clamped shut, intubation via direct visualization impossible
- generalized muscular rigidity
- cola colored urine
- tachypnea
- hypercarbia
- cyanosis
- skin mottling
- sinus tachycardia
- ventricular tachycardia
- ventricular fibrillation
- elevated temperature
- rapidly increasing temperature
- sweating
- excessive bleeding
- hypertension > 20% of baseline
- other (specify): \_\_\_\_\_

50. Did the patient survive both the initial reaction, the recrudescence, if any, and recover?

*check one*

- no
- yes     unknown due to transfer to another hospital

51. If the patient died, what was the primary cause of death?

*check all that apply*

- MH
- other (specify): \_\_\_\_\_
- unknown     death > one month after the MH episode

52. If the patient died, was an autopsy performed?

- no
- yes specify principal findings \_\_\_\_\_

53. Was tissue from the deceased examined for a specific genetic defect?

If so what was found?

specify: \_\_\_\_\_

53a. In what tissue (check all that apply)?

- Blood
- Muscle
- Other (specify) \_\_\_\_\_

**CLINICAL IMPRESSION**

54. Patient experienced (opinion of attending anesthesiologist):  
*check one*  
 adverse metabolic reaction that was not related to MH  
 possible MH - may include masseter spasm (MH diagnostic center referral recommended)  
 fulminant MH (family counseling, MH diagnostic center referral recommended)  
 other (*specify*): \_\_\_\_\_

55. Were the patient and his/her family referred to a MH diagnostic center?  
*check one*  
 no  
 yes  
 unknown

56. If referred to a MH diagnostic center, check identity of center:  
 Ottawa Hospital Civic Campus .....Ottawa, ON  
 Wake Forest University .....Winston-Salem, NC  
 Uniformed Services University .....Bethesda, MD  
 University of California at Davis .....Davis, CA  
 University of Minnesota .....Minneapolis, MN  
 University of Toronto .....Toronto, ON

57. Were the patient and the family also referred to MHAUS?  
32 South Main Street  
PO Box 1069  
Sherburne, NY 13460-1069  
(607) 674-7902 or 1-800-986-4287  
*check one*  
 no  
 yes

**COMMENTS ON PATIENT**

(Optional)

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Please make photocopies and distribute according to instructions on cover sheet.

Original may be mailed to:

The North American Malignant Hyperthermia Registry  
UPMC Mercy  
8<sup>th</sup> Floor, Ermire Building (B)  
Room 8522-3  
1400 Locust Street  
Pittsburgh, PA 15219

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