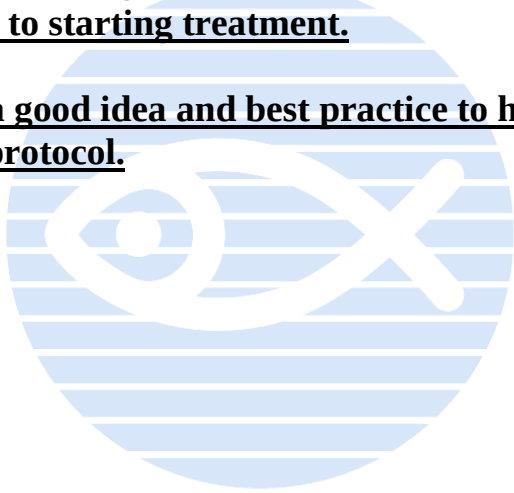


New England Aquarium
2014 General Protocol on Sea Turtle Treatment

Anyone doing clinical work on a sea turtle is required to read and understand this protocol prior to starting treatment.

It is a good idea and best practice to have all members of the sea turtle treatment team read this protocol.



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**New England Aquarium
2014 General Protocol on Sea Turtle Treatment**

COMMUNICATIONS

All communication should be relayed between designated Animal Health Department (AHD) staff and full-time Marine Animal Rescue & Rehabilitation staff (Rescue) (unless otherwise specified)

VETERINARIANS:

CONSULTS:

- Contact the veterinarian on duty when turtles are coming in.
- Veterinarian on duty: fluid plan and diagnostics.
- Meet w/ veterinarian in AM to go over blood results & get fluid plans so enough time is allotted for PM treatments.
- Contact AHD staff person in charge in the morning to schedule blood and radiograph timing.

EXAMS:

- Contact the veterinarian on duty and coordinate a time for turtle exams.
 - o Vet emails w/ diagnostic results will be printed and placed in a binder that is kept in the rehab clinic in the cabinet above the dopplers.
 - o Update case histories w/ diagnostic results & exam notes once a week. Once updated the vet note binder will be cleared out.

AHD STAFF:

- Prioritize blood samples to allow ample time for veterinarians to review results.
- When turtles arrive synchronize NEST and case numbers with appropriate AHD staff.

Standard Operating Procedure (SOP) Binder

SOP Binder can be found in last cabinet in clinic on shelf above Doppler or on Rescue server (see rescue staff member for access)

CLINICAL

BLOOD:

See Blood Draw SOP

DIAGNOSTICS: [Basic schedule for turtle blood sampling]

- Could be altered on a case-by-case basis depending on the individual animal.
- Nova: run all on whole blood directly from the syringe, NOT on plasma.

On Admission:

- Draw 3.0 ml of whole blood: run a Nova, Total Solids (T.S.), and PCV, then Archive the remaining plasma into two cryotubes if able (0.5ml minimum preferred in each; if less than 1ml of plasma put full sample into one cryotube). Preserve spun cells in RNAlater on all archive days.
 - Confer with CI about blood culture study: See studies below.

Once turtle has reached 70 degrees

- Draw 3.0 ml of whole blood and run a CBC/Chem and Nova, and archive (two cryotubes if possible).

2 weeks from first CBC/Chem:

- Draw 3.0 ml of whole blood and run a CBC/Chem and Nova, and archive (two cryotubes if possible).

Second Month in Rehab Onward:

- Every turtle should have a CBC/Chem, NOVA and archive (two cryotubes if possible) once per month unless otherwise specified by vet.

Reminders:

- Before a turtle is to be transported or released, draw a final Archive, CBC/Chem, +/- Nova, unless blood was drawn within the past 4 weeks or otherwise specified by vet.
- Any additional blood that is taken for banking or additional studies should be noted on the Sea Turtle Diagnostic Form.

New England Aquarium

2014 General Protocol on Sea Turtle Treatment

Preparing Blood Samples:

- Use **heparinized syringe**, consistency of amount drawn is a priority. (No heparin should be visible within syringe)
See Heparinizing syringe for blood draw SOP
- Blood Draw Amounts:

<u>Test</u>	<u>Whole Blood</u>	<u>Plasma</u>
CBC/PCV/Smears	0.3 ml	
Chemistries	1.0 ml	0.5 ml
Nova	0.5 ml	
Archive	1.5 ml	1.0 ml
Blood Culture	1.0 ml	
Total	4.3 ml	1.5 ml

Daily NOVA runs:

0.5 ml whole blood

For cbc/chem only:

1.3 ml whole blood:

0.3 ml for CBC

1.0 ml spun down for plasma for chemistry

Blood Culture:

1.0 ml whole blood (If no other test being performed use unheparinized syringe)

- Label each syringe with the following:
 - Date
 - Time
 - NEST Number
 - Case Number
 - Body Temperature (temp of water or air)
 - Tests being requested

Notify AHD “in person” morning of blood that needs preparation or analysis.

Some results are affected if the sample is not processed immediately. If this is not possible – refrigerate the sample to slow the process down. Record the sample information on the lab sample white board located on the freezer door in AHD.

NOVA Samples:

- Blood values will be downloaded by AHD staff from Nova blood analyzer, and archived in “Turtle NOVA results” folder on Melbourne/All Users after AM blood samples are completed. PM samples will be downloaded with AM blood values of following day.

BANKING:

- One box will be set up in the Rescue Freezer for all blood going to –80 Freezer (labeled Cold-Stun YEAR Archive).
- CM will transport blood to –80 Freezer once/week and log in manually.

RADIOGRAPHS:

- Radiographs should be arranged verbally with AHD staff. They will prepare the equipment in advance.
- Sedation may be used in some cases to ensure accurate radiographs (only vets will administer).
- AHD staff to take radiographs.

Once at 70 Degrees

- DV, AP, and 4 Flippers

Third Week:

- DV, AP, Flippers as needed.

Fifth Week:

New England Aquarium
2014 General Protocol on Sea Turtle Treatment

- DV, AP, Flippers as needed.

Monthly (unless otherwise specified by Veterinarian):

- DV, AP, Flippers as needed.

Reminders:

- Radiograph flippers and any wounds, swellings or lameness issues.
- Highlight known wounds or handling cautions on diagnostic sheet.
- Make sure to radiograph the head of loggerhead sea turtles.
- Insure that all of the body is visible on the first radiograph.

WOUNDS:

TREATMENT:

- Includes debridement of necrotic tissue when present.
- Clean with dilute Betadine or Nolvasan (dilute 5ml in 1L sterile water). Triple antibiotic ointment and Silvadene may be applied topically on a case-by-case basis.
 - Please use silvadene sparingly. A thin coat is enough to treat the wound. Copious amounts of silvadene can easily be removed and possibly have a detrimental effect on good bacteria that inhabit our LSS.
- Lesions should be treated on a case-by-case basis depending upon severity and frequency of when the animal will be removed from the water.
- If carapace of turtle has wound(s) or is heavily covered (>75%) by epibionts then turtle should receive a flipper-band unless contraindicated.

MEDICATION:

Alternating by odd and even case numbers: Doses indicated on individual treatment sheets when they are increased to 70° F

- **Odd NEST#s: Ceftazidime** [antibiotic] (280 mg/ml) 22 mg/kg IM q3d
For 21 days or case by case
Please notify vets after 21 days for a complete reassessment.
- **Even NEST#s: Oxytetracycline** 42 mg/kg IM q6d decided on a case by case basis.(should be diluted 1:1 with sterile water or saline and inject slowly)
For 21 days or case by case
Please notify vets after 21 days for a complete reassessment.
- All loggerheads will receive Oxytetracycline q6d

Case-by-Case:

- **Other antimicrobials will be determined on a case-by-case basis.**
 - See Sea Turtle Formulary 2014 for list of medications
- **Anti-parasitic:**
May be considered on a case-by-case basis.

Switching medication:

- **Injectable to Oral**
When rescue staff change from an injectable form of medication to oral AHD should be notified by e-mail. If there is back and forth between PO and inj. due to inappetence AHD should be notified of that as well.

FLUID THERAPY:

- **IV or SQ given at between 0.5% -2.0 % body weight initially depending on the condition of the animal.**
- **Type of Fluid**
 - o RRS (1 part LRS to 2 parts 2.5%Dex/0.45%NaCl)
 - o LRS
 - o 0.9% NaCl
 - o 2.5% Dextrose/0.45% NaCl
 - o Normosol

Warm fluids before administering to be as close to the turtle's temperature as possible.

DRUG STORAGE:

- Solution bags and blood tubes that have expired **should be discarded.**
- Solutions containing sugars should only be used for **three days** after opening.
- Solutions without sugars should only be used for **seven days** after opening.

New England Aquarium
2014 General Protocol on Sea Turtle Treatment

- All solutions should be refrigerated.
- Labeling of syringes:
 - o Use stickers on syringes.
 - o Label with NEST number, Date, Name of Drug and Dose.
- Only draw up medications the night before if the number of turtles exceeds a reasonable number.

DRUG DISPOSAL:

- All medications that have expired should be sent to AHD.
- Solution bags:
 - o LRS, NaCl, Normasol, Dextrose/Sodium Chloride mixtures can be disposed of down the drain
 - o Dispose of bags in regular trash receptacles or recycle when possible

DIET:

SOLID FOOD:

Only start offering food once turtle is at 70 degrees and swimming in pool for 24 hours straight
Initial feeding does not include any hard parts i.e. shells, bones, beaks, etc.

If a turtle has a full GI on radiographs animal should be cleared by a second set of radiographs before starting steaks. For turtles with clear GI on initial radiograph and turtle has been witnessed defecating the turtle can start getting steaks of fish.

- o Fillets
 - Head & tail removed from fish. Slice longitudinally along spine, removing skin and muscle (no bones)
- o Steaks
 - Head & tail removed from fish. Cut slices ¼ to ½ inch in width.
- o Squid
 - De-pen by pinching the top of the pen at the front of the mantle and gently pull out. The beak is located under the arms, and can be popped out by pinching the head. The head is cut off and the mantle is sliced ½ to 1 inch.
- o Greens
 - During rehabilitation of Green sea turtles, begin offering dark leafy green vegetables as an alternative diet source as animals approach food limits.
- o Turtle Gel may be offered on a case- by- case basis.

Tube Feeding:

If a turtle continues to be anorexic, tube feeding of fish gruel may be offered. Decisions to tube feed will be made between veterinarians and rescue staff.

Food Limits:

After turtles GI have initially been cleared they can be fed ad libitum (no restriction).

If a turtle requires calorie restriction (as directed by Veterinarian or Rescue staff):

Using minimum energy cost (MEC) formula to determine the caloric intake of each sea turtle.

$$MEC = K(W_{kg}^{0.75})$$

Where K is a taxonomically based constant dependent upon average core body temperature. In reptiles at preferred temp K=10

Degree of illness will determine a maintenance energy variable (Factor) to be multiplied by the MEC.

MF Group	Factor
Sleep or cage rest	1.25
Limited Activity	1.5

New England Aquarium 2014 General Protocol on Sea Turtle Treatment

Limited activity of young growing animal or moderately injured adult	2
Severely injured adult	3

Example: 5kg turtle with carapace injury
 $MEC = 10(5^{0.75})$
 Factor = 2
 turtle needs 66.87Kcal/day

Herring and capelin Kcals can be obtained from Mammals Dept., other feed items have kcals listed on the packaging.

MEC calculations and factors came from the Tufts Wildlife Clinic Student Handbook. Article: Finding the Dietetic Needs of Captive Native Wildlife and Zoo Animals by Allometric Scaling

VITAMINS:

All Turtles: All turtles receive the following vitamins and doses indicated on their individual treatment sheets.

- **Vitamin B COMPLEX** (5mg B1/kg of sea turtle)
 - o Injectable IM Q6 or 7D until eating
- **Multivitamin** (25 mg of B1/kg fish fed)
 - o Sea Tabs SID.
- **Calcium Carbonate** (25mg/kg of turtle weight)
 - o SID

WEIGHT AND LENGTHS

- Animals will be weighed at all clinical exams or at least once per week. Straight carapace length (notch to tip) and straight carapace width will be measured monthly (ideally by the same individual).

TAGGING:

- Prior to release, each turtle will receive two Inconel tags and a PIT tag.
- Inconel tags will be placed in both hind limbs of turtle whose SCL $\geq$ 30cm. If <30 cm SCL, or if there is a clinical concern with a rear flipper, then Inconel tag(s) need not be placed. See Inconel Tag SOP.
- A PIT tag will be placed in the left triceps muscle. The right triceps may be used on a case by case basis. See PIT Tag SOP.
- If a satellite tag is available and its use will advance our clinical research, then a turtle may be satellite tagged.
- Some turtles may need to be sedated for tagging. Minimally, 0.1cc of 2% lidocaine will be infused locally at each Inconel tag site.

ENVIRONMENT

WATER QUALITY: [Environmental Quality Lab will perform]

Water samples from each tank should be brought to AHD as soon as possible each morning (8:30 AM at the latest)
 Samples will be brought down in Nalgene bottles which are supplied by water quality.

Quincy RR tank testing schedule

	pH	NH3	Salinity	NO2	NO3	Br2
Target Range	7.70 – 8.30	<1.00 ppm	28 - 34	<1.000 ppm		≤ 0.20 ppm
RR24	Daily	Daily	Daily	Tue	Monthly	T/F
RR15	Daily	Daily	Daily	Tue	Monthly	T/F
RRISO1	Daily	Daily	Daily	Tue	Monthly	X
RRISO2	Daily	Daily	Daily	Tue	Monthly	X
RRISO3	Daily	Daily	Daily	Tue	Monthly	X
RR1200	Daily	Daily	Daily	Tue	Monthly	X

Additionally, bacteria samples of all tanks will be tested weekly during turtle season. Samples that are high will be retested.

New England Aquarium

2014 General Protocol on Sea Turtle Treatment

Water Quality Spreadsheet:

A new water quality spreadsheet can be found \\Melbourne\Water Quality Data\2014 Water Quality Data\Quincy\Quincy RR.xlsx. Rescue staff or volunteers will now be recording AM and PM temperatures, NH₄Cl additions, as well as bioload data daily.

- Bioload: Weight of turtles and daily food intake of all animals per tank will be calculated and entered into the spreadsheet.

*****Please stress keeping food and fecal matter out of the tanks is of utmost importance in maintaining a healthy life support system.*****

ENRICHMENT:

- Linda D'Eri will be supervising our turtle enrichment program this year. A protocol for adding new enrichment and tracking enrichment, based on our AZA enrichment program, is being developed at the time of this meeting. For now Please notify Linda every time the enrichment is changed.
- Once animals are eating well introduce hide-a-ways to tanks.
- Make every effort to provide additional enrichment such as hide-a-ways, lettuce trays, and fake kelp

TEMPERATURE:

- ICU: If a turtle arrives to NEAQ with an internal body temp below 55°F, it needs to be raised to 55°F as soon as possible.
- ICU sometimes runs lower than digital readout. As a general rule set the ICU 2-3°F above where you want the ICU temp to actually be (set at 63°F to be at 60°F).
- Turtles should be raised approximately 5°F increments each day, and should be raised this entire amount at one time.
- Please write down temperature adjustments on the treatment chart.
 - Example: "3:45 pm ICU set at 65°F, turtle should be at 65°F"
 - If ICU air too dry use ICU humidifier attachment to increase humidity.

NECROPSY / SAMPLES

DEAD TURTLES:

- Any questionable turtle should receive a cardiac ultrasound exam prior to being removed to the necropsy room.
- Any turtle that arrives with a possible HR and ultimately dies should be given a **Time of Death (T.O.D.)** by the veterinarian on duty.
 - T.O.D. should be recorded in the ATTITUDE or HR/RESP cell of the particular day on the Medical Treatment Log.

DEATH STATUS:

- Dead-on-arrival (DOA): This implies that the turtle is dead (i.e. cannot be resuscitated because it is DEAD) when it enters our facility. In many cases, this is clear (rigor mortis and no heart activity with echo). If a turtle arrives with detectable cardiac activity, but has no cloacal, palpebral, or corneal reflex, no voluntary respiration, and no meaningful response to treatment, and dies within several days or less, it will be classified as DOA. For such cases, we are assuming that the turtle was dead on admission but had residual cardiac activity.
- Mortality natural: This implies that the turtle was not dead when it arrived to us, and that it later died in our care (even if "later" is on the same day as admission). In many cases, it is clear that a turtle is alive (e.g. voluntary breathing, voluntary movement). We will define a turtle as being alive if it has detectable cardiac activity, and any detectable reflex response (indicating at least some neurologic function). If this turtle later dies without euthanasia, it is considered "mortality natural".
- Mortality euthanasia: This implies that we used a euthanasia method to end the life of a turtle that was alive. This category will not be used for turtles that are defined as DOA above, but for which potassium chloride or other methods are used to end cardiac function.
 - The veterinarian on duty is ultimately responsible for categorizing the case for purposes of the medical record. If there is disagreement over the category, the final determination will be made by Dr. Innis after discussion with the involved staff. In most cases, the category is clear, and it is expected that these guidelines will be used for only a small percentage of cases.

New England Aquarium
2014 General Protocol on Sea Turtle Treatment

NECROPSY:

- Inform veterinarians of necropsies to be performed. (Prioritize Cm's and Cc's)
- Contact vet w/ interesting findings @ the time of necropsy.
- Ridleys should receive full gross necropsy however histo will not be evaluated unless unusual lesions are found. Please see Charlie, Julie, Kathy or Connie with lesion questions (Hybrids should be treated as Ridley's).
- Greens and loggerheads will receive full gross necropsy and histo will be submitted.
- Samples can be frozen in whirl packs



RESEARCH

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