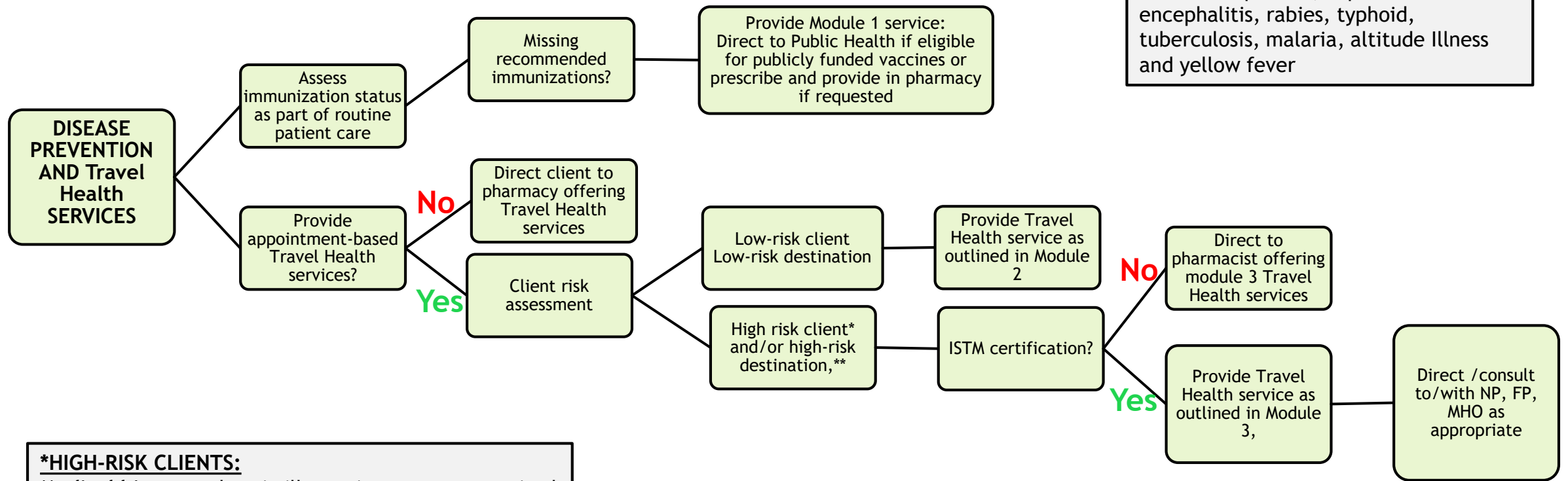


Disease Prevention and Travel

Moderate to High Risk Travel

Triage Flowchart



****HIGH-RISK DESTINATIONS:**
 Travel recommendations/ requirements for prophylactic vaccines and / or medications for cholera, European tick-borne encephalitis, Japanese encephalitis, rabies, typhoid, tuberculosis, malaria, altitude illness and yellow fever

***HIGH-RISK CLIENTS:**
Medical history - chronic illness, immunocompromised
 Purpose of travel - visiting friends and relatives, volunteers /missionary aid work, students abroad, mass gatherings, adoption abroad, seeking health care abroad
High-risk activities - wilderness expeditions, mountain climbing, scuba diving, caving, etc.

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[Travel Healthcare Plan](#)

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Pre-travel risk assessment

Client assessment form
(filled out prior to consultation)

High Risk Destinations

High Risk Activities

Endemic Diseases

Geography

Wilderness expeditions

Adventure sports

Mass gatherings

Malaria Risk Assessment
Malaria Prophylaxis

Yellow Fever

Japanese encephalitis

Tuberculosis

Animal-transmitted disease

High altitude

Temperature extremes

Water-related concerns

Mountain climbing, backpacking, cycling, river rafting, spelunking

Paragliding, skiing, snowboarding, skydiving, surfing, scuba diving (YB); (Divers Alert Network)

Mass gatherings (GC)
Travel to mass gatherings (YB)
Hajj (YB)

Malaria Risk Assessment

Destination

Incidence / level of malaria by country and areas within country

- [CATMAT](#)
- [CDC](#)
- [WHO](#)
- [Travax](#) (membership required)
- [ProMED](#) (search malaria)

Risk of exposure

- Low: large urban centres in most countries (exceptions Africa, India); at altitudes > 1500 m
- High: dusk to dawn, rural / wilderness areas
- Seasonal: highest at end of, shortly after rainy season

Duration of exposure

- Risk increases with length of stay
- Chemoprophylaxis not recommended for stays
 - ≤ 2 weeks if minimal exposure risk, incidence of *P. falciparum* very low
 - ≤ 1 week if minimal exposure risk, higher *P. falciparum* incidence

Traveller

Risk factors

- High risk: young children, pregnant or breastfeeding, co-morbidities, immunosuppressed, older adults, long-stay travellers and VFRs.
 - [CATMAT recommendations on malaria in special hosts](#)
 - [Malaria \(YB\)](#)
- Cautions, contraindications to certain chemo agents e.g., pregnancy, breastfeeding, renal impairment, epilepsy, myasthenia gravis

Potential for chemoprophylaxis drug interaction

- Review medication profile, concurrent or recent vaccinations
- Recommend INRs., ECGs for QT prolongation, or other tests, as appropriate

Access to medical care

- Chemo not 100 % effective. Malaria may be fatal if treatment not started promptly . If medical care cannot be accessed within 24 hrs, stand-by emergency treatment (SBET) may be considered.

Risk tolerance and individual preferences

- Weigh risk of malaria versus adverse effects of antimalarial medication
- Ensure traveller understands the potential severity of infection with malaria.

Malaria Prophylaxis

Personal protection measures (PPM) [CATMAT \(pg 12\)](#)

Minimize exposure dusk to dawn

Chemical :
1st line: DEET, picaridin
2nd line: p-Menthane-3,8, diol (PMD, oil of lemon eucalyptus)

Physical - screening, bed nets, clothing

Chemoprophylaxis [Risk & Recommended Chemoprophylaxis \(CATMAT\)](#) [YB: Drugs used in prophylaxis of malaria](#) [WHO: Malaria - Table 7.2](#)

Review advantages and disadvantages
[CAN: Routinely used antimalarial drugs](#)
[YB: Considerations when choosing malaria prophylaxis](#)
[CDC: Choosing a drug to prevent malaria](#)

If more than one regimen acceptable, allow client to make choice

Adverse reaction (AR) prevention / management:

- May consider a drug trial if concern about side effects, monitoring INR, etc. Not routinely recommended
- Discuss strategies for changing regimen if serious AR occurs. If side effects experienced while abroad antimalarial must not be stopped until another one is started
- Discontinuation or reducing dose of antimalarial medication NOT an option

Standby emergency treatment (SBET) [WHO: Malaria - Section 7.3.2](#)

Atovaquone-proguanil or quinine and doxycycline recommended for travellers more than a day away from malaria diagnostic help
Should not be the same agent(s) used for prophylaxis

Fever occurring ≥ 1 wk after entry to malaria-endemic area AND medical assistance unavailable within 24 hrs

First-aid measure only - seek medical advice ASAP

Yellow Fever Risk Assessment / Prophylaxis

Destination Risk
[WHO](#)
[Yellow Book \(CDC\)](#)

Note: risk may vary within countries

Personal protection measures (PPM)
[CATMAT](#)

24 hour protection required - YF transmitting mosquitoes active in daytime esp. sunrise and sunset

Yellow Fever Vaccine
[\(CIG\)](#); [CATMAT](#)

Vaccination Categories

Recommended: areas of endemic /transitional YF risk for everyone ≥ 9 mon of age

Generally Not Recommended: Low risk destination

Not Recommended: no YF risk

Rare serious adverse effects including
 *YEL-AND, **YEL-AVD

[Vaccine Safety & AEs \(CIG\)](#); [Contraindications, precautions\(YB\)](#):

Age:
 Cl'd if < 6 mon
 Caution 6 - 8 mons; 60 years of age or older

Pregnancy, breastfeeding:
 Advise to avoid travel to YF risk areas if possible
 Unavoidable travel - if vaccination risk outweighs exposure risk, obtain medical waiver
 High exposure risk - vaccinate

Immunocompromised conditions:
 Cl: if thymus disorder, HIV, radiation therapy, immunocompromising drug therapy, etc.
Precautions: certain comorbidities such as asymptomatic HIV, MS, etc.

Important Information about YF Vaccine
[Booster doses](#) not required for most travellers. Exceptions:
 - diminished response to primary dose (e.g. immunocompromised, pregnant)
 - particularly high risk of exposure
 - regular, ongoing risk of exposure
 World-wide shortage of vaccine - [Use of fractional doses \(CATMAT\)](#)
 YF vaccine available only at [designated YF centres](#)
 Destination entry requirements: some countries require [proof of vaccination](#) from all travellers; others only if from, or have passed through country with risk of YF transmission. May require [proof of exemption](#) if vaccine risk outweighs risk of YF
 Check [diplomatic or consular office](#) in destination country

*YEL-AND - vaccine-associated neurotropic disease → encephalitis, Guillain-Barre syndrome
 **YEL-AVD: vaccine-associated viscerotropic disease → multiple organ dysfunction and failure

Japanese Encephalitis Risk Assessment and Prophylaxis (CATMAT, YB)

Risk by destination
YB
IAMAT

Other risk factors:
Season/zone - Temperate zone peaks in summer and fall: Sub- and tropical zones - can occur sporadically or year round
Higher risk: rural agricultural areas, outdoor activities, duration of stay > 1 month

Personal protection measures
CATMAT

Especially sunset
to sunrise

Japanese encephalitis vaccine
(CIG); (YB); (UK)

Indications for adult vaccination:

> 30 day stay in rural area during risk season (or JE endemic or epidemic urban areas)
< 30 day stay during risk season if travel to area with an ongoing outbreak; travel outside urban area and higher risk activities such as spending substantial time outdoors, or indoors if no insect protection (air conditioning, screens, bed nets); or if travel to endemic area and uncertain of activities or duration of stay

Infants, children:

CAN: Off-label, consider risk vs. benefit : US: infants / children 2 mon and older

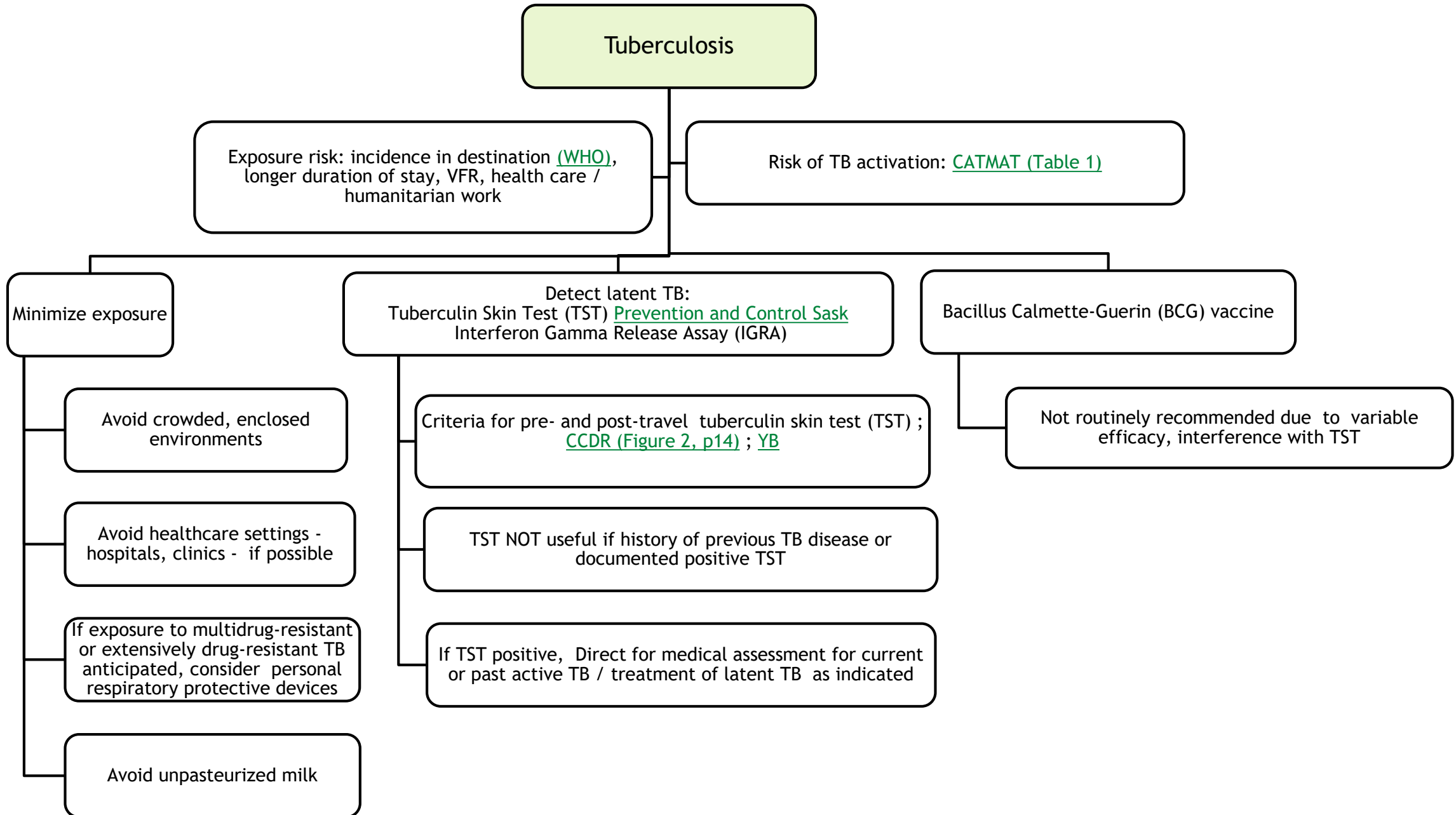
Other:

Limited data on safety, efficacy during pregnancy, lactation - vaccinate only if high exposure risk
General precautions for inactivated vaccines in other risk groups

Booster doses: One dose 12 to 24 months after second dose in primary series prior to re-exposure; one dose at 12 mons if ongoing exposure. No data on response to boosters given 2 or more years after primary series. If primary series plus 1st booster not completed, schedule should be resumed, not restarted

Re-immunization: If received the formerly used mouse brain-derived vaccine more than 3 years ago, a 2 dose primary series of currently available vaccine is required if ongoing protection is needed

Options for last minute travel: Administer one dose, advise client protection may be unreliable; accelerated schedule of two doses 0 and 7 days (off-label in Can; approved in Europe); Simultaneous administration of two doses in separate injections at separate sites (off-label)



Animal-Transmitted Diseases

Animal Bites and Stings (YB)

General Prevention Measures:

Do not provoke domestic animals
Do not approach or handle wildlife
Do not carry food or feed wildlife

Consider personal protective equipment in bat-inhabited areas such as caves

Tetanus (CIG) (YB)
animal scratches, bites

Ensure booster within last 10 years: within last 5 years if uncertain access to post-exposure care (not publicly funded if <10 yrs since last dose)

Rabies (CIG) ((YB))
Dogs, cats, bats, monkeys, other mammals

Pre-exposure immunization: children, frequent or long-term travellers to high-risk areas, poor or unknown access to post-exposure medical care

Post-exposure protocol: **Immediately** clean the wound thoroughly by washing and flushing with soap and water for at least 15 minutes, then seek medical attention as soon as possible.

Upon return, contact Public health as soon as possible (to complete PREP series or assess need for additional doses or if medical care not received abroad, assess need for PREP)

B-virus (Cercopithecine herpesvirus 1) YB

Vector - Macaque monkeys

No pre-exposure vaccine. Advise to avoid monkeys, not to touch or feed monkeys or carry food in pockets.

Post-exposure: **Immediately** clean the wound thoroughly by washing and flushing with soap and water for at least 15 minutes, then seek medical attention. Obtain photo of monkey if possible

Upon return, contact Public Health to assess need for rabies prophylaxis, Directral; to infectious diseases specialist for B-virus prophylaxis

Hemorrhagic fevers (YB)

Ebola Prevention and risks Avoid contact with wild animals, (alive sick, dead), eating wild meat, dealing with dead human bodies
All travellers to areas with reported Ebola should be directed to Public Health Travel Clinic

Marburg virus (GC): risk of exposure in caves or mines with fruit bat colonies

Crimean-Congo fever - infected livestock ticks in endemic areas. Wear protective clothing, insect repellent

Others

Histoplasmosis CDC, CCOHS
Transmitted via **BIRD OR BAT** droppings
High risk : cave exploration, farm workers in endemic areas

MERS-CoV (YB) (WHO)
Exposure to **CAMELS** is risk factor; clients at high risk: diabetes, kidney failure, chronic lung disease, immunocompromised

Avian influenza (YB)
Avoid contact with sick or dead poultry or environments; good hand hygiene, do not eat undercooked, raw meat or eggs or products containing blood

SNAKES / SPIDER BITES
Prevention: do not disturb or try to handle; wear heavy, higher boot, long pants in high risk areas
Seek medical care esp. if bite breaks skin or contacts eyes, other mucous membranes

MARINE ANIMALS - see [water-related concerns](#)

High Altitude Illness (AI)

Destination Risk
Altitude > 2500 m (8,200ft)
Countries with increased risk

Traveller risk factors
Hx of prior AI
Comorbidities (YB)
Rapid ascent, strenuous exercise, cold temperature

Syndromes of AI

Acute Mountain Sickness (AMS) - sx: headache, fatigue, loss of appetite, nausea / vomiting
High-Altitude Cerebral Edema (HACE) - sx: lethargy, drowsiness, confusion and staggering gait
High-Altitude Pulmonary Edema (HAPE) - sx: shortness of breath with exertion, then at rest, weakness and cough, cyanosis

Acclimatization (YB); (IAMAT)

Ascend gradually, avoid going directly to above 3000 m
Sleep at 2500-3000 m for 1 or 2 nights before ascending
Do not increase sleeping altitude by > 300 to 400 m /night;
Spend 2nd night at same altitude for every 1000 m of ascent
Day trips to higher elevations with return to lower level to sleep speeds acclimatization

Avoid alcohol, strenuous exercise for 1st 24 hrs

Pharmacologic prophylaxis Medications to prevent and treat AI (YB)

First line, acetazolamide as indicated by
Risk category (YB)
Dose recommendations (YB)

Direct if intolerance or contraindications to acetazolamide
(dexamethasone could be considered)

If history of HAPE, Direct
(nifedipine +/- salmeterol inhalation OR tadalafil OR high-dose dexamethasone could be considered)

Treatment

Identify early symptoms of AI
Never ascend to higher altitude to sleep if sx of AI

Options:
Descend \geq 300 m - sx should rapidly improve
Remain at current altitude and treat symptoms with non-opiate analgesics, antiemetics
Treat AI with dexamethasone +/- acetazolamide (YB)

Temperature Extremes
Problems with heat and cold (YB)

Heat

Risk factors for injury:

Elderly, infants, children
CVD, diabetes, renal dysfunction, extensive skin disorders or scarring
Poor physical conditioning
Not acclimatized to heat
Strenuous activity

Assess for medications which predispose to hyperthermia: anticholinergics, stimulants, antipsychotics, diuretics etc.

Prevention / Treatment
WMS guidelines

Heat acclimatization:, physical conditioning:
1 to 2 hrs exercise in heat daily for up to 10 days prior to leaving OR limit exercise intensity, duration during 1st week in hot climate

Appropriate clothing: lightweight, loose, light-coloured clothes; wide brimmed hat

Maintain hydration
Mild-moderate exertion - water
Intensive or extensive duration: salt replacement- salty snacks, food, salt tablets
DO NOT OVER-HYDRATE.

Be able to differentiate between heat exhaustion and exercise-associated hyponatremia and their treatment

Cold

Risk factors:

Elderly, Infants, children
CVD, PVD, peripheral neuropathy
Arctic or high-altitude destinations
Exposure to humidity, rain, water immersion, wind

Agents that increase risk of frostbite: beta-blockers, sedatives, neuroleptics, alcohol, smoking

Prevention/Treatment
WMS guidelines

Clothing, gloves, footwear appropriate for expected temperatures

Water activities - flotation devices, self-rescue knowledge to minimize duration of immersion

Treatment of frostbite (if > 2 hrs from medical care)
Rapid rewarming in warm water (37 - 39 ° C)
Analgesics e.g. ibuprofen
Loose, dry gauze dressings
DO NOT THAW IF POTENTIAL FOR REFREEZING

Water-Related Concerns

Freshwater Recreational Water(YB)

Schistosomiasis ([IAMAT](#)); (YB)
Risk: exposure to freshwater in [endemic areas](#)
Prevention: avoid wading, swimming or other contact with untreated freshwater

Leptospirosis ([GC](#)), (YB) ([WHO](#))
Risk: contact with contaminated freshwater or wet soil; consuming contaminated water or food
Prevention: Avoid exposure to potentially contaminated water e.g. flood water if possible; wear protective clothing esp. footwear: high risk, short term exposure, can consider doxycycline prophylaxis (200 mg weekly, starting 1-2 days before and continue during exposure period)

Warm fresh water:
Naegleria fowleri ([CDC](#)): **Risk:** swimming in lakes, rivers, hot springs; nasal irrigation (e.g. ritual cleansing for Hajj)

Marine Waters

[Risk of infection from seawater \(IJE\)](#)
Increased risk of ear ailments, GI illness, and other symptoms reported in seawater swimmers esp. if head is immersed

Marine life: stingrays, jelly fish such as box jelly fish, blue bottles, sea urchins, etc. (YB)
Risk of exposure in tropical coastal areas
Prevention: swim on patrolled beaches, wear protective clothing during season - long sleeves, wetsuit, aqua shoes
Treatment depends on species

Water safety

Water safety abroad ([GC](#))
Water and aquatic injuries ([Injury Prevention YB](#))

Wilderness Expeditions Pre-travel Assessment

[Adventure Travel\(YB\); fitfortravel](#)

Medical / medication history

- Co-morbidities which could be exacerbated by altitude, heat or cold extremes, physical extremes
- Previous travel history - altitude sickness, hypothermia, frostbite, heat exhaustion, etc.
- Required medications, medical devices

Access to medical care

- Pre-travel medical check
- Pre-travel dental check
- Does guide (or other member of group) have medical training?
- Consider **wilderness first-aid course**, ex: [Red Cross Wilderness & Remote First-Aid Course](#)

Physical fitness

- Physical exertion involved in trip
- Consider pre-travel conditioning, exercise program

Mental fitness

- Separation from support networks
- Pressure of physical demands
- Change in routine
- Unfamiliar culture

Guided vs. self-planned trip

- Communication arrangements
- Supplies

Insurance

- Travel, medical rescue security, repatriation
- Wilderness rescue insurance often separate from travel insurance
- Ensure includes
 - Coverage for duration of longer trips
 - Coverage for clients with underlying conditions
 - Coverage for baby if early delivery on trip

Additional resources:

Textbooks: Auerbach's *Wilderness Medicine*; Auerbach's *Field Guide to Wilderness Medicine*; Oxford HandBook of Expeditions and Wilderness Medicine; Duff & Gormly *First Aid and Wilderness Medicine* pocketbook

Adventure Sport Pre-travel Assessment

Experience/skill level

- Training and/or guided trips for beginners

Physical conditioning required?

Availability, condition of equipment

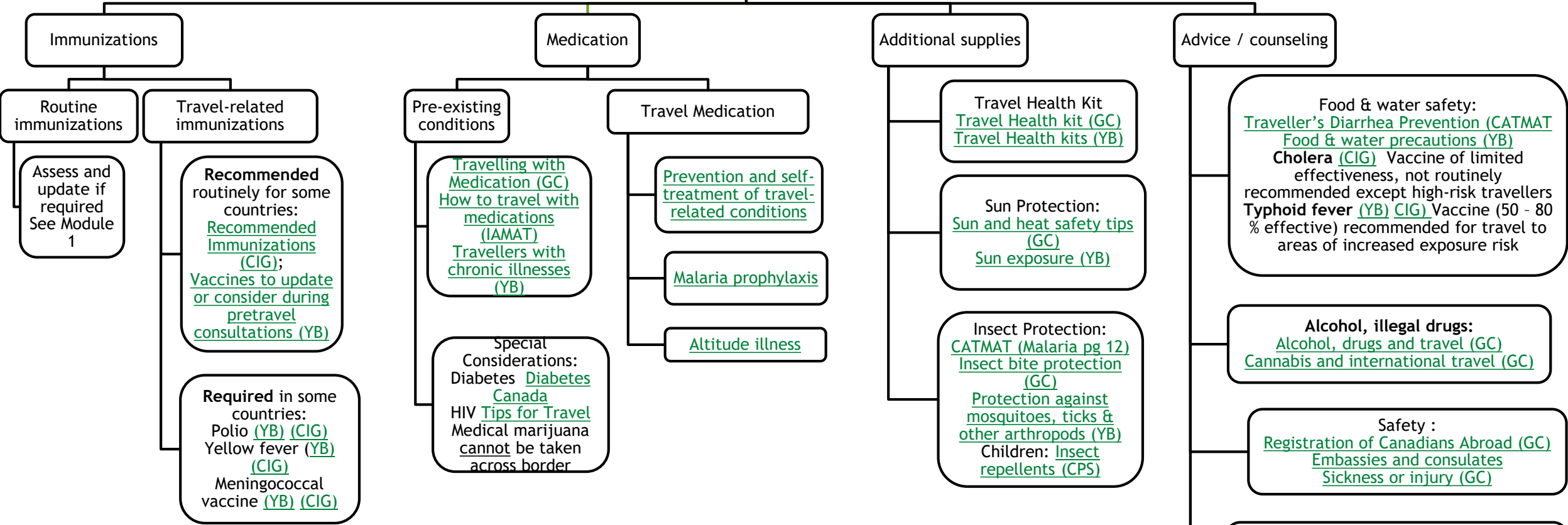
Availability of emergency medical care

Travel insurance

- Include adventure sports rider

Travel Healthcare Plan

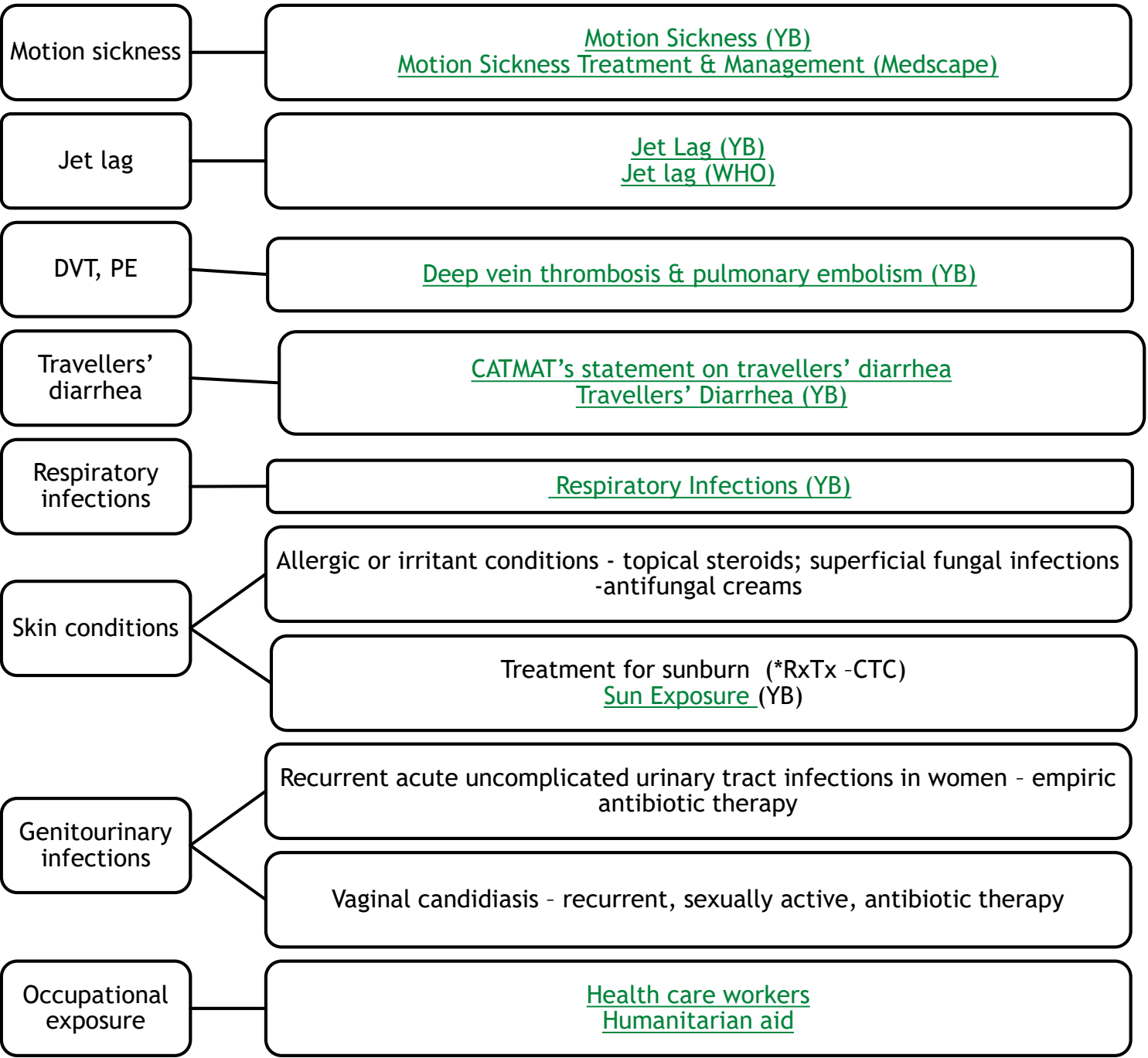
Pre-Travel Providers' Rapid Evaluation Portal;
Travax; Tropimed



Dispensing, administration, counselling on vaccines:
 SIM: [Biological Products](#)
 CIG: [Active Vaccines](#)
 DPD: [Manufacturer's monographs](#)
 RxTx: e-CPS monographs
 Lexicomp: Vaccine monographs

Post-travel:
 Schedule injections to complete vaccination series after return
 Advise to see healthcare provider If return with or develop fever, persistent diarrhea, rash or other symptoms after return.
 Always inform healthcare provider they have been outside Canada

Prevention and Self-Treatment of Travel-Related Conditions
Self-Treatable Conditions (YB)
 (last section Pretravel Consultation monograph);
*Information for the Traveller (*RxTx - CTMA)*



*RxTx accessible through PIP or [SHIRP](#)

Post-travel Assessment
(For clients with symptoms or concerns)

Client Evaluation
Important elements (YB) ;
Medical Checklist (TravMed)
Consider destination, exposures,
prophylaxis, severity and timing of
symptoms, underlying conditions
etc.

**Have a low threshold for Directral to
FP/NP especially if moderate / severe
or persistent symptoms**
Lab tests or imaging may be required to
identify cause

Post-travel Vaccines, Medications
- Post-travel TST if recommended
- Complete malaria prophylactic
regimens if applicable
- Schedule injections to complete
vaccination series if applicable

Fever
Fever in Returning International Traveller
(CATMAT)
Fever in Returned Travellers (YB)

Diarrhea
Persistent Travellers' Diarrhea (YB)

Skin Conditions
Skin & Soft Tissue Infections in Returned
Travellers(YB)

Respiratory Infections
Respiratory Infections (YB)

**Other symptoms such as unexplained
fatigue, weight loss presenting post-
travel**

Immunization and Travel Health Resources

- ▶ Canadian Immunization Guide <https://www.canada.ca/en/public-health/services/canadian-immunization-guide.html>
- ▶ Saskatchewan Immunization Manual <https://www.ehealthsask.ca/services/Manuals/Pages/SIM.aspx>
- ▶ CDC Health Information for International Travel (Yellow Book) <https://wwwnc.cdc.gov/travel/page/yellowbook-home>
- ▶ CanTravNet - The international Society of Travel Medicine - <https://www.istm.org/cantravnet>
- ▶ CDC Traveller's Health Clinician Resources <https://wwwnc.cdc.gov/travel/page/clinician-information-center>
- ▶ World Health Organization International travel and health <https://www.who.int/ith/en/>
- ▶ Travel and Tourism, Gov't of Canada <https://travel.gc.ca/>
- ▶ Committee to Advise on Tropical Medicine and Travel (CATMAT) Statements & Recommendations <https://www.canada.ca/en/public-health/services/catmat.html>
- ▶ Information for Travel Health <https://www.canada.ca/en/public-health/services/catmat.html>
- ▶ International Association for Medical Assistance for Travellers (IAMAT) <https://www.iamat.org/> (free subscription)
- ▶ Tropimed (Travel Medicine Support System) <http://www.tropimed.com> (license purchase required)
- ▶ Travax www.travax.com (membership purchase required)
- ▶ Travel Clinic Operations Guide, Edition 5, Shoreland <https://www.shoreland.com/content/pdf/clinicguide.pdf>
- ▶ Promed International society for infectious diseases <https://www.promedmail.org/>
- ▶ International Travel Health Guide <https://www.travmed.com/pages/health-guide>
- ▶ fitfortravel: Information on how to stay safe and healthy abroad <https://www.fitfortravel.nhs.uk/home>