Hot Topics in Infectious Diseases

(For Infection Control Practitioners)

SASKPIC Conference 2023
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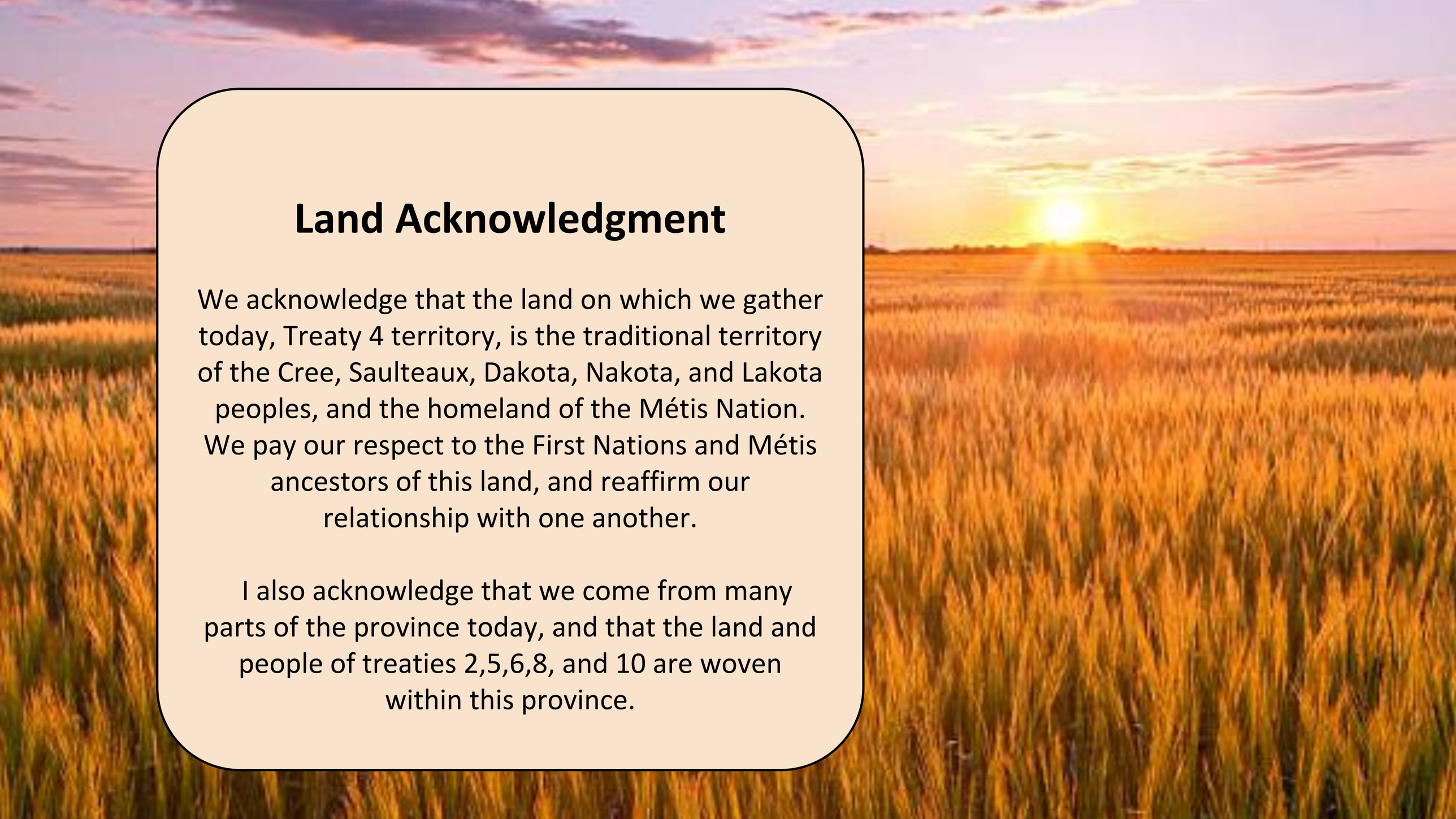


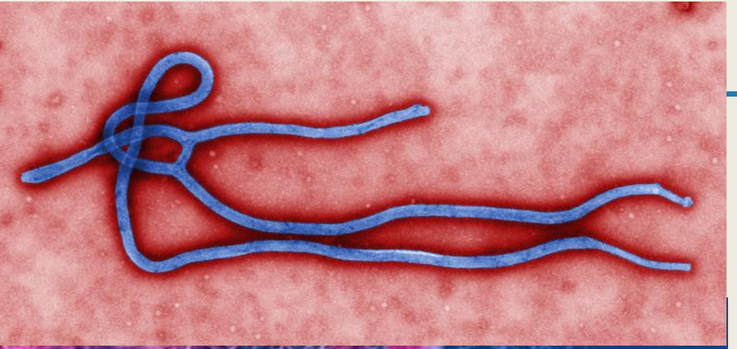
Land Acknowledgment

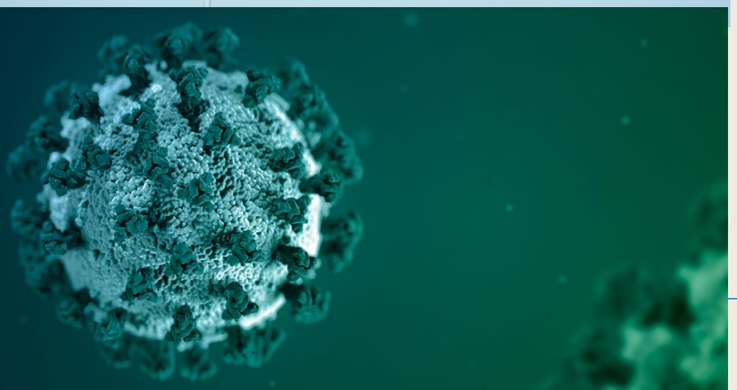
We acknowledge that the land on which we gather today, Treaty 4 territory, is the traditional territory of the Cree, Saulteaux, Dakota, Nakota, and Lakota peoples, and the homeland of the Métis Nation. We pay our respect to the First Nations and Métis ancestors of this land, and reaffirm our relationship with one another.

I also acknowledge that we come from many parts of the province today, and that the land and people of treaties 2,5,6,8, and 10 are woven within this province.

Disclosures:

- Honorarium - ViiV Regional advisory board
- Honorarium - Moderna regional advisory board
- There are no identifiable conflicts of interest with today’s presentation





Objectives:

Suggested “Hot Topics” of 2023

- ***VIRAL HEMMORHAGIC FEVERS***:To discuss the clinical presentation of some viral hemmorhagic fevers (Ebola virus disease, Marburg virus disease, CCVF)
- ***ANTIMICROBIAL RESISTANCE***: What’s new with ARO’s
- ***RESPIRATORY VIRUSES:*** what to expect this fall

Coronavirus confirmed as pandemic by World Health Organization

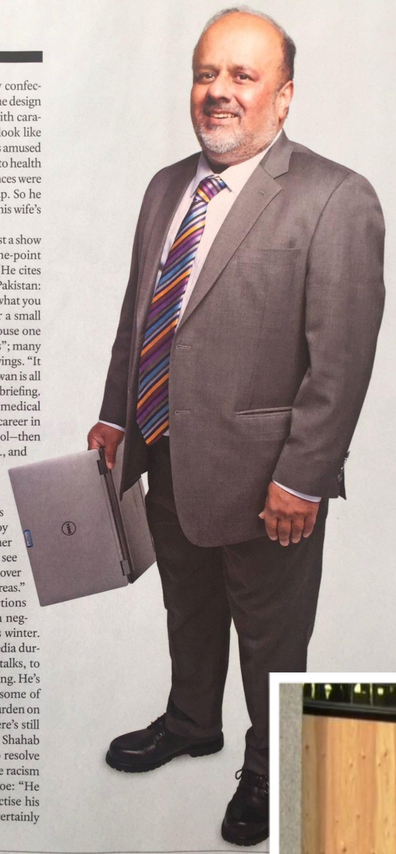
11 March 2020

Coronavirus outbreak has officially become pandemic says WHO

The coronavirus outbreak has been labelled a pandemic by the World Health Organization (WHO).

Prairie star

A fortunate Saskatchewan has rallied around its top doctor, Saqib Shahab

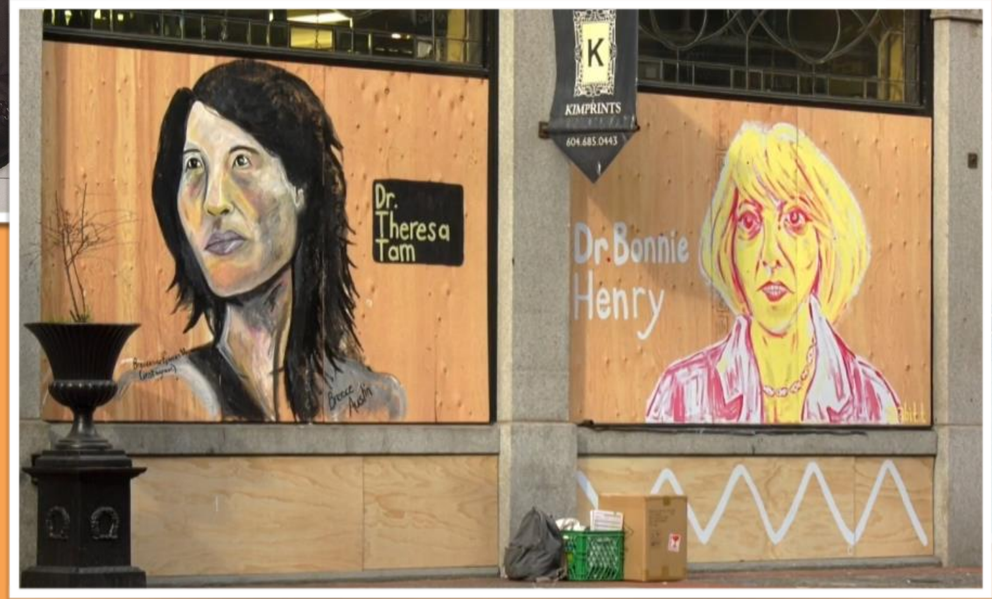


WHEN STAFF AT a Tim Hortons in Regina wanted to pay confectionary tribute to Saskatchewan's top public health doctor, the design was pretty obvious: two chocolate eclairs fused together with caramel icing trim and white "buttons" down the middle, to look like Dr. Saqib Shahab's trademark brown knit cardigan vests. He's amused they became his trademark—he'd only begun wearing them to health updates because early in the pandemic, when such appearances were daily, he didn't have enough suit-jacket combos to keep up. So he began donning his many sweater vests, including the ones his wife's aunt had knit for him, with matching ones for his kids.

The doughnut, introduced in February, was more than just a show of gratitude for Shahab, whose compassionate and to-the-point briefings made him a household name in Saskatchewan. (He cites a saying of his father's, once a prominent civil servant in Pakistan: "Tell the truth, because then you don't have to remember what you said.") It was also a very Canadian show of solidarity after a small group of anti-restriction protesters picketed outside his house one Saturday. Premier Scott Moe called them a "group of idiots"; many families sent Shahab support messages and children's drawings. "It gives wind to my sails, certainly, and that is what Saskatchewan is all about and what Canada is all about," Shahab said at the next briefing.

He's one of Canada's longest-serving provincial chief medical officers, in his current post since 2012. Shahab started his career in Pakistan, where he helped create its first public health school—then he answered a job posting in the small city of Yorkton, Sask., and became enamoured with the Prairies' relaxed pace and wide open spaces. There's been little relaxing during the last year: he recalls, in the coronavirus crisis's first months, that his research, reading and briefings only allowed him four hours of sleep per night. But he's also taken more of the year to enjoy Regina's outdoors, reckoning he's walked and cycled farther in the last 12 months than he's driven. He's been pleased to see others doing the same: with a ban on indoor social gatherings over Christmas, "every inch of snow had footprints on it in open areas."

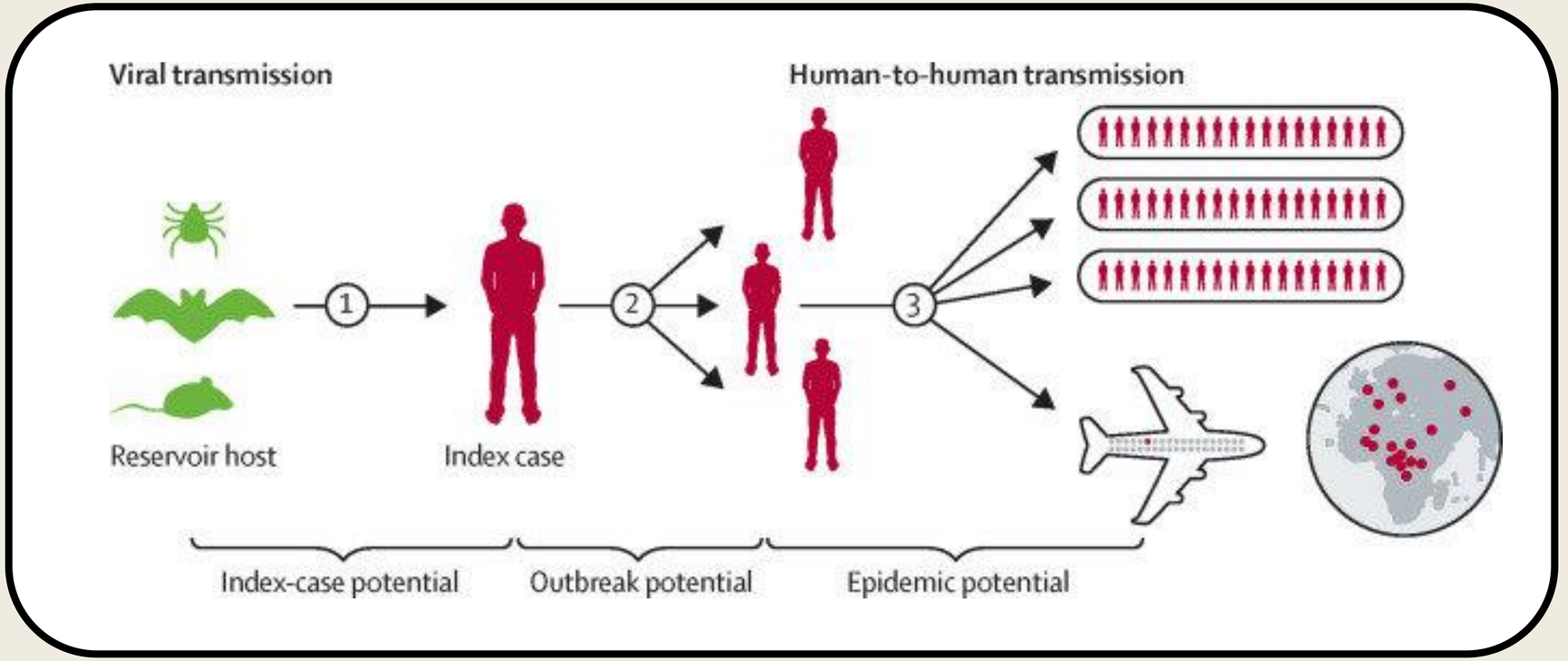
Saskatchewan was compliant enough with the restrictions Shahab urged—and, let's be realistic, lucky—that it had a negligible first wave, and a late and limited second wave this winter. Even though he is well distanced from the premier and media during briefings, Shahab insists on wearing a mask when he talks, to show frontline workers it's no impediment to communicating. He's preached restraint on lockdowns; Saskatchewan has had some of Canada's lightest restrictions: "Every measure puts some burden on people and it has to be proportionate to the risk." But there's still pushback, and at one rally last fall, the criticism got racist. Shahab says the few who criticize him based on ethnicity need to resolve their issues, and he's more concerned about those who face racism but who lack his own privileges and protections. Says Moe: "He could have chosen anywhere in the world to go and practise his trade, but he didn't. He chose here, and Saskatchewan is certainly a better place because of the choice he made." JM



NEW YORK TIMES, A Rubin July 29, 2022

What’s hot with Viral Hemmorhagic Fevers?

Why does it matter?

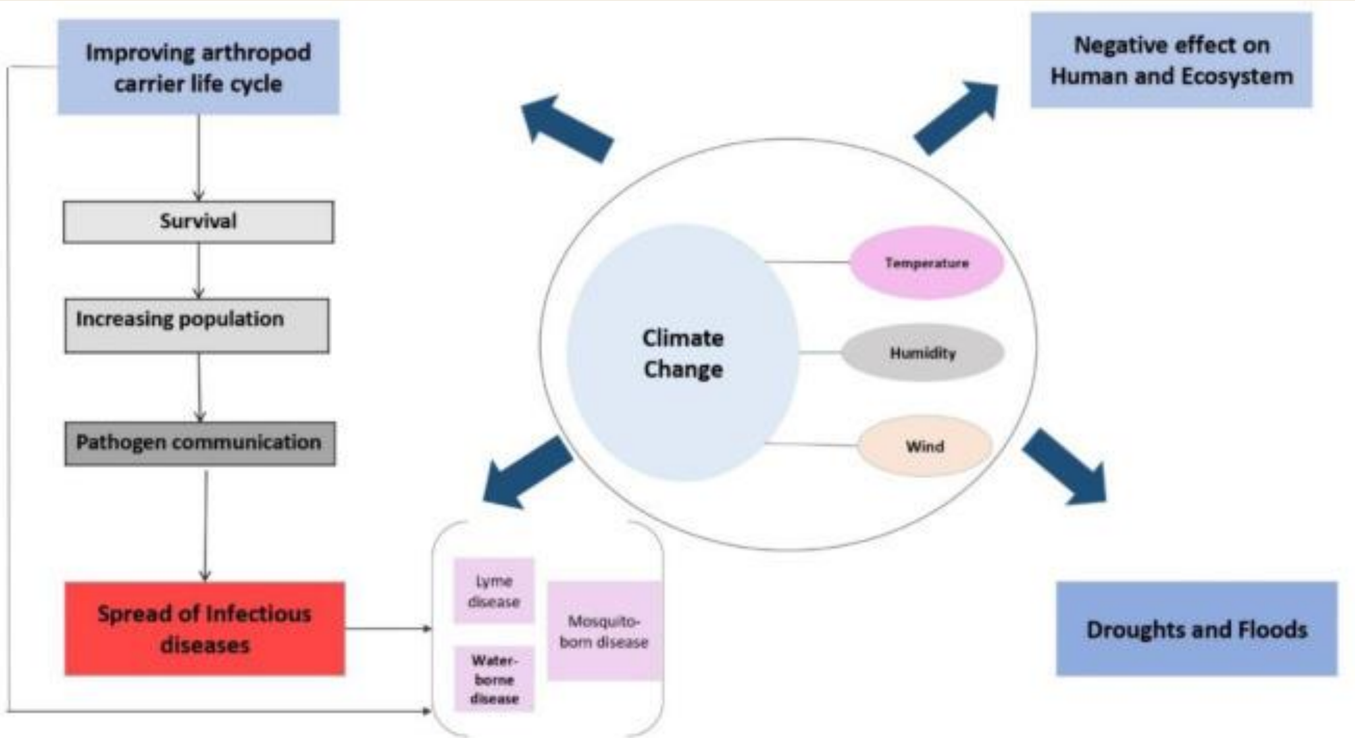


Conceptual progression of a viral haemorrhagic fever from animal reservoir to global pandemic:

Keys stages in the progression to a potential widespread epidemic are summarised. Stage 1, index-case potential, refers to spillover viral transmission from animal reservoir to index cases. Stage 2, outbreak potential, represents an index case infecting individuals within the local community or in a care-giving setting quantified via a composite indicator assessing outbreak receptivity. Stage 3, epidemic potential, reflects the widespread transmission of the virus both at regional and international scales.

Local, national, and regional viral haemorrhagic fever pandemic potential in Africa: a multistage analysis. The Lancet. Pigott DM et al. VOLUME 390, ISSUE 10113, P2662-2672, DECEMBER 16, 2017

The effects of global warming

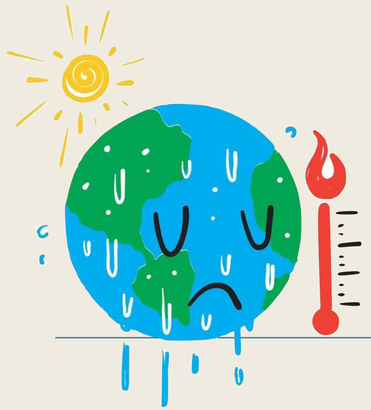


- Increase in reservoir animals (eg. Bat species)
- Increase geographic spread of vector arthropods
- Lengthen duration of transmission season
- Increase natural disasters, risk of disease
- Increase antimicrobial resistance

Rocklöv, J., Dubrow, R. Climate change: an enduring challenge for vector-borne disease prevention and control. *Nat Immunol* **21**, 479–483 (2020).

Mojahed N et al. Climate Crises and Developing Vector-Borne Diseases: A Narrative Review. Iran J Public Health. 2022 Dec;51(12):2664-2673.

- Many factors at play: land-use changes, the abundance of reservoir hosts, migration patterns, control measures, natural climate variability
- BUT…”it is clear that vectorborne disease systems (pathogens, vectors, and reservoir hosts) are highly responsive to the varied environments they inhabit and that observed changes in the rates of vectorborne diseases at given locations are often associated with concomitant changes in the local climate.”
- Aedes mosquitoes of Dengue fever, expanding from tropical and sub-tropical climates to Latin America, Caribbean, South Asia, and sub-Saharan Africa (now available in Florida , Texas, Arizona and Hawaii)
- Expansion of Ixodes ticks into Canada and Norway, with a corresponding increase in cases of Lyme disease



Climate Change and Vectorborne Diseases. Thomson, Medeline C et al. N Engl J Med Nov 2022;387:1969-78.

Viral Hemorrhagic Fevers

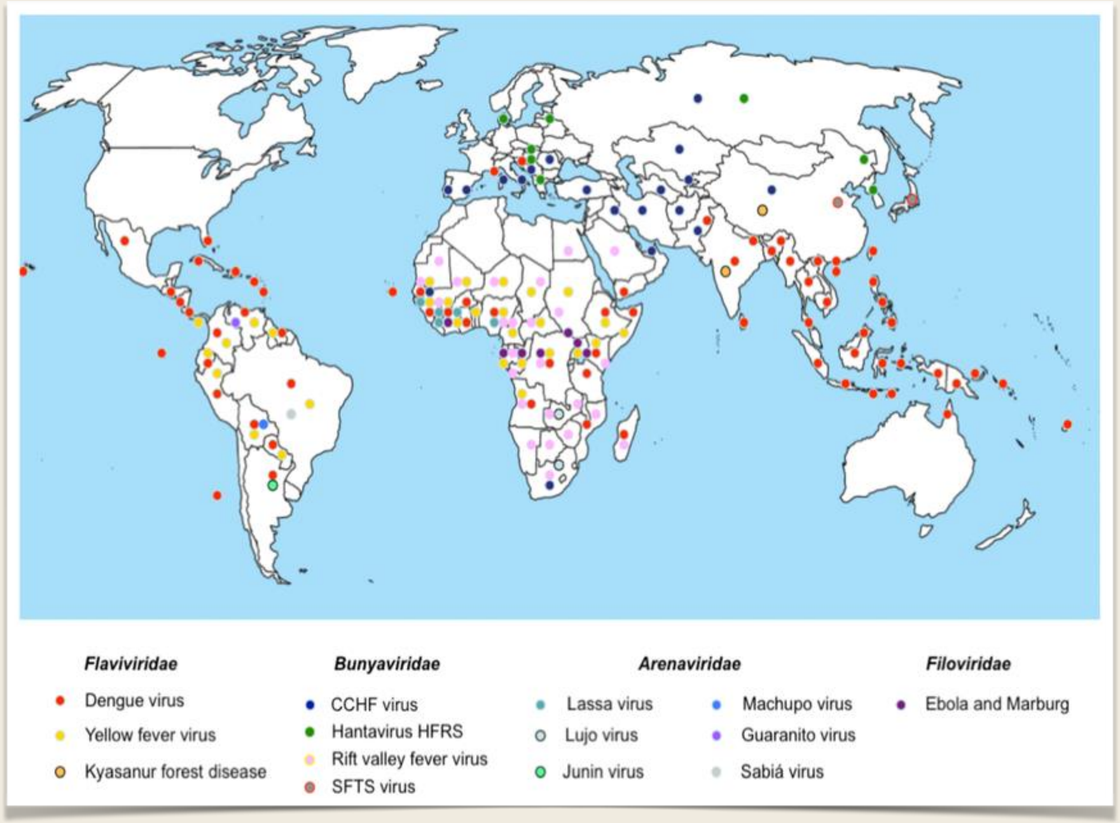
- 4 families of viruses

Family of viruses	Vectors	Name of viral hemorrhagic fever
Bunyaviridae	Mosquito	Rift valley fever
	Tick	Crimean-congo hemorrhagic fever
	Rodent	Hantavirus fever
Flaviviridae	Mosquito	Dengue fever, yellow fever
	Tick	Omsk fever, kyasanur forest disease
Arenaviridae	Rodent	Lujo virus fever, lassa fever, argentine fever, bolivian fever, venezuelan fever
Filoviridae	Bat	Ebola hemorrhagic fever, marburg hemorrhagic fever

- **WHO Risk Group 4** (high individual and community risk) -

A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measures are not usually available.

- Global distribution, global community
- Person-to-person transmission occur for some
- Blood and body fluid transmission (nosocomial) also occurs



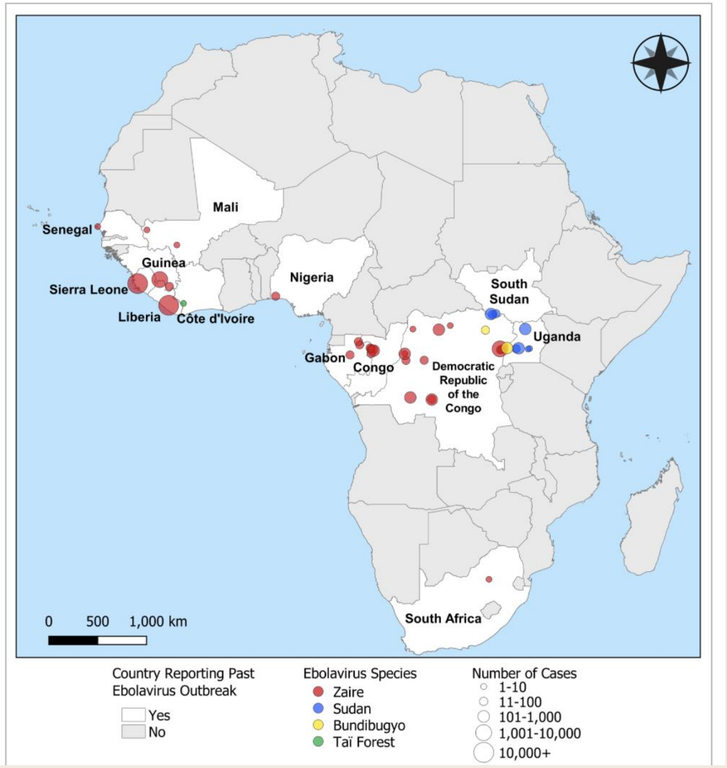
Lahariya C, Goel M K, Kumar A, Puri M, Sodhi A. Emergence of viral hemorrhagic fevers: Is recent outbreak of crimean congo hemorrhagic fever in India an indication?. J Postgrad Med 2012;58:39-46

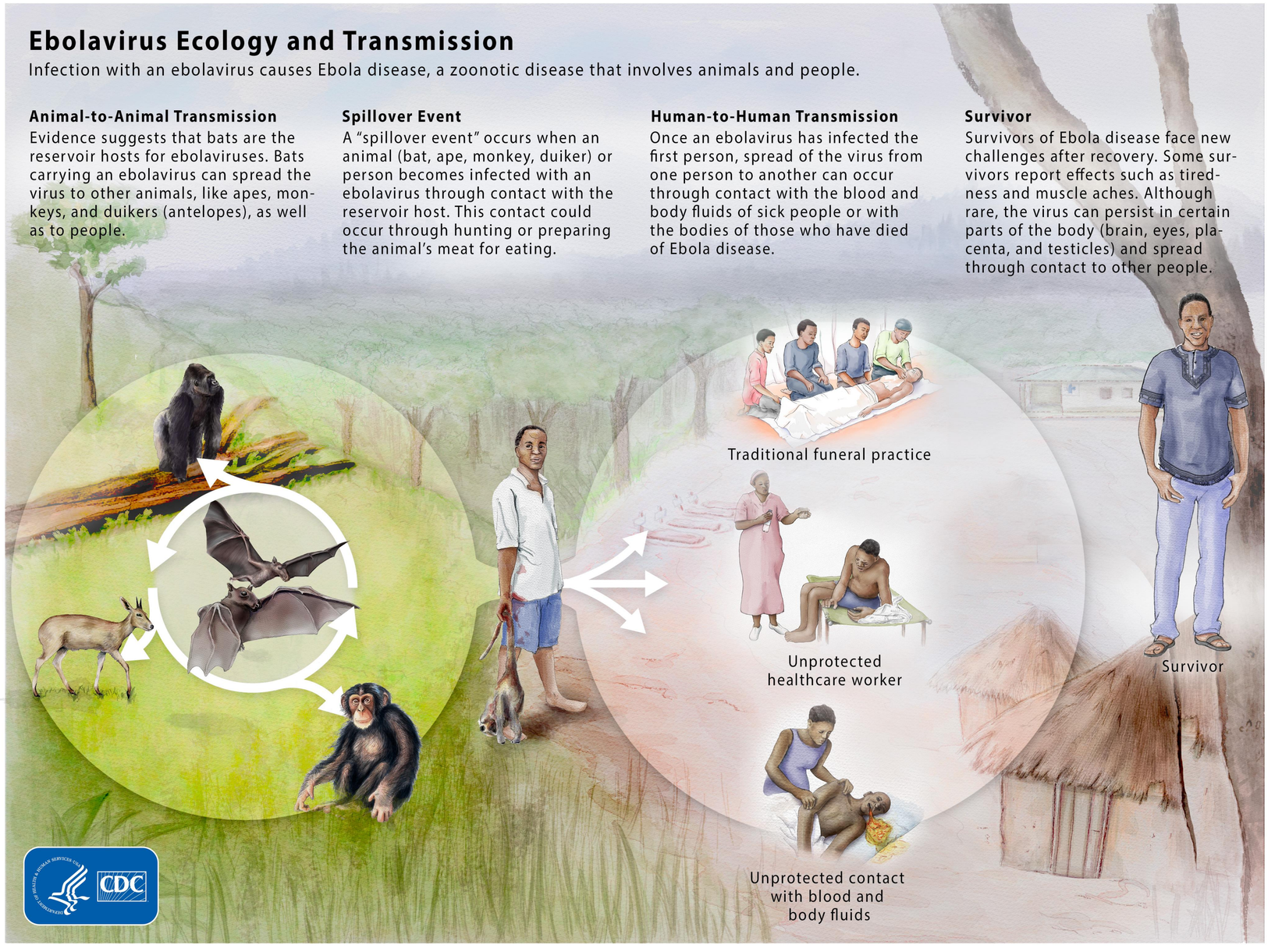
Ebola Virus Disease

- Discovered in 1976, along Ebola River in former Zaire (now Democratic Republic of the Congo)
- Low seroprevalence (1.4%) suggests asymptomatic infection doesn’t really occur
- Mortality ranges 50-90% depending on the type of ebola virus
- 4 types infect humans: *Ebola (Zaire ebolavirus), Sudan ebolavirus, Taï Forest ebolavirus, Bundibugyo ebolavirus*
- Natural reservoir: fruit bats; can be transmitted by non-human primates & other infected animals
- Sub-Saharan Africa
- Latest outbreak Sept 20, 2022 ~ Jan 11, 2023 (Sudan ebolavirus) in Mubende district, West Uganda with142 confirmed cases with 55 deaths (34% fatality)
- Democratic Republic of the Congo, April~July and Aug~Sept 2022, total 6 cases, 100% fatality (Zaire ebolavirus)

Ebola Virus Disease

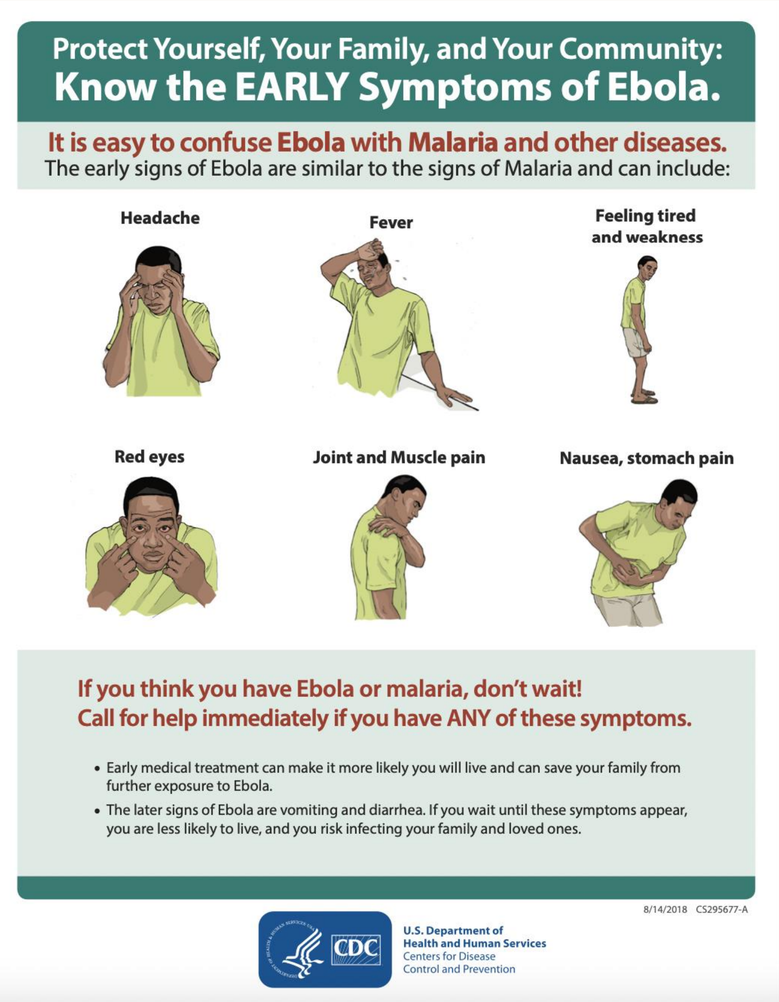
Ebola Disease Outbreaks by Species and Size, Since 1976

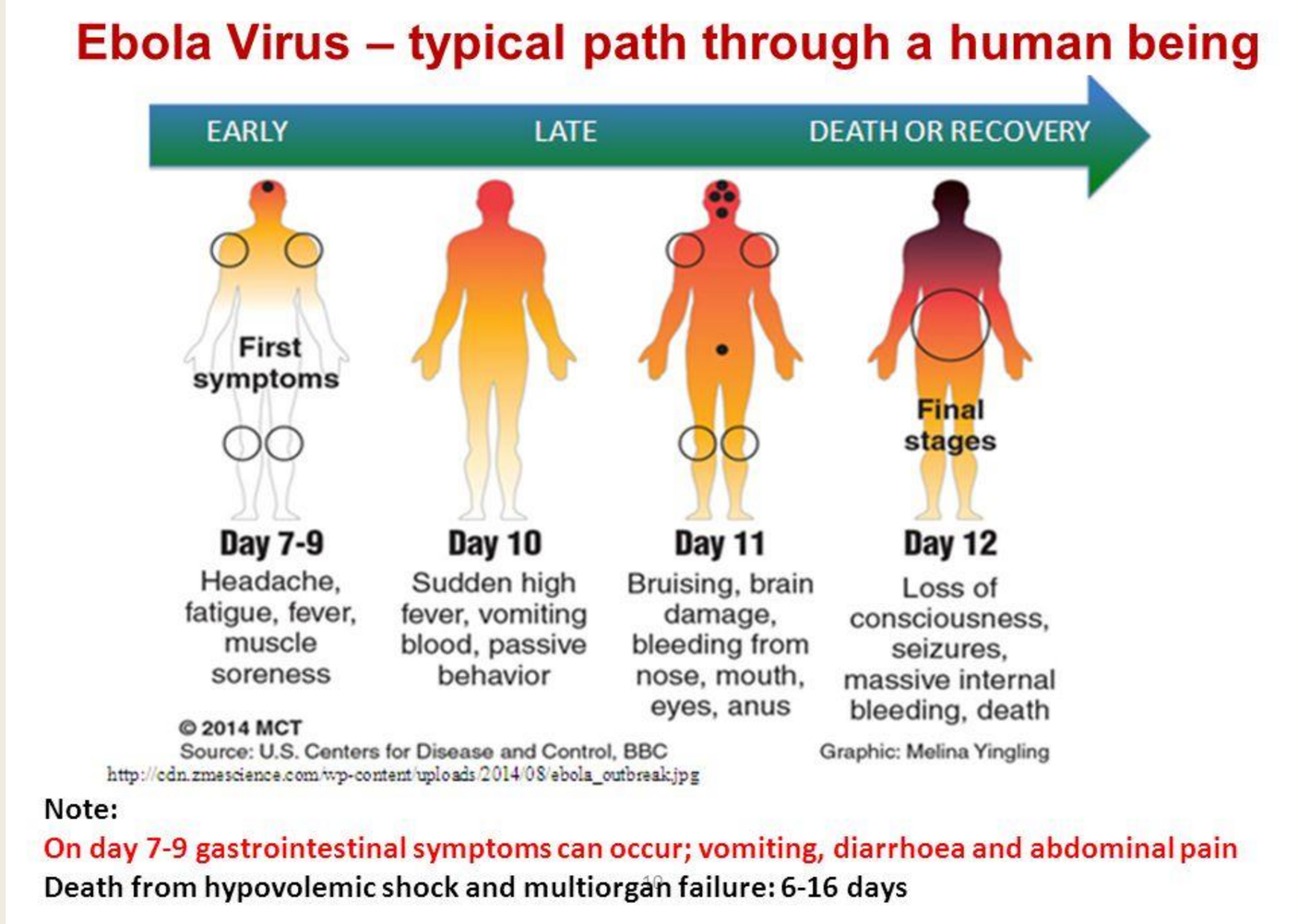




Ebola Virus Disease

- Incubation 2-21 days
- Moves from “dry” to “wet” symptoms





Ebola Prevention & Treatment

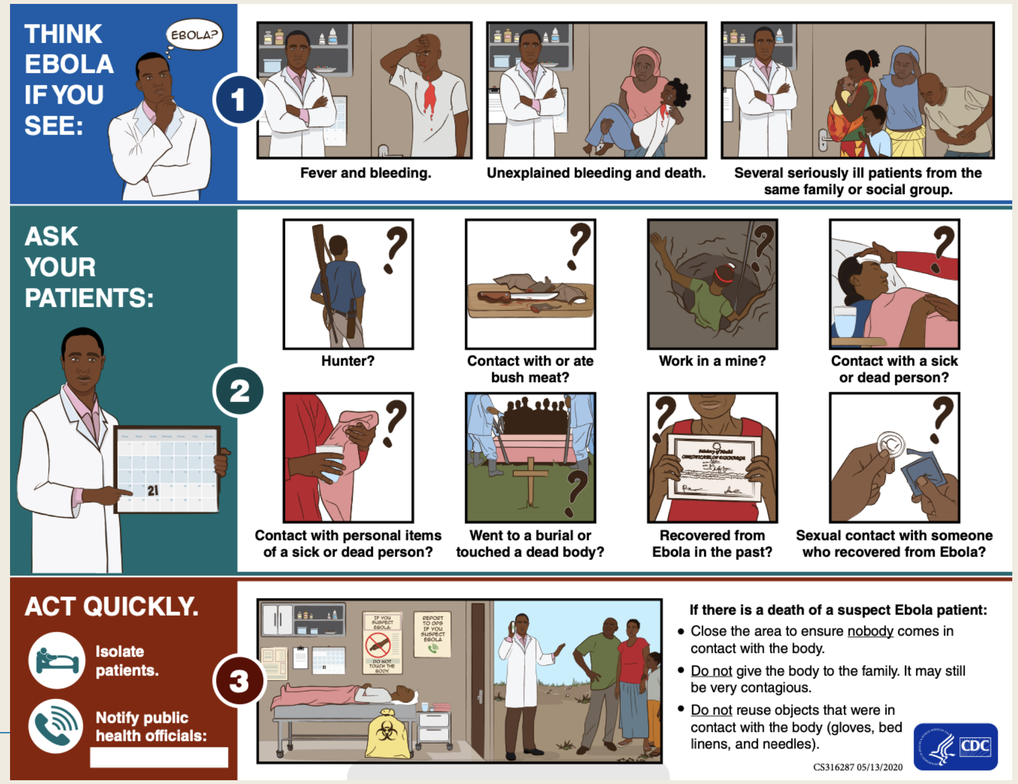
THINK - ASK - ACT

IDENTIFY - ISOLATE - INFORM

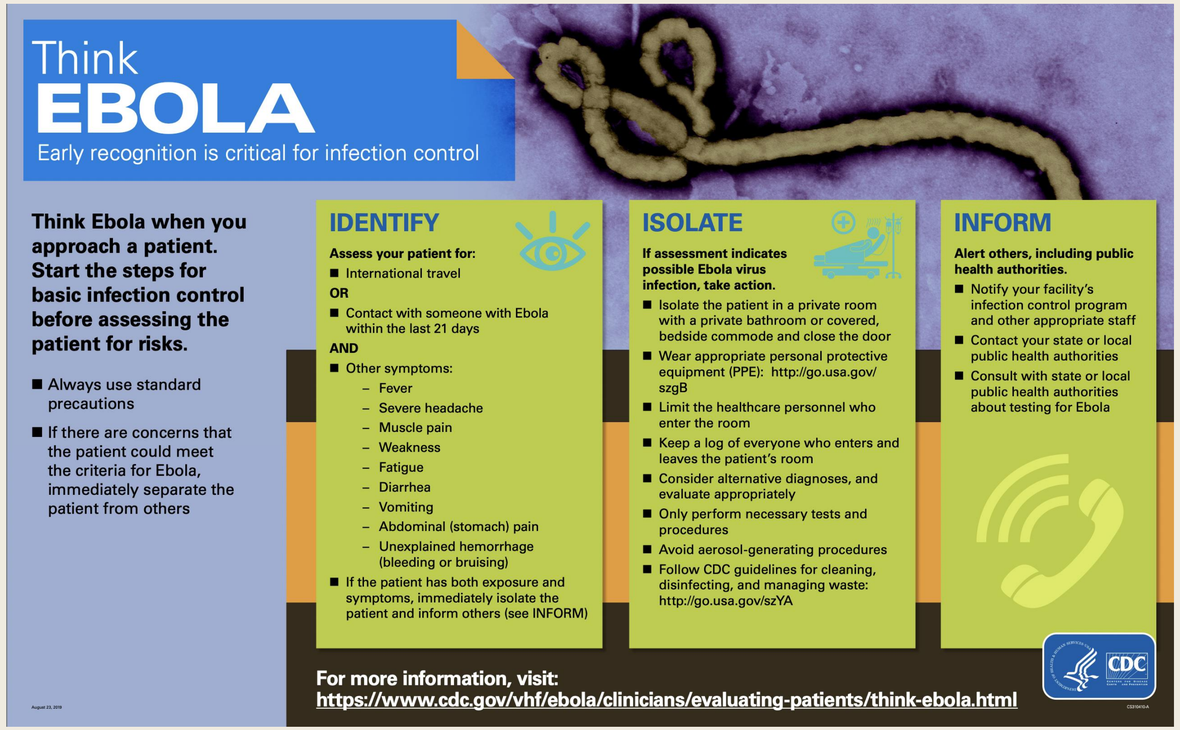
- **Ebola vaccine** rVSV-ZEBOV (called Ervebo®) became FDA approved Dec 2019
- single dose vaccine, only against Ebola virus (species Zaire ebolavirus)
- Since 2020 recommended in US as pre-exposure prophylaxis for adults ≥ 18 years at potential occupational risk of exposure to Zaire ebolavirus:
    - Responding to an outbreak caused by Ebola virus
    - Lab staff working at biosafety-level 4 facilities working with live Ebola virus
    - Healthcare personnel working at federally designated Ebola Treatment Centers

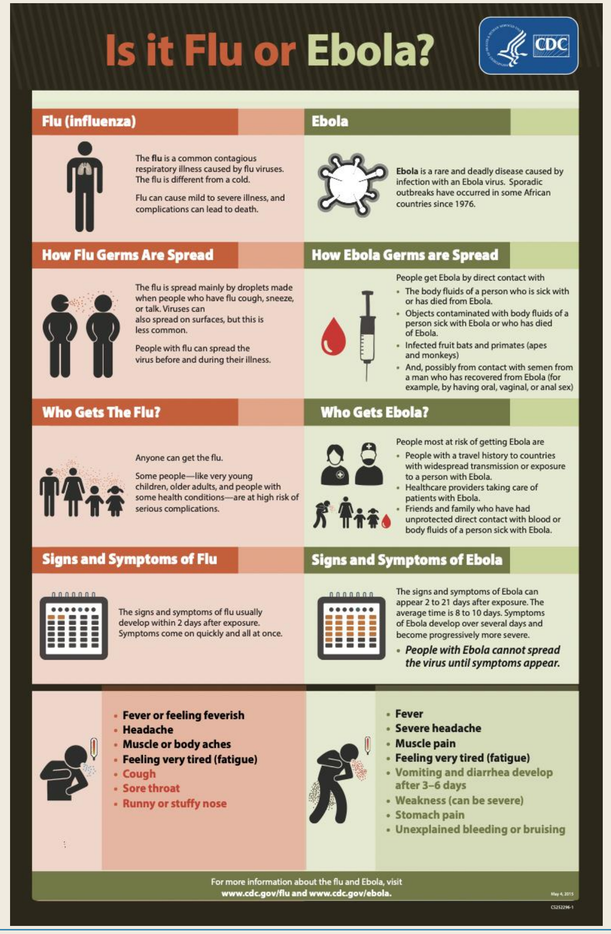
- **Ebola treatments** now available
- 2020: FDA approval of 2 Zaire ebolavirus monoclonal antibodies Inmazeb™ & Ebanga™
    - Inmazeb™ : 28-day mortality dropped from 51% to 33.8%
    - Ebanga™ : 28-day mortality dropped from 49.4% to 35.1%

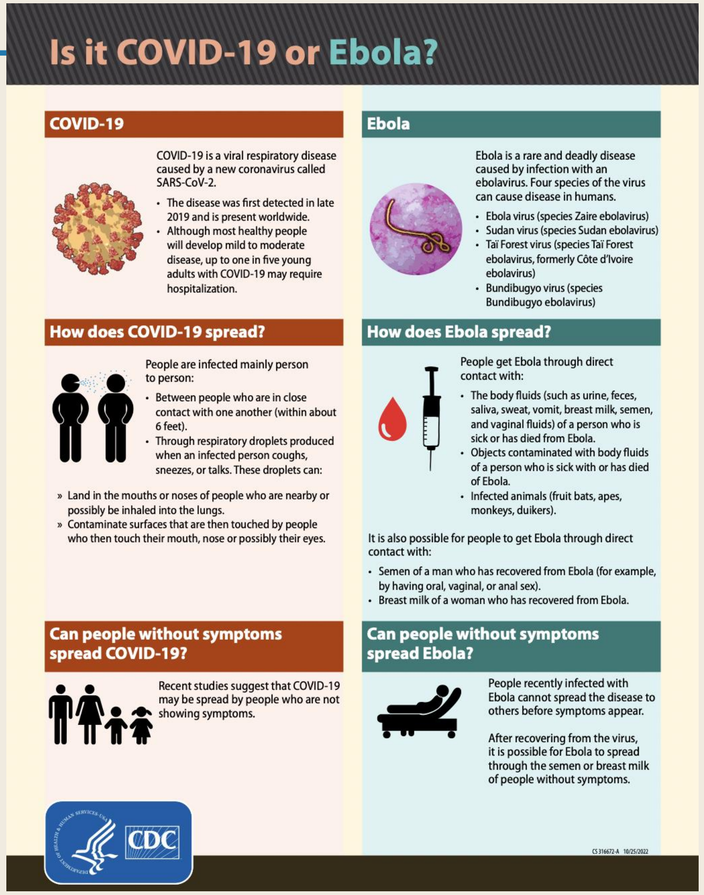
- **Best prevention remains avoidance!**



Ebola Virus Disease



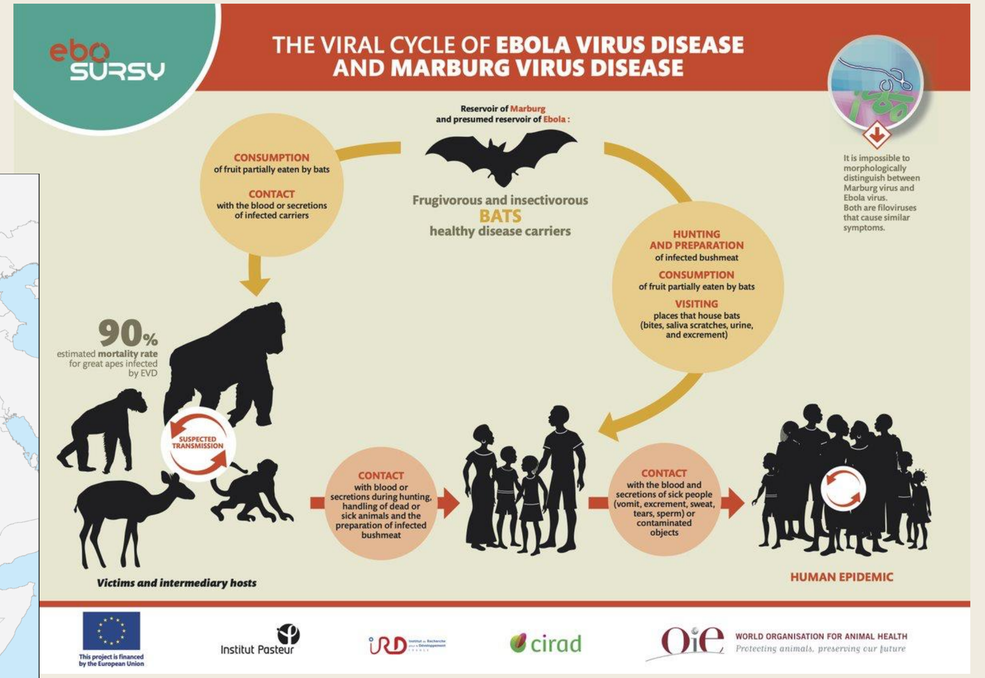




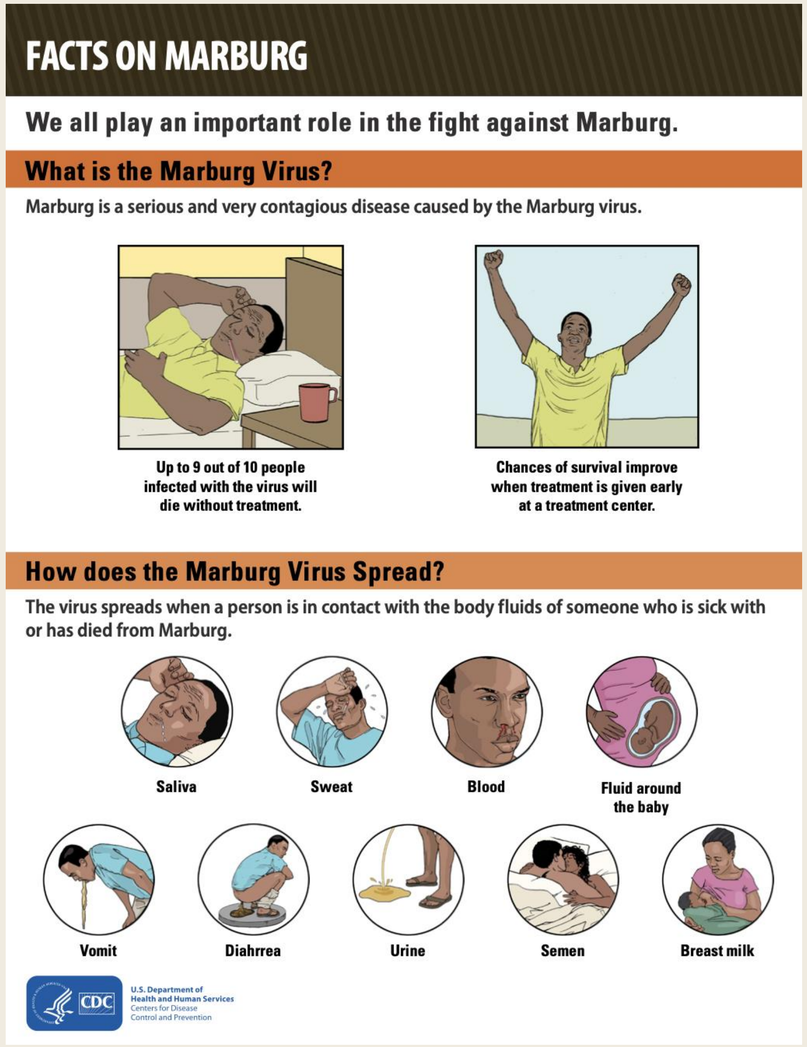
https://www.cdc.gov/vhf/ebola/resources/posters-and-factsheets.html#anchor_allcommus

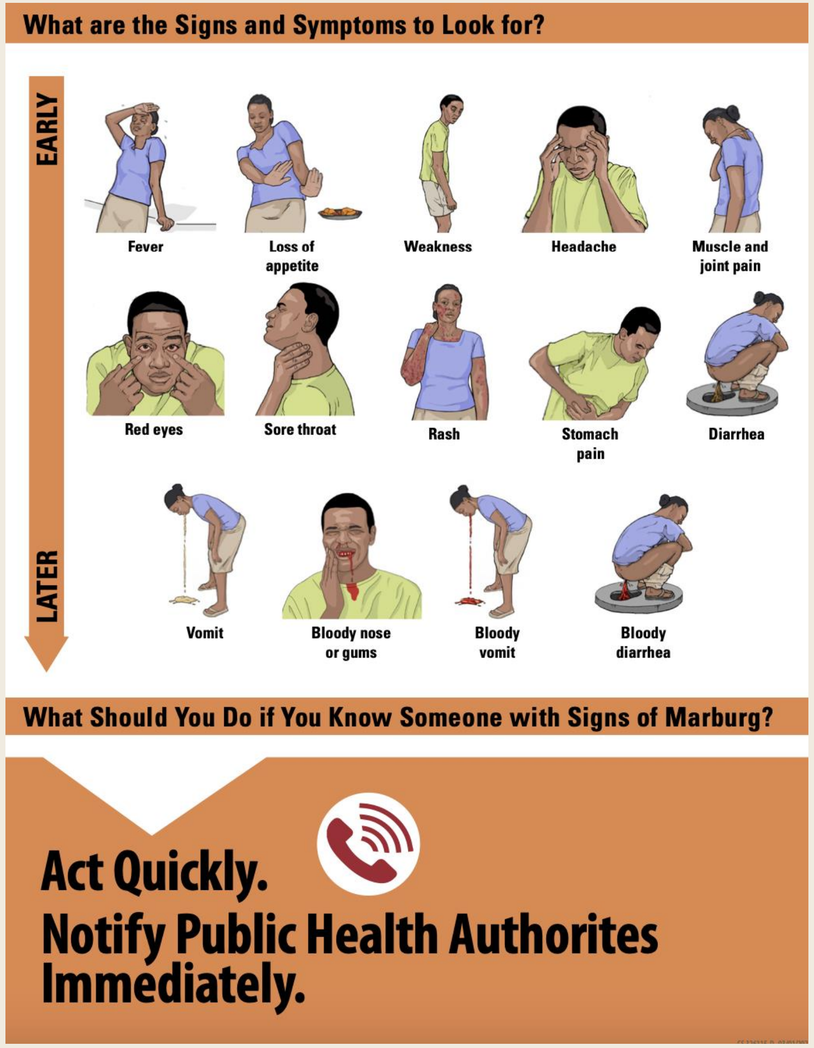
Marburg Hemorrhagic Fever

- Named for Marburg, Germany, lab outbreak 1967 (31 cases) in Marburg/Frankfurt/Belgrade
- Disease of Central Africa/Subsaharan Africa
- Outbreak in Equatorial Guinea Feb 13~June 8 2023: 16 confirmed & 23 probable cases, 12/16 and 23/23 died
- Outbreak in Tanzania Mar 21~May 31, 2023: 9 cases with 5 deaths (1 probable, 8 confirmed)
- Reservoir probably fruit bats (mines, caves) or other animals
- Easily transmissible thru blood and body fluid exposure
- Survives days on contaminated surfaces
- 5-10 day incubation



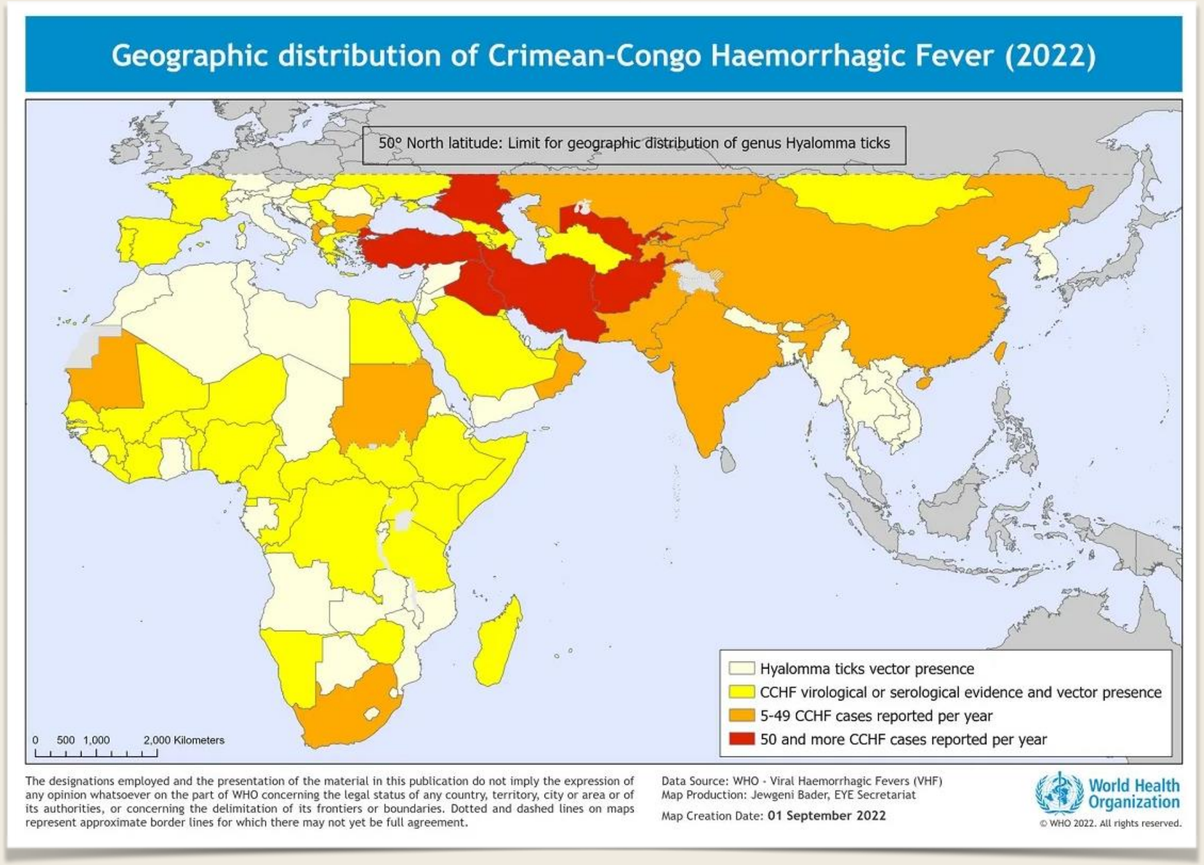
Marburg Hemorrhagic Fever





https://www.cdc.gov/vhf/marburg/resources/index.html#print

Crimean-Congo Hemmorhagic Fever



- Usually a disease of Africa, the Balkans, the Middle East and Asian countries south of the 50th parallel north
- 2016 - Spain
- 2022 - Turkey
- With climate change, new cases seen in Europe as *Hyalomma marginatum* ticks found in new areas
- ~30% mortality rate
- Host is wild and domestic animals (cattle, goat, sheep, ostrich)
- Transmission through tick bite or infected livestock
- Incubation 5~13 days, death in 2 weeks of illness
- Jan 1~May 22, 2022 outbreak in Iraq with 212 cases, 27 deaths; most had history of livestock contact (sheep, cattle)

What's hot with Antimicrobial Resistance Organisms?

World Health Organization

AWaRe

A
Access

which indicates the antibiotic of choice for each of the 25 most common infections. These antibiotics should be available at all times, affordable and quality-assured

Access

Amoxicillin
Amoxicillin and clavulanic acid
Ampicillin
Benzathine benzylpenicillin
Benzylpenicillin
Cefalexin or cefazolin
Chloramphenicol
Clindamycin
Cloxacillin
Doxycyline
Gentamicin or amikacin
Metronidazole
Nitrofurantoin
Phenoxymethylpenicillin
Procaine benzylpenicillin
Spectinomycin
Sulfamethoxazole and trimethoprim

Core access antibiotics

Azithromycin
Cefixime
Cefotaxime
Ceftriaxone
Ciprofloxacin
Clarithromycin
Piperacillin and tazobactam
Meropenem
Vancomycin

* Antibiotics that are also in the Watch group

Wa
Watch

which includes most of the "highest-priority critically important antimicrobials" for human medicine and veterinary use. These antibiotics are recommended only for specific, limited indications

Watch

Anti-pseudomonal penicillins with beta-lactamase inhibitor (eg, piperacillin and tazobactam)
Carbapenems or penems (eg, faropenem, imipenem and cilastatin, meropenem)
Cephalosporins, third generation (with or without beta-lactamase inhibitor; eg, cefixime, cefotaxime, ceftazidime, ceftriaxone)
Glycopeptides (eg, teicoplanin, vancomycin)
Macrolides (eg, azithromycin, clarithromycin, erythromycin)
Quinolones and fluoroquinolones (eg, ciprofloxacin, levofloxacin, moxifloxacin, norfloxacin)

Reserve

Aztreonam
Cephalosporins, fourth generation (eg, cefepime)
Cephalosporins, fifth generation (eg, ceftaroline)
Daptomycin
Fosfomycin (intravenous)
Oxazolidinones (eg, linezolid)
Polymyxins (eg, colistin, polymyxin B)
Tigecycline

Re
Reserve

antibiotics that should only be used as a last resort when all other antibiotics have failed

- Mike Sharland, et al. Classifying antibiotics in the WHO Essential Medicines List for optimal use—be AWaRe, The Lancet Infectious Diseases,Volume 18, Issue 1, 2018, Pages 18-20.
- https://adoptaware.org

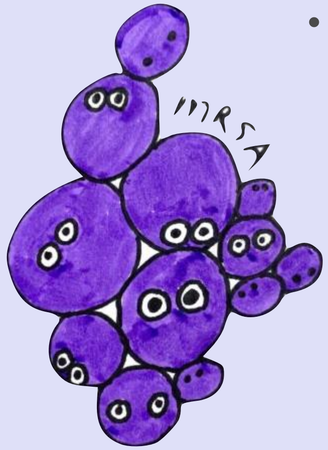
Alphabet Soup or ARO's

- MRSA — Methicillin Resistant Staphylococcus aureus
- VISA — Vancomycin Intermediate Resistant [illegible] aureus
- VRSA — Vancomycin Resistant [illegible] aureus
- VRE — Vancomycin [illegible] faecium
- ESBL — Extended-[illegible] Beta-Lactamase
- CPE — [illegible]emase Producing Enterobacterales
- MDRTB — Multi-drug Resistant Tuberculosis

What does this mean for the patient?

Methicillin Resistant Staphylococcus aureus (MRSA)

- Resistance conferred to most other beta-lactams (cefazolin, ceftriaxone, piperacillin-tazobactam, meropenem, ertapenem)
- Often resistant to other classes: erythromycin, clindamycin, ciprofloxacin, fuscidic acid
- Blurred line between HA-MRSA & CA-MRSA … most is now CA-MRSA
- From 2017 to 2021, 35% increase in rates per 10,000 patient days were observed for MRSA BSIs (CNISP)
- More virulent? PROBABLY! Panton–Valentine leucocidin (PVL) producing strains accounted for 35–45%
- More than 1 in 6 (17.5%) with MRSA BSI died within 30 days of diagnosis (all-cause mortality).
- Since 2020, Daptomycin resistant MRSA identified



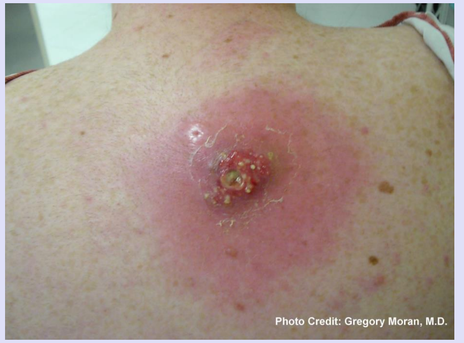
n/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2023-49/issue-5-may-2023/infections-antimicrobial-resistance-hospitals.html#:~:text=Between%202017%20and%202021%2C%

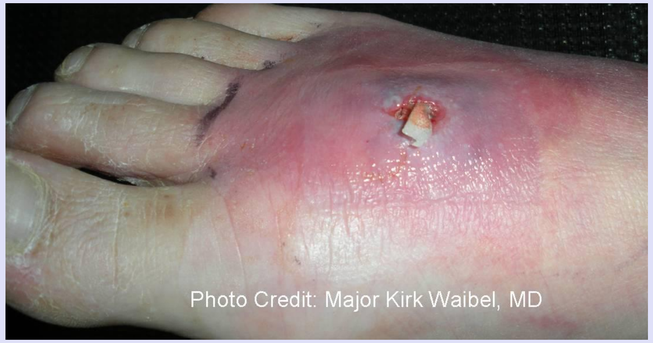
VISA & VRSA

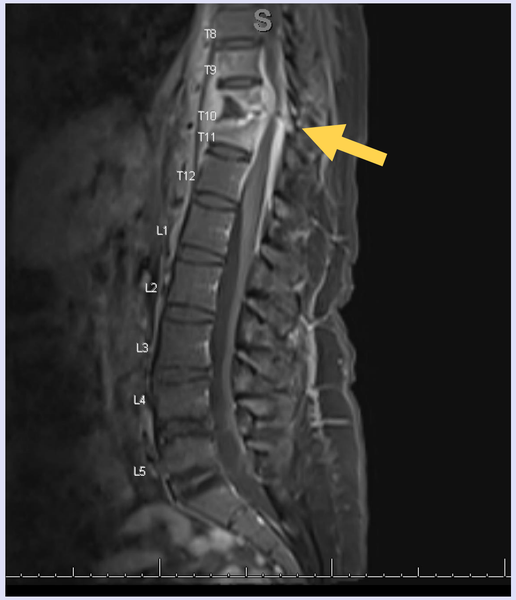
- So far remains rare
- VISA = Vancomycin MICs ≥4 mcg/mL
- Risk factors (CDC): recent dialysis, methicillin-resistant *S. aureus* (MRSA) bacteremia associated with central venous catheters or prosthetic graft material, and prolonged vancomycin exposure (6 to 18 weeks) in the three to six months preceding infection
- US and Europe surveillance: VISA = 0.3% of S.aureus isolates
- VRSA = Vancomycin MICs ≥ 32 mcg/mL
- Comes from transfer of vanA gene from VRE to S.aureus, first appeared clinically in 2002.
- On review 2002-2006, 7 cases in the US (Clin Infect Dis. 2008;46(5):668) all had prior colonization or infection with MRSA and VRE
- So far only 52 cases worldwide

Methicillin Resistant Staphylococcus aureus (MRSA)

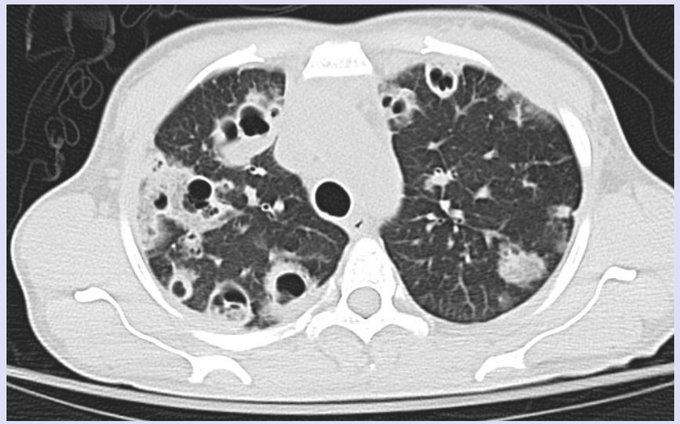
- What does this mean?
  - Increase morbidity
  - Longer hospital stays
  - Permanent disability
  - Fewer treatment options



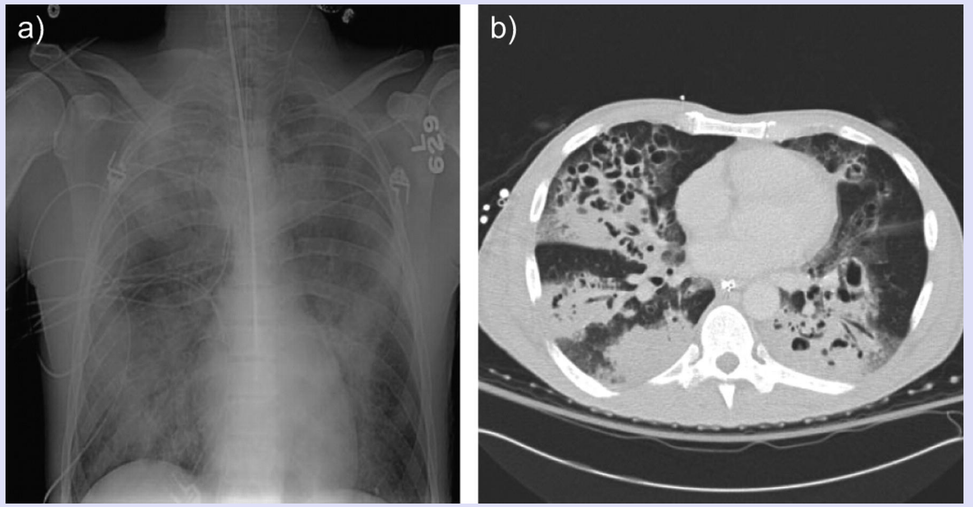




Recent patient on ID service RUH



Field Z, Madruga M. Innumerable septic pulmonary emboli [published online February 11, 2020]. Consultant360.

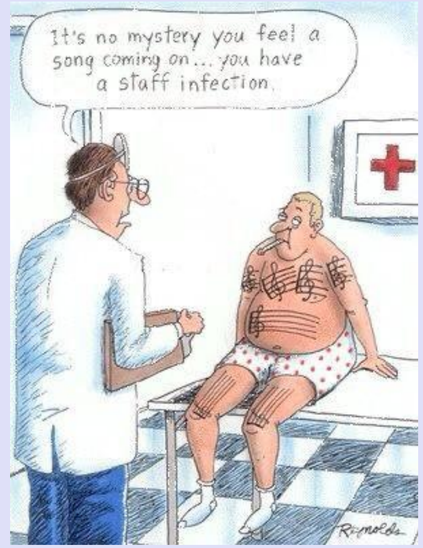


S. Defres, C. Marwick, D. Nathwani. European Respiratory Journal 2009 34: 1470-1476; **DOI:** 10.1183/09031936.00122309

Current treatment of MRSA infection

- **VANCOMYCIN** - glycopeptide: acute kidney injury, immune thrombocytopenia (DITP), neutropenia, rash
- **DAPTOMYCIN** - lipopeptide: won’t work in lungs, myositis, rhabdomyolysis, eosinophilic pneumonitis, rash
- **LINEZOLID -** oxazolidinone: bacteriostatic, many drug interactions (monoamine oxidase inhibitor, serotonin syndrome risk with serotonergic agents) , myelosuppression
- **5th GEN CEPHALOSPORINS** - Ceftaroline, Ceftobiprole
- **OTHER:** Trimethoprim-Sulfamethoxazole, Clindamycin, Teicoplanin, Tigecycline

Future treatments of MRSA infection



- ***Dalbavancin (Oritavancin)***
  - long-acting lipoglycopeptide (once a week!)
  - Risk of cross resistance to Daptomycin and Vancomycin
  - Not yet approved for anything but SSTI

- ***Combination therapy***
  - Dapto + Ceftobiprole (Ceftaroline) - our current go-to if combo is used
  - Vanco or Dapto + “other” (Cefazolin, Cloxacillin, Gentamicin) -“no” due to increase toxicities or ineffective

- ***Novel therapies:*** Bacteriophages (Phage therapy) and endolysins ???

https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2023-49/issue-5-may-2023/infections-antimicrobial-resistance-hospitals

Vancomycin Resistant Enterococcus faecium (VRE)

- CNISP showed:
  - 43% increase in rates per 10,000 patient days for VRE BSIs (2017 ~ 2021)
  - 32.7% all-cause mortality for VRE BSI’s (2016 ~ 2020)
  - 89.9% of VRE BSI’s were acquired in a healthcare facility (2017 ~ 2021)
  - 99.4% of VRE BSI isolates were identified as *Enterococcus faecium*
  - low levels of resistance to tigecycline (<1%), linezolid (<2%) and daptomycin (<9%) (2016 ~ 2020)
  - The once “harmless commensal organism” now causing significant morbidity and mortality

Canadian Nosocomial Infection Surveillance Program. Healthcare-associated infections and antimicrobial resistance in Canadian acute care hospitals, 2017–2021. Can Commun Dis Rep 2023;49(5):235–52. https://doi.org/10.14745/ccdr.v49i05a09

Is VRE more pathogenic?

- Little research to date
- “Putative” virulence factors being studied, some linked to vanA so could enhance virulence of vancomycin-resistant enterococcal strains
- Others are more predominant in *E. faecium,* such as cell surface adhesins that promote bacterial aggregation onto intestinal epithelium, renal cells, and extracellular collagen matrix
- *E faecium* also have virulence factors that enhance biofilm production, promoting IE and GU colonization
- Adhesins play role in infective endocarditis

Geraldes C, Tavares L, Gil S, Oliveira M. *Enterococcus* Virulence and Resistant Traits Associated with Its Permanence in the Hospital Environment. Antibiotics (Basel). 2022 Jun 26;11(7):857. doi: 10.3390/antibiotics11070857.

How do we treat VRE?

- Most E. faecium are resistant to beta-lactams (ampicillin, carbapenems, cephalosporins)
- Options are:
    - **DAPTOMYCIN** - Low levels fo resistance, no lung penetration
    - **LINEZOLID** - low levels of resistance, limited by myelosuppression and drug interactions
    - **TIGECYCLINE** - toxic, must be iv, must check susceptibility
    - TETRCYCLINE. - only ~30% susceptible
    - QUINUPRISTIN-DALFOPRISTIN - toxic, and no longer FDA approved
    - CHLORAMPHENICOL - toxic
    - FOSFOMYCIN - $$$ last line!

Carbapenemase Producing Enterobacterales (CPE)

- Thankfully CPE infection rates have remained low at 0.06 infections per 10,000 patient days (2018 to 2021)
- Thirty days all-cause mortality was 19.7% (n=38/193)
- 28.9% (n=48/166) of CPE infected patients reported travel outside of Canada and of those, 91.5% (n=43/47) received medical care while abroad

- The predominant carbapenemases identified in Canada in 2021 were (88.7%):
  - *Klebsiella pneumoniae* carbapenemase (KPC)
  - New Delhi metallo-ß-lactamase (NDM)
  - Oxacillinase-48 (OXA-48)

Table S5: Number and proportion of main carbapenemase-producing pathogens identified[a]

Pathogen	Year									
	2017		2018		2019		2020		2021	
	n	%	n	%	n	%	n	%	n	%
Klebsiella pneumoniae	51	25.4	66	28.2	57	21.3	48	19.5	51	17.7
Escherichia coli	60	29.9	54	23.1	83	31.1	83	33.7	69	24
Enterobacter cloacae complex[b]	39	19.4	44	18.8	60	22.5	54	22	64	22.2
Acinetobacter baumannii	14	7.0	6	2.6	5	1.9	1	0.4	4	1.4
Serratia marcescens	3	1.5	7	3.0	3	1.1	4	1.6	1	0.3
Citrobacter freundii	16	8	18	7.7	40	15	39	15.9	49	17
Klebsiella oxytoca	11	5.5	11	4.7	12	4.5	5	2	20	6.9
Others	7	3.5	28	12	7	2.6	12	4.9	30	10.4
Total number of isolates tested	201	N/A	234	N/A	267	N/A	246	N/A	288	N/A

Abbreviation: N/A, not applicable
[a] Includes data for all isolates submitted
[b] *Enterobacter cloacae* complex includes *Enterobacter cloacae* and other *Enterobacter* spp. but excluding *E. aerogenes*

https://www.canada.ca/en/public-health/services/reports-publications/canada-communicable-disease-report-ccdr/monthly-issue/2023-49/issue-5-may-2023/infections-antimicrobial-resistance-hospitals.

So what does this all mean for the patient?

Clinical Infectious Diseases

IDSA Infectious Diseases Society of America

hivma hiv medicine association

JOURNAL ARTICLE CORRECTED PROOF

Infectious Diseases Society of America 2023 Guidance on the Treatment of Antimicrobial Resistant Gram-Negative Infections FREE

Pranita D Tamma ✉, Samuel L Aitken, Robert A Bonomo, Amy J Mathers, David van Duin, Cornelius J Clancy Author Notes

Clinical Infectious Diseases, ciad428, https://doi.org/10.1093/cid/ciad428

Published: 18 July 2023 **Article history** ▾

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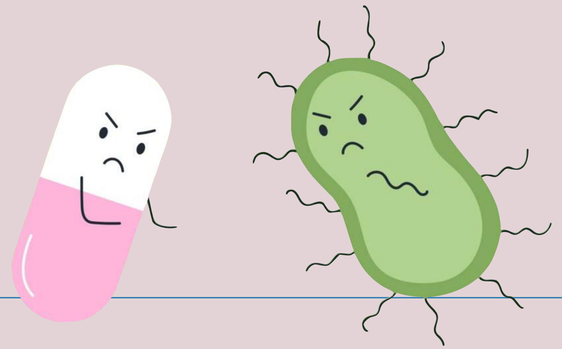
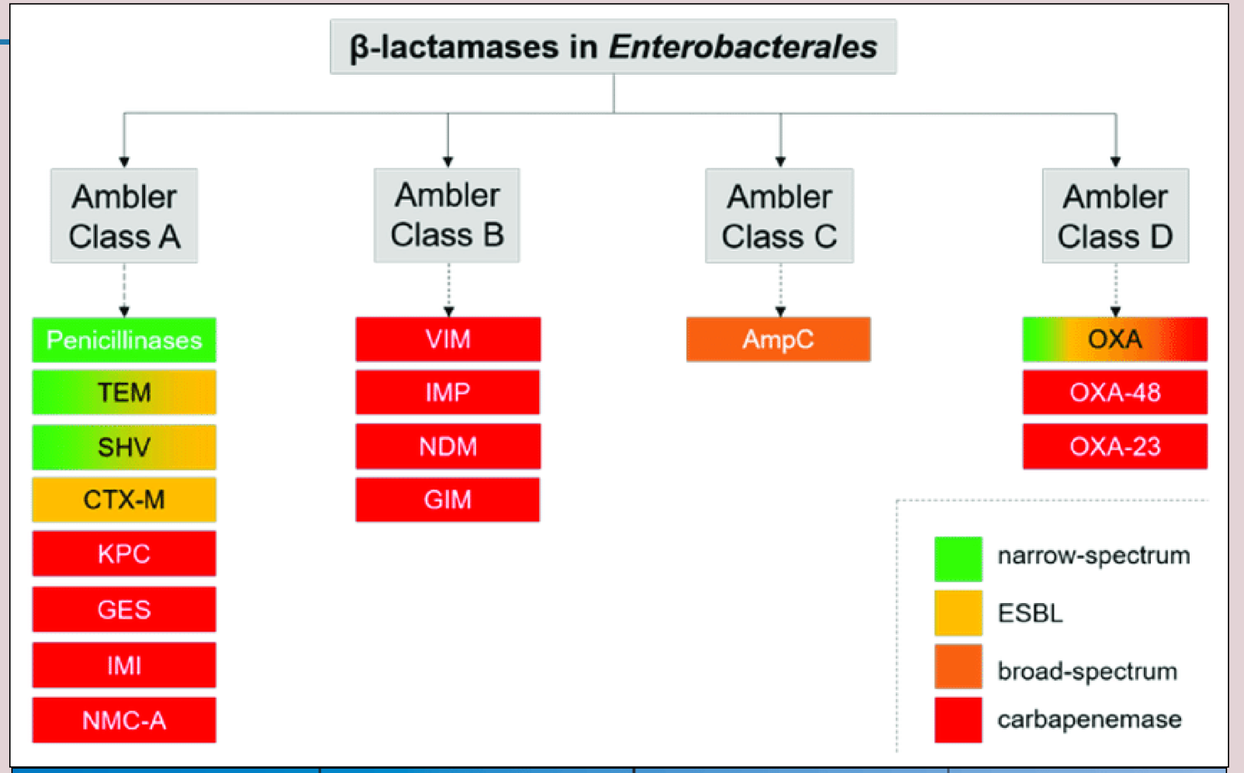


- Carbapenems: our LAST RESORT?
  - Ertapenem
  - Meropenem
  - Imipenem
- Resistance to Carbapenems leaves very little option for treatment
- most new therapies not really available in Canada

https://www.idsociety.org/practice-guideline/amr-guidance/

But there's more!
So many multi-drug resistant gram negatives

- extended-spectrum β-lactamase-producing Enterobacterales (ESBL-E)
- AmpC β-lactamase-producing Enterobacterales (AmpC-E)
- carbapenem-resistant Enterobacterales (CRE)
- Pseudomonas aeruginosa with difficult-to-treat resistance (DTR-P. aeruginosa)
- carbapenem-resistant Acinetobacter baumannii species (CRAB)
- Stenotrophomonas maltophilia



Ambler classification	Description or characteristics	Examples of enzymes	Bacterial strains
Class A (serine β-lactamase)	Cephalosporinases (ESBLs) Usually clavulanic acid susceptible, except for KPC	TEM, SHV, CTX-M, **KPC**, VEB	*Enterobacteriaceae*, *Pseudomonas* spp.
Class B (metallo-β-lactamase or MBL)	Contain metal ion (Zn) Carbapenemases Not inhibited by clavulanic acid Inhibited by aztreonam	**IMP, VIM, NDM**	*Enterobacteriaceae*, *Acinetobacter* spp., *Pseudomonas* spp.
Class C (AmpC β-lactamase – serine β-lactamase)	Resistant to clavulanic acid Intrinsic in certain species of Gram-negative	CMY, DHA	*Enterobacteriaceae*
Class D (serine β-lactamase)	Oxacillinases Susceptible to clavulanic acid Carbapenemase	**OXA**	*Enterobacteriaceae* (OXA-48 like), *Acinetobacter* spp.

https://incacare.live/new-antibiotics-against-multidrug-resistant-gram-negative-bacteria/
https://www.publish.csiro.au/ma/Fulltext/ma13014

Antimicrobials for Multi-drug Resistant Gram Negative Bacilli (MDR GNB) & Availability in AHS

Antimicrobial Agent[1]	Activity	AHS acute care hospital Formulary Status/ Availability/Cost	Contact Information
Cefiderocol (Fetroja)	CRE CPE CRPA (incl. MBL) CRAB SM	**SAP**[4] Very laborious acquisition process and expensive: $190 USD/1g + ~ $1,878 USD shipping	As of Dec 1, 2021, SAP requests are processed through Inceptua via Imap portal: https://inceptua.com **Shionogi** 1-800-849-9707 medinfo@shionogi.com
Ceftazidime-avibactam (Avycaz) 2.5 g	CRE Class A + D CPE CRPA (non-MBL)	**SAP**[4]	**AbbVie** AbbVie Medical Information Tel: 1-844-241-5011 medicalquestions@abbvie.com
Ceftolozane-tazobactam (Zerbaxa) 1.5 g vials contain ceftolozane 1 g/ tazobactam 0.5 g	CRE (non-CPP) CRPA (non-CPP) SM	**FRG** $142.80/1.5g	**Merck**
Fosfomycin IV (Ivozfo)	CRE CPE CRPA (incl. MBL)	**NF – STEDT** $19/gram	**Verity Pharmaceuticals** Contact: Summer Stewart, s.stewart@veritypharma.com
Imipenem-relebactam (Recarbrio) 1.25g vial contains imipenem 500mg/cilastatin 500mg/relebactam 250mg	CRE Class A + D CPE CRPA (non-MBL)	**SAP**[4] No charge	**Merck** 1-800-463-7251 regulatoryaffairs_canada@merck.com
Meropenem-vaborbactam (Vabomere)	CRE Class A CPE	Jan 2022 - No SAP process in place, per Melinta	**Melinta Therapeutics**
Plazomicin (Zemdri)	CRE CPE CRPA (incl. MBL)	Unavailable $315USD/500 mg	**Cipla** USA Courtney.Barton@Cipla.com
Colistin	CRE[2] CPE[2] CRPA CRAB	**F** $12.49/150mg	FRESENIUS KABI
Tigecycline (Tygacil)	CRE[3] CPE[3] CRAB SM	**FRG** Restricted to Infectious Diseases $17.50/50mg	Pfizer

For feedback or updates, contact Susan Fryters
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susan.fryters@ahs.ca ahs.ca

Alberta Health Services

Future therapies for MDR gram negative organisms

- Selection based on the bug and the beta-lactamase

Antimicrobials for MDR GNB & Availability in AHS | 2

1. Susceptibility testing available for all of these agents, except fosfomycin IV for non-*E. coli* Enterobacterales. Contact microbiology lab.
2. Intrinsic resistance of: *Proteus* species, *Providencia* species, *Morganella morgannii*, *Serratia marcescens*
3. Intrinsic resistance of: *Proteus* species, *Providencia* species, *Morganella morganii*
4. Special Access Programme contact information:
   Website: https://www.canada.ca/en/health-canada/services/drugs-health-products/special-access/drugs.html
   Phone: (613) 941-2108 (Must press 0 to reach an on-call officer)
   Fax: (613) 941-3194
   E-mail: SAPdrugs@hc-sc.gc.ca

CPE = carbapenemase-producing *Enterobacterales*
  Class A CPE – includes KPC, GES, NMC, SME, IMI carbapenemases
  Class D CPE – includes OXA carbapenemases
CPP: carbapenemase producer
CRAB = carbapenem-resistant *Acinetobacter baumannii*
CRE = carbapenem-resistant *Enterobacterales*
CRPA = carbapenem-resistant *Pseudomonas aeruginosa*
F = formulary
FRG = formulary, restricted with guidelines
MBL: metallo-β-lactamase
NF = non-formulary
SAP = Special Access Programme request
SM = *Stenotrophomonas maltophilia*
STEDT = Short Term Exceptional Drug Therapy request

Acknowledgments: Christine Ondro PharmD; Tanis Dingle MD; Susan Fryters BScPharm, ACPR

Reviewed by AHS Antimicrobial Stewardship Subcommittee, March 26, 2021
Approved by AHS Antimicrobial Stewardship Subcommittee, May 28, 2021
Last updated: July 28, 2023

Multidrug-resistant (MDR) and extensively drug-resistant (XDR) ***Pseudomonas aeruginosa***

Anti-pseudomonal antibiotics are limited:

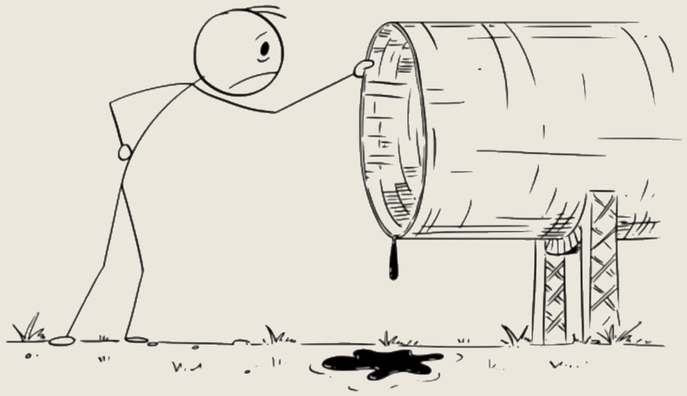
- antipseudomonal penicillins (piperacillin–tazobactam)
- cephalosporins (ceftazidime, cefepime)
- fluoroquinolones (ciprofloxacin, levofloxacin)
- aminoglycosides (tobramycin, gentamicin)
- carbapenems (meropenem, imipenem)
- Monobactam (aztreonam)

MDR-PA: R to one antibiotics in 3 classes

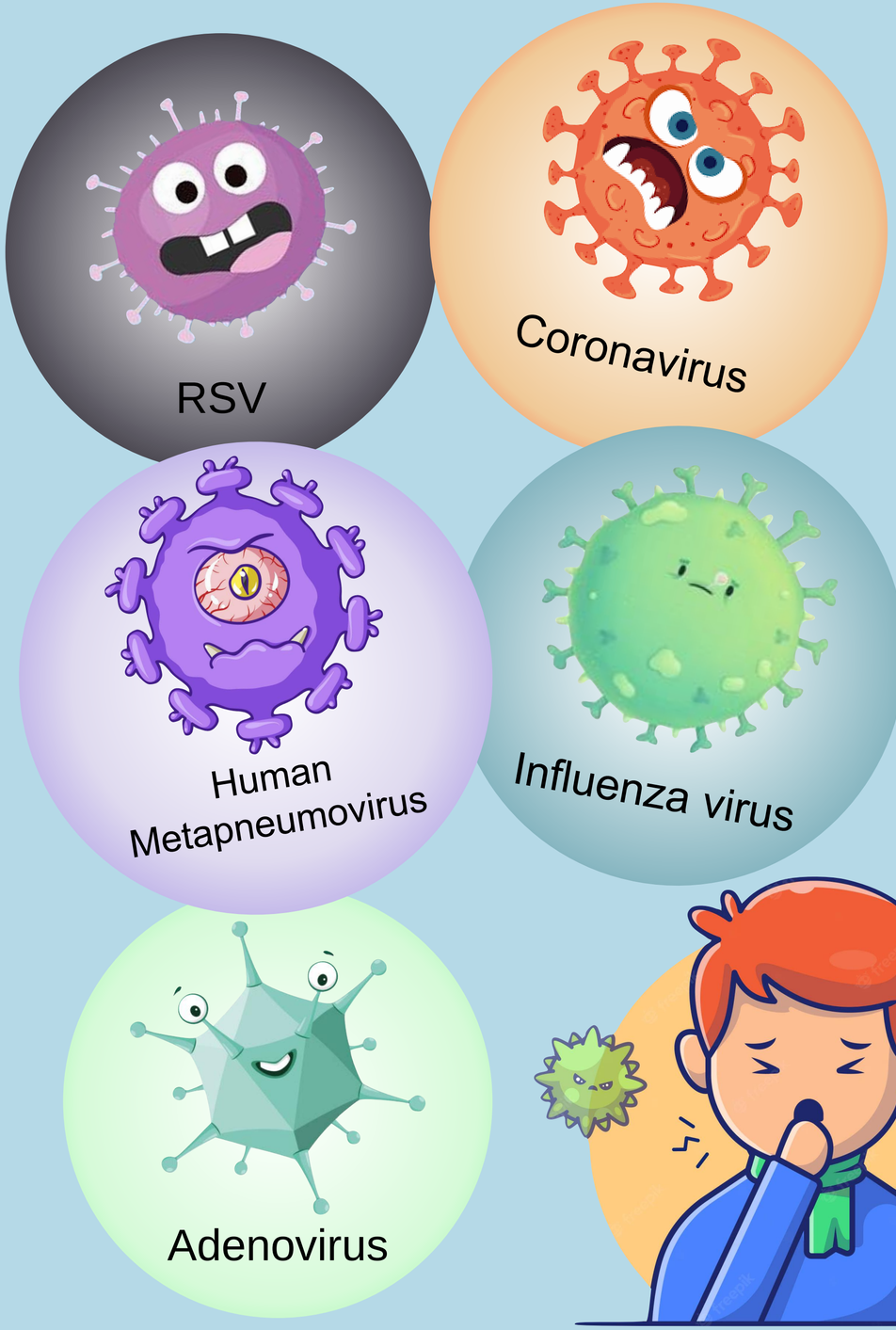
XDR-PA: R to one antibiotic in all but 1 or 2 classes

DTR-PA: R to everything but aminoglycosides

Running out of options…

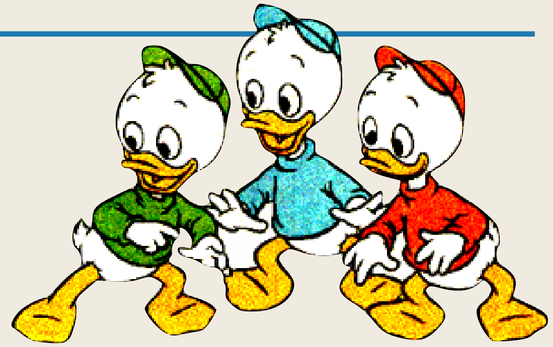


- Antibiotic production is far behind rates of antibiotic resistance
- monotherapy with novel β-lactam/β-lactamase inhibitors:
  - ceftolozane–tazobactam
  - ceftazidime–avibactam
  - mipenem–cilastatin–relebactam
- combination therapy with conventional agents
- Cefiderocol, a novel siderophore cephalosporin
- Bacteriophage therapy? Lytic phages (topical, iv) infect a host bacterium, replicate, lyse the cell, may even reverse resistance mechanism. Need further PK/PD studies to address phage titers, susceptibility, phage resistance, and ?neutralizing antibodies



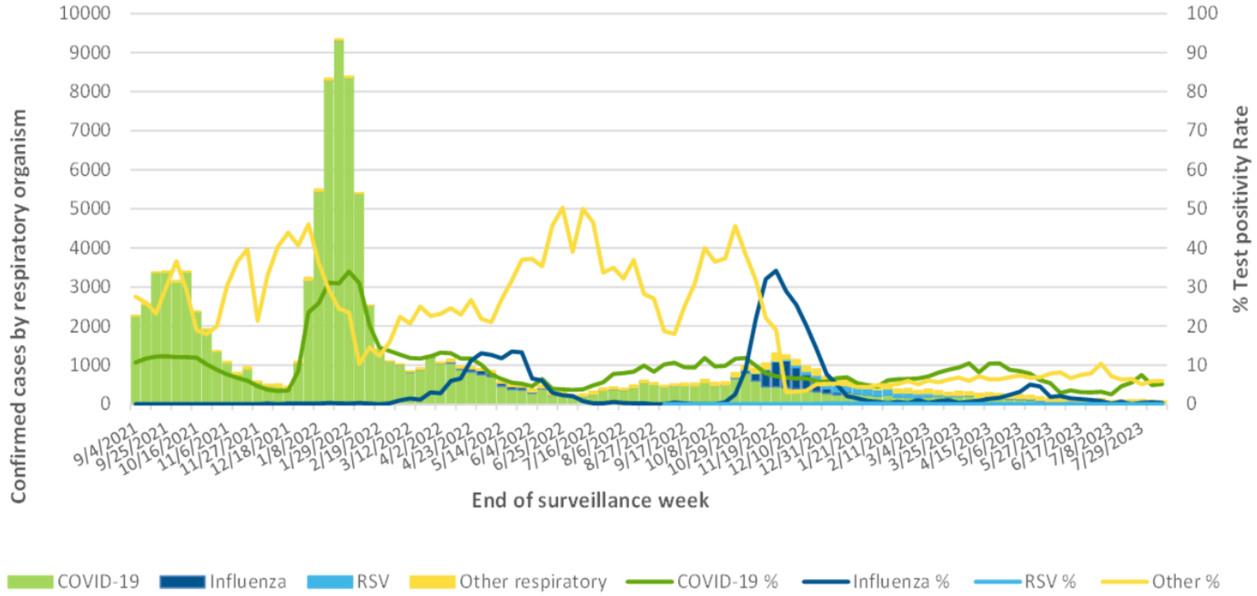
What's hot with RESPIRATORY VIRUSES THIS FALL?

Is “Tridemic” even a thing?



- Twindemic, Tridemic, “Flurona” are all words made up during the pandemic
- Has it happened?

Figure 1: Epidemic curve, respiratory illness by organism and test positivity, August 29, 2021 – August 12, 2023



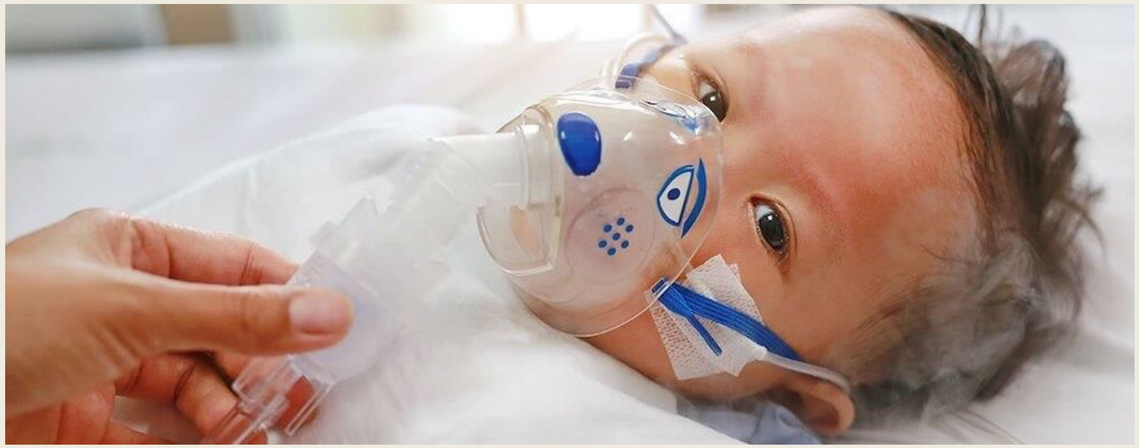
Data sources: Panorama IOM extracted on August 14, 2023 (COVID-19 cases)

Respiratory Virus Detections Surveillance System (influenza and other respiratory) (RRPL extracted August 14, 2023)
As of September 4, 2022, COVID-19 cases include new and reinfections.

https://www.saskatchewan.ca/government/government-structure/ministries/health/other-reports/community-respiratory-illness-surveillance-program

What’s RSV?

- **enveloped, negative sense, single-stranded RNA virus, Pneumovirus genus in the Paramyxoviridae family**
- **incubation period ranges from 2-8 days.**
- **symptoms within 4-6 days of getting infected.**
- **usually mild, cold-like symptoms: runny nose (rhinorrhea), coughing, sneezing, fever, wheezing, and/or decrease in appetite**
- **in babies, symptoms include irritability, decreased activity, and breathing difficulties.**
- **In kids under 1, is the most common cause of bronchiolitis and pneumonia (severe RSV infection)**
- **progress to lower respiratory tract disease in ~50% cases, esp in infants, older adults (+65), and immunocompromised**
- **2-4X increased risk for childhood asthma**



Infant with nebulizer mask. Source: rona.net

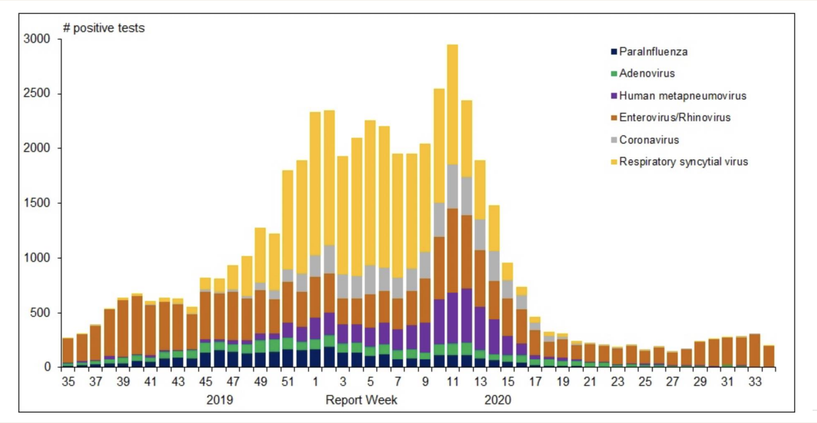
Why did RSV make headlines?

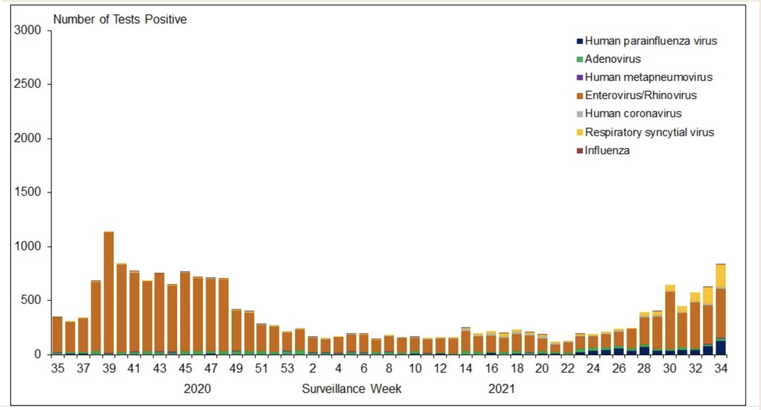
Since the beginning of the pandemic, many countries have observed a near total disappearance of RSV and influenza cases
With lifting of restrictions, increase cases and increase in age affected (from average 12 months, to 18.4 months)
Interseasonal resurgence also occurred

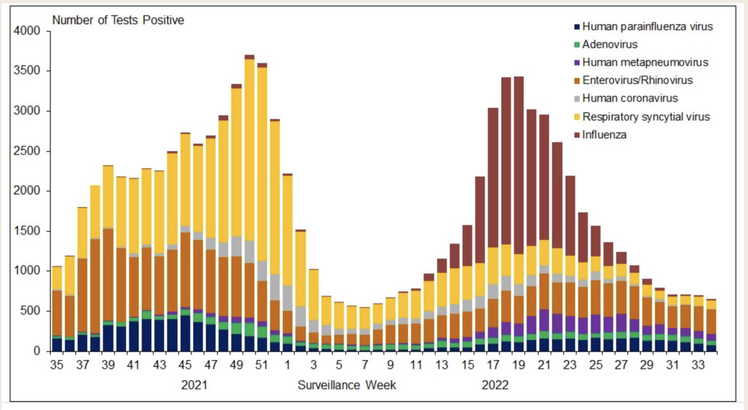
In Canada, between Aug. 29, 2020, and May 8, 2021: only 239/339 627 tests positive for RSV = 0.07%
Compare to Aug. 25, 2019, and May 2, 2020: 18860/412 861 tests positive for RSV = 4.57%
Compare to Aug 29, 2021 to April 30 2022: 28930/468636 tests positive for RSV = 6.17%

Number of positive respiratory virus tests

Figure 2: Number of positive respiratory virus tests reported by participating laboratories in Canada by surveillance week







https://www.canada.ca/en/public-health/services/surveillance/respiratory-virus-detections-canada.html

Pascal M. Lavoie, Frederic Reicherz, Alfonso Solimano and Joanne M. Langley. CMAJ July 26, 2021 193 (29) E1140-E1141

Why did this happen with RSV?

LESS POPULATION IMMUNITY

- Pandemic restrictions reduced contact with circulating respiratory viruses
- Usually healthy adults have lifelong seasonal exposure to the virus that maintains memory B- and T-cell immunity (often asymptomatic)

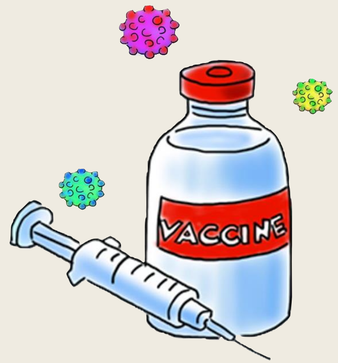
LESS MATERNAL IMMUNITY

- pregnant individuals were less likely to be exposed to RSV
- Immunologically naive infants depend on passively transferred maternal antibodies to protect them at birth
- pregnant individuals less likely to boost their RSV antibodies to levels usually seen in the winter
- This raises a possibility that infants are less well protected than usual and could become sicker if they are infected this summer

OTHER FACTORS

- Cold medication shortage (increased demand off-season)
- Increase acute care capacity (surgical resumption), led to over capacity with RSV surge

RSV VACCINES!



Preparations authorized for use in Canada:

"**Arexvy,** an RSV vaccine, has been authorized for use in Canada for the prevention of lower respiratory tract disease caused by RSV in adults 60 years of age and older. NACI is reviewing the use of Arexvy. Recommendations and a chapter update will follow."

- is on the SK immunization manual

Monoclonal antibodies:

SYNAGIS (palivizumab) (PVZ), humanized IgG1 monoclonal antibody directed to the RSV fusion protein (AstraZeneca Canada Inc.), licensed for prevention of RSV LRTI in high-risk children

BEYFORTUS™ (nirsevimab) passive immunity, human monoclonal antibody. (AstraZeneca Canada Inc.). Pending NACI review. Long acting, only need one dose

Palivizumab

- Monthly administration (x4) during RSV season reduces hosp. risk for RSV by **55%** in premature infants with or without chronic lung disease and by **45%** in infants with hemodynamically significant congenital heart disease

- Specific recommendations: (CPS, AAP and NACI)
  - Born @ <30 wk GA and <6 months of life at start of season
  - HD significant cardiac disease and <12 months of life
  - BPD / CLD and <12 months of life, or <24 months if recent O2 needs
- Broader indications:
  - Infants in remote communities who would require air transport for hospitalization, born before 36 + 0 weeks' GA and <6 months of age at the start of RSV season
  - Consideration may be given to administering palivizumab during RSV season to term Inuit infants until they reach six months of age

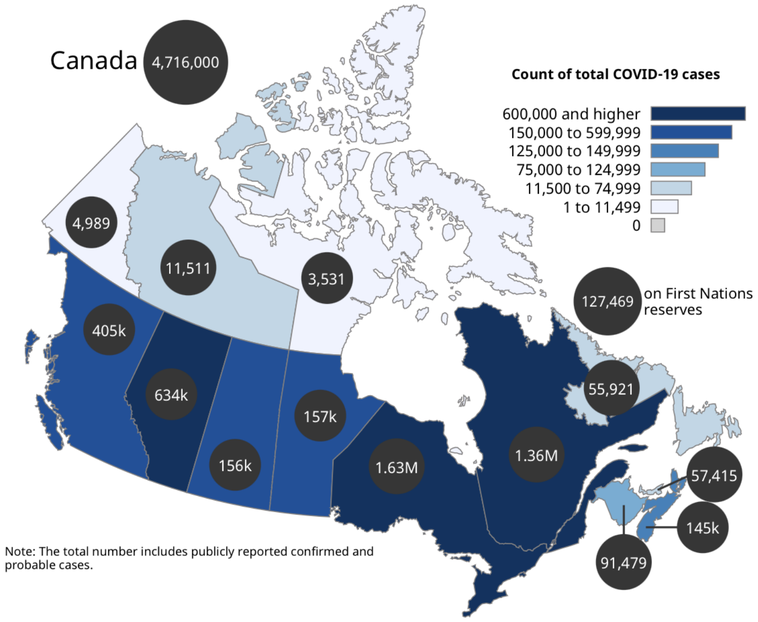
http://www.cps.ca/en/documents/position/preventing-hospitalizations-for-rsv-infections

What about COVID-19?

National and regional trends

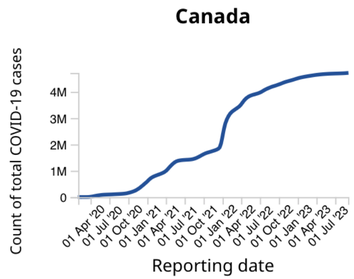
Figure 1. Count of total cases of COVID-19, province/territory as of September 2, 2023 (Last data update September 12, 2023, 9 am ET)

Hover over or tap regions to see cases, deaths in Canada over time. Click the play button to animate the map. Map data is available in .csv and .json formats and a data dictionary is available .csv format.



Note: The total number includes publicly reported confirmed and probable cases.

The count of total cases of COVID-19 in **Canada** was **4,716,000** as of September 2, 2023.

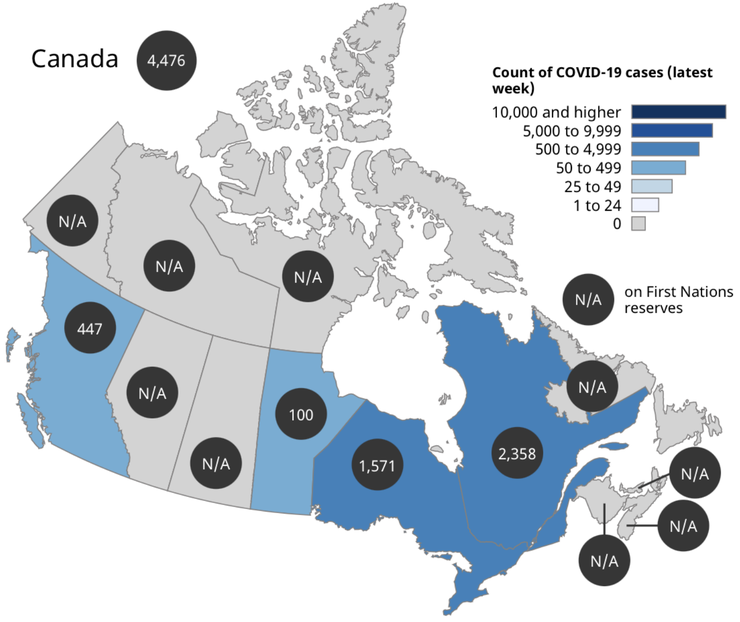


Play .csv

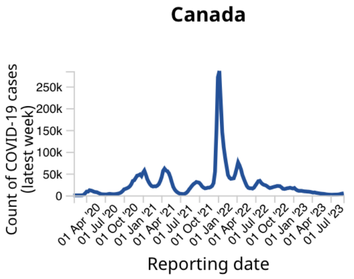
National and regional trends

Figure 1. Count of cases (latest week) of COVID-19, province/territory for the week of August 27 to September 2, 2023 (Last data update September 12, 2023, 9 am ET)

Hover over or tap regions to see cases, deaths in Canada over time. Click the play button to animate the map. Map data is available in .csv and .json formats and a data dictionary is available .csv format.



The count of cases of COVID-19 for the week of August 27 to September 2, 2023 in **Canada** was **4,476**.



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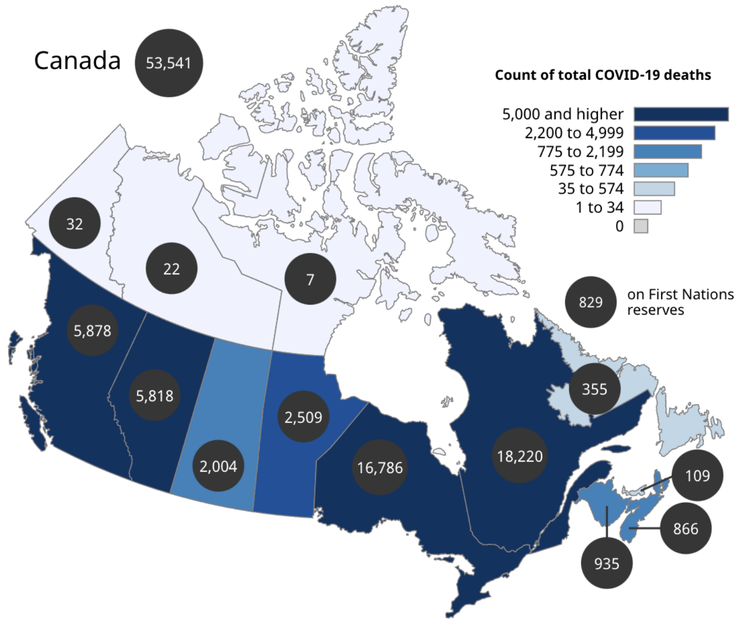
What about COVID-19?

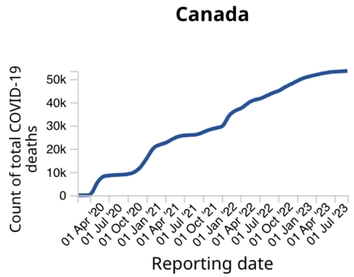
National and regional trends

Figure 1. Count of total deaths of COVID-19, province/territory as of September 2, 2023 (Last data update September 12, 2023, 9 am ET)

Hover over or tap regions to see cases, deaths in Canada over time. Click the play button to animate the map. Map data is available in .csv and .json formats and a data dictionary is available .csv format.



The count of total deaths of COVID-19 in **Canada** was **53,541** as of September 2, 2023.

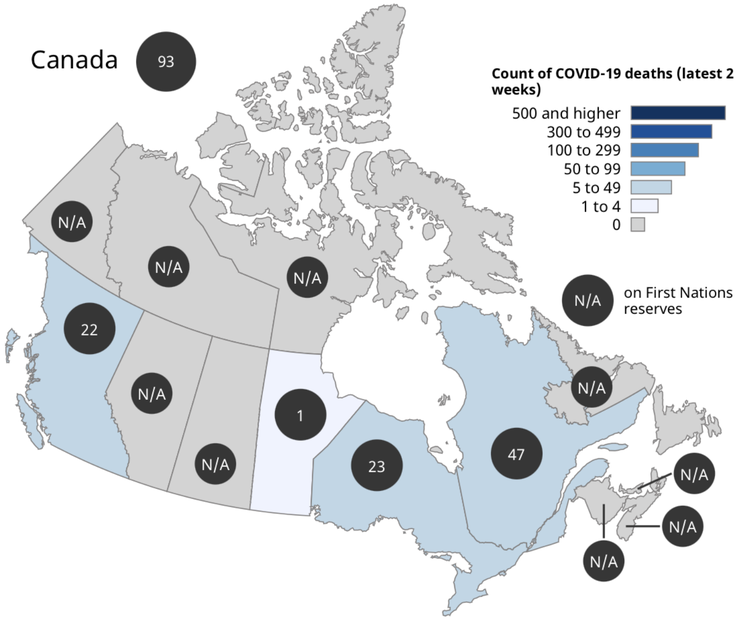


Play .csv

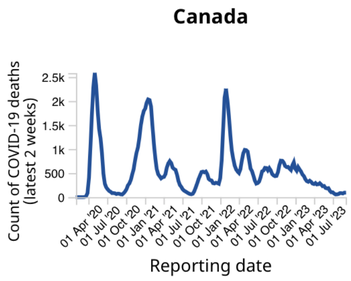
National and regional trends

Figure 1. Count of deaths (latest 2 weeks) related to COVID-19, province/territory for the weeks of August 20 to September 2, 2023 (Last data update September 12, 2023, 9 am ET)

Hover over or tap regions to see cases, deaths in Canada over time. Click the play button to animate the map. Map data is available in .csv and .json formats and a data dictionary is available .csv format.

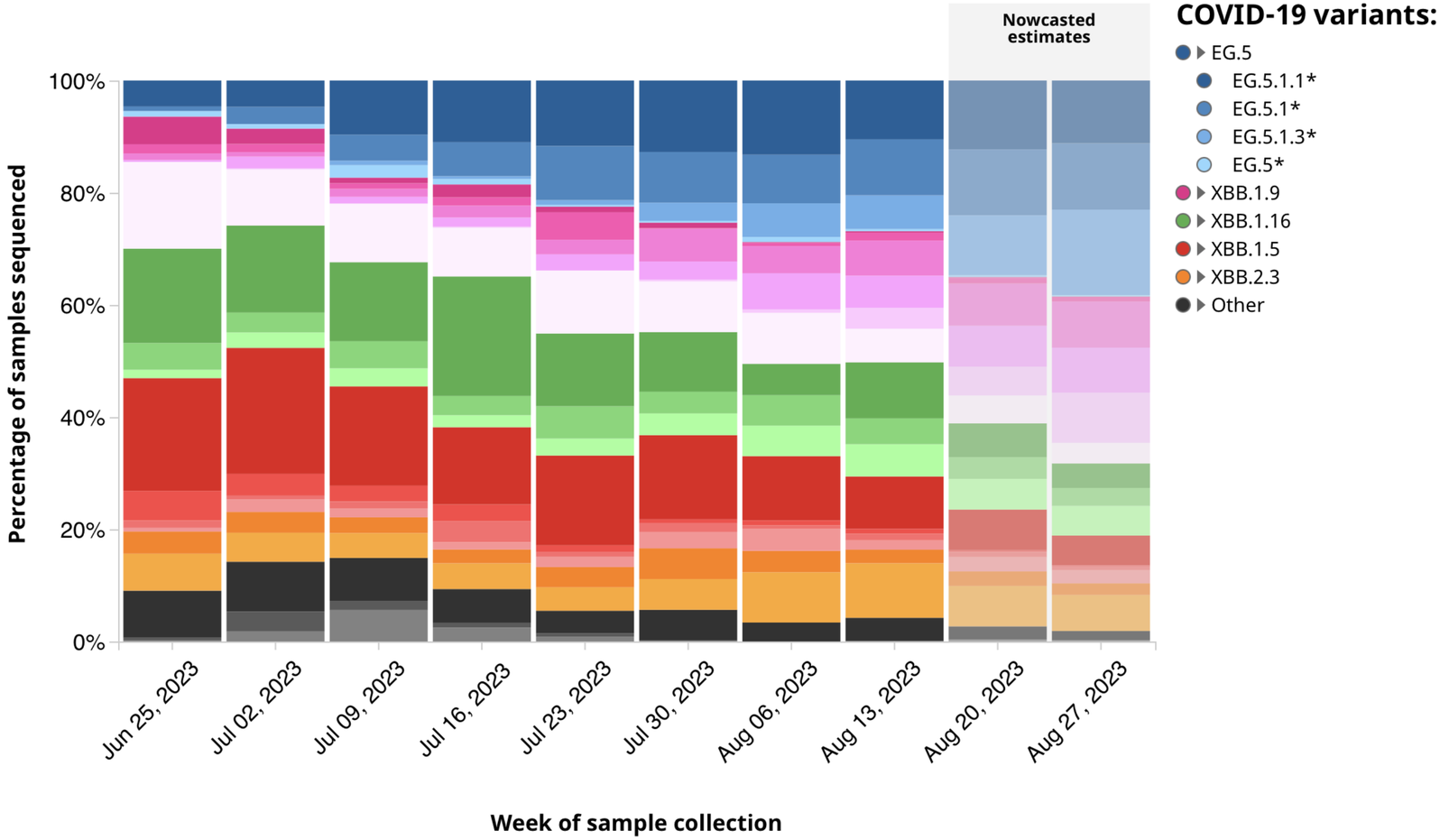


The count of deaths of COVID-19 for the weeks of August 20 to September 2, 2023 in **Canada** was **93**.

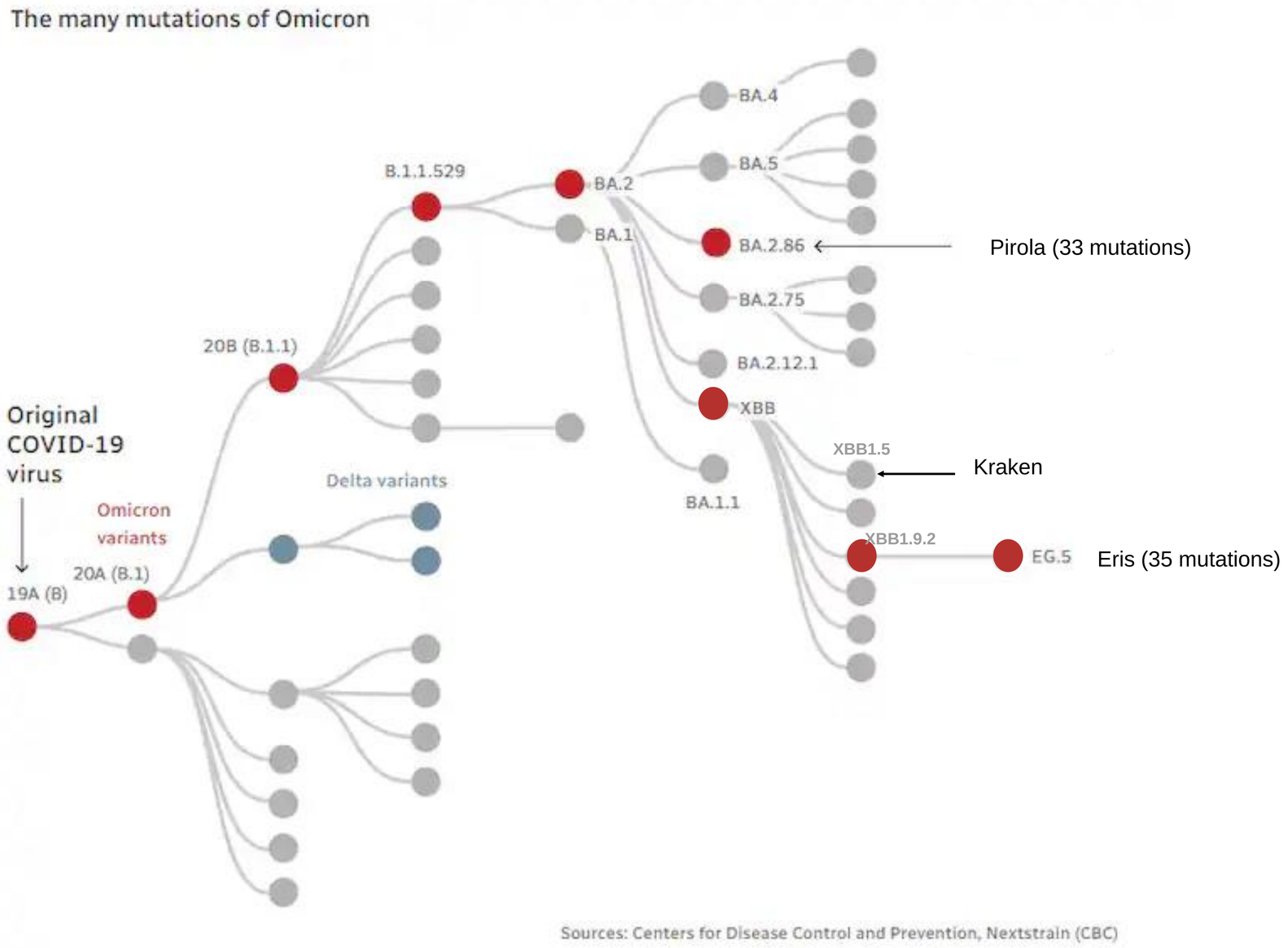


Play .csv

What’s the hot variant now?



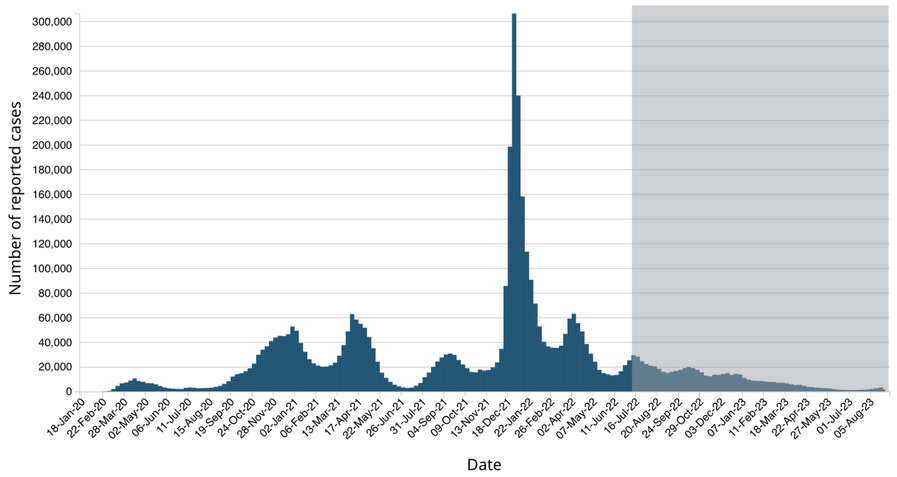
XBB.1.16 is no longer the most prevalent lineage group, as it has been passed by XBB.1.9.2, primarily driven by its EG.5 sub-lineages, over the last three weeks.


The many mutations of Omicron
Original COVID-19 virus
19A (B)
20A (B.1)
20B (B.1.1)
B.1.1.529
Omicron variants
Delta variants
BA.2
BA.1
BA.4
BA.5
BA.2.86
BA.2.75
BA.2.12.1
XBB
BA.1.1
XBB1.5
XBB1.9.2
EG.5
Pirola (33 mutations)
Kraken
Eris (35 mutations)
Sources: Centers for Disease Control and Prevention, Nextstrain (CBC)

The current COVID-19 situation …

Figure 2. Weekly number of COVID-19 cases (n=4,410,894) in Canada as of September 12, 2023, 8 am ET

.csv

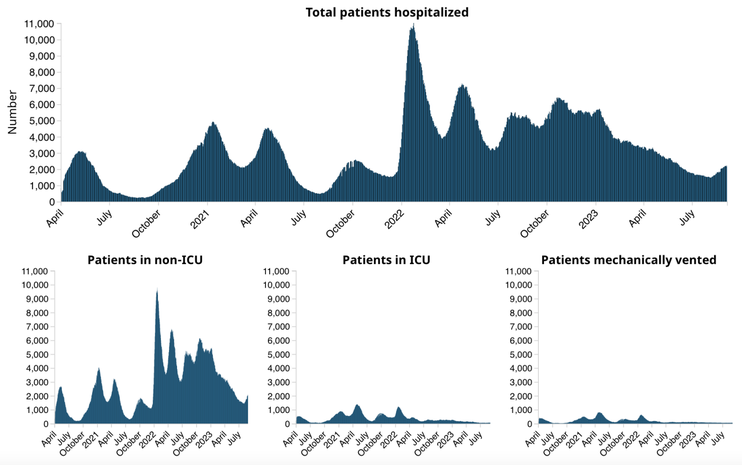


Hospital use

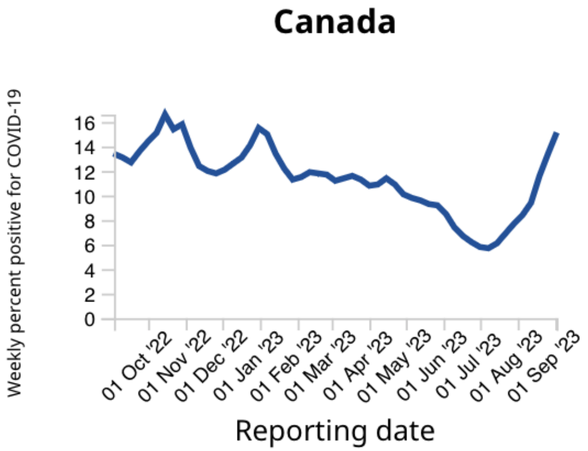
Figure 5. Daily number of hospital beds and ICU beds occupied by COVID-19 patients as of September 5, 2023

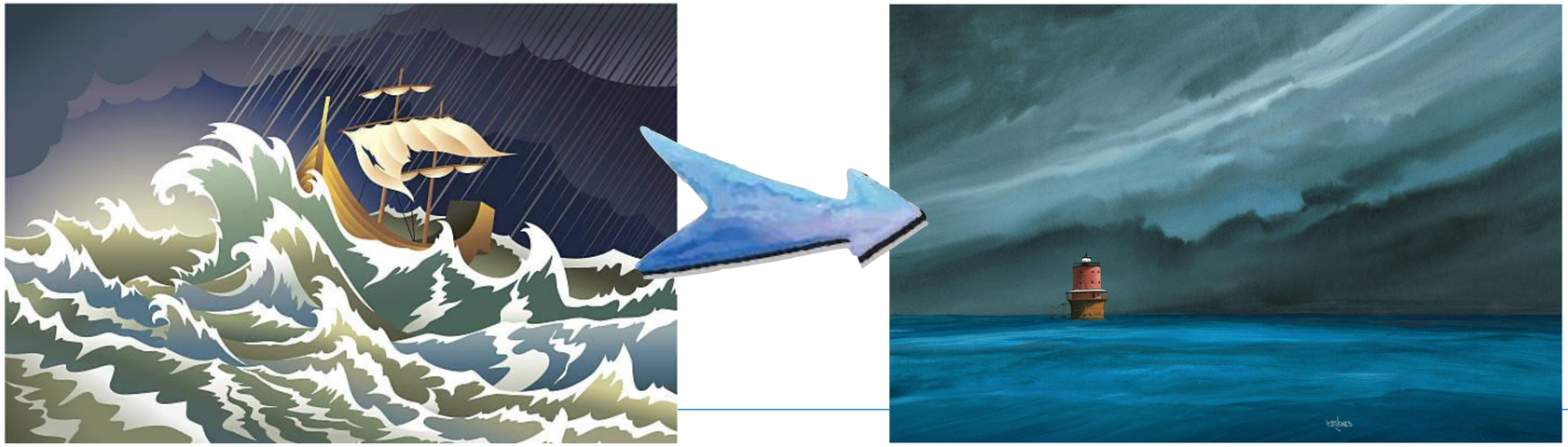
.csv

Relative scale



The percentage of weekly positive tests up to September 2, 2023 in **Canada** was **15.1%**.





NO MORE “WAVES”! Steady state of test positivity from 10.42 ~ 16.58%

What’s in store for COVID-19 vaccines?

On May 18, 2023, the WHO Technical Advisory Group on COVID-19 Vaccine Composition (TAG-CO-VAC) released recommendations for updates to COVID-19 vaccine antigen composition:

- recommended a monovalent XBB.1 descendent lineage, such as XBB.1.5 or alternatively XBB.1.16.
- The International Coalition of Medicines Regulatory Authorities (ICMRA), European Centre for Disease Prevention (ECDC), the European Medicines Agency (EMA), and the US Food and Drug Administration Vaccines and Related Biological Products Advisory Committee (FDA VRBPAC) also released decisions supporting XBB as a candidate for the COVID-19 vaccine composition update.
- Upcoming vaccine will be tailored to the SARS-CoV-2 XBB.1.5 sublineage
- Pre-clinical data: neutralizing antibody responses against Omicron sublineages, XBB.1.5, BA.2.86 (Pirola), & EG.5.1 (Eris)
- seasonality of SARS-CoV-2 has not been established, but target is for fall release to help reduce the impact of COVID-19 on the health system while other respiratory viruses are circulating

Public Health Agency of Canada | Agence de la santé publique du Canada

Canada

NACI National Advisory Committee on Immunization

Beginning in the fall of 2023 for those previously vaccinated against COVID-19, NACI recommends a dose of the XBB.1.5-containing formulation of COVID-19 vaccine for individuals in the authorized age group if it has been at least 6 months* from the previous COVID-19 vaccine dose or known SARS-CoV-2 infection (whichever is later).

Immunization is particularly important for those at increased risk of COVID-19 infection or severe disease, for example:

- **Adults 65 years of age or older;**
- **Residents of long-term care homes and other congregate living settings;**
- **Individuals with underlying medical conditions that place them at higher risk of severe COVID-19;**
- **Individuals who are pregnant;**
- **Individuals in or from First Nations, Métis and Inuit communities**;**
- **Members of racialized and other equity-deserving communities;**
- **People who provide essential community services.**

(Strong NACI Recommendation)

Access to COVID Antivirals for Community Prescribers

medSask
YOUR MEDICATION INFORMATION SERVICE

CLINICAL ASSESSMENT OF SYMPTOMS

- Refer red flag symptoms, severe COVID symptoms to Emergency
- Refer Oncology and Transplant Patients to Specialist Team or Early COVID Therapeutics Team

+

COVID-19 TEST (RAT, PCR) to confirm diagnosis

RAT = self-testing; available in community
PCR = priority populations; SHA and MD/NP clinic only
LINKS: SELF-TESTING | WHERE TO GET TESTED IN SASK

Individuals who test positive and are symptomatic can contact their physician, nurse practitioner, community pharmacist or call HealthLine 811 for antiviral assessment.

CONSIDER ANTIVIRAL THERAPY

Review eligibility criteria: risk factors for severe disease, vaccination status, previous infection/treatment, age, duration of symptoms
LINK: ELIGIBILITY ASSESSMENT

Monoclonal Ab Therapy:
Evusheld™–not currently recommended due to resistance
LINK: EVUSHELD

Sotrovimab–inpatient only; use in SK discontinued due to resistance

Eligible for Paxlovid™
(high risk of serious illness)

→ **Paxlovid™ can be prescribed by physician, nurse practitioner, pharmacist**
Must use medSask PAR

→ **Paxlovid™ dispensed by community pharmacy**
LINK: PARTICIPATING DISPENSING PHARMACIES

Not eligible for Paxlovid™, but potentially eligible for remdesivir
(high risk, Paxlovid™ contraindicated)

→ **Remdesivir is not prescribed by community prescribers**
Refer to Early COVID Therapeutics Team using medSask PAR
Email: c19meds@saskhealthauthority.ca or fax: 306.766.3395

→ **Remdesivir provided at SHA infusion clinic**

Not eligible for Paxlovid™, not eligible for remdesivir
(low risk of serious illness, antiviral not necessary)

→ **Supportive Care**
LINKS:
SELF-MANAGING COVID-19
medSask: AT HOME WITH COVID-19

FOR MORE PRESCRIBING INFORMATION:

medSask
YOUR MEDICATION INFORMATION SERVICE

Mild COVID-19 (Paxlovid™)

REMINDER: Prescribing is ONLY allowed during a declared COVID-19 pandemic

Assess for red flag symptoms →

ARE ANY OF THE FOLLOWING PRESENT?
- Difficulty breathing or worsening of respiratory symptoms
- Greater than 30 breaths per minute
- Shortness of breath at rest or requiring supplemental oxygen
- Respiratory distress (difficulty speaking in full sentences, severe wheezing)
- High fever >40.5°C or fever >38.5°C for >72 hours
- Severe dehydration, decreased urination or significant reduction in food or fluid intake
- Tachycardia (heart rate greater than 100 beats per minute)
- Persistent pain or pressure in the chest
- Lethargy, confusion, altered mental state, difficulty waking up

YES → ! REFER ! EMERGENCY

NO ↓

ARE SYMPTOMS TYPICAL OF MILD COVID-19?^

NO → As appropriate, Refer to Primary Care Practitioner, or Emergency

YES ↓

Assess patient factors →

ARE ANY OF THE FOLLOWING PRESENT?
- Age <18 years
- Previous COVID-19 infection in which it has been less than 90 days since symptoms have resolved
- Previously received 2 courses early COVID-19 antiviral (i.e: Paxlovid™, remdesivir)
- Pregnant or breastfeeding or unwilling to use contraception/abstain
- No positive confirmed PCR test or RAT, or asymptomatic
- Under- or un-vaccinated, age ≥18 to <55 without ≥1 high risk factor or immunocompromised
- Fully vaccinated* (unless immunocompromised or age ≥70 with either ≥3 high risk factors OR Indigenous or Northern residency & ≥2 high risk factors)
- Renal impairment <30mL/min or on dialysis
- Active liver disease

YES → INELIGIBLE

High risk factors^
- BMI ≥30 kg/m²
- Chronic kidney disease (≥30 to <60 mL/min)
- Cardiovascular or cerebrovascular disease
- Diabetes
- Chronic lung disease
- Sickle cell disease
- Neurodevelopmental disorder or other condition that confers medical complexity

NO ↓

- > day 5 since symptom onset (note: remdesivir eligible up to ≤ day 7)
- Advanced, untreated, or uncontrolled HIV
- Active treatment for cancer
- Hematopoietic stem cell transplant
- Solid organ transplant
- Moderate to severe primary immunodeficiency^
- Absolute interacting medications or interacting medications that require intervention by specialist (cancer/transplant)^

YES → REFER to Appropriate Specialist

NO ↓

Non-pharmacologic treatment ± OTC symptomatic treatment as indicated

Paxlovid™ (in Adults ≥ 18 years of age) x 5 days:

Usual dosing: 300mg (TWO x 150mg tablets) of nirmatrelvir with 100 mg (ONE x 100 mg tablet) of ritonavir every 12 hours

Renal dosing (CrCl ≥ 30mL/min - <60mL/min): 150mg (ONE x 150mg tablets) of nirmatrelvir with 100 mg (ONE x 100 mg tablet) of ritonavir every 12 hours

Follow up in 2 days ↓

Assess benefit - has there been any improvement?

YES or no worsening → Complete treatment course

Worsening/more severe symptoms → ! REFER ! EMERGENCY

*Fully vaccinated = 2 doses of a 2-dose vaccine or 1 dose of Janssen Jcovden™ | ^ See guideline | BMI = body mass index | OTC = over-the-counter

COVID-19

Inpatient COVID-19 Management
Medication and Prescribing Guidance

Management of adult patients (18 years and older) hospitalized with COVID-19 infection is stratified based on severity of illness:

Severe illness: Hospitalized patients requiring advanced respiratory/circulatory support (HFNC, NIV, IMV, ECLS, Vasopressors)
Moderate illness: Hospitalized patients requiring low-flow supplemental oxygen
Mild Illness: Non-hospitalized adults not requiring supplemental oxygen (Refer to CV-19 G0165 Outpatient COVID-19 Management)

Severely Ill Patients

Therapies that are recommended with demonstrated benefit in patients meeting detailed eligibility criteria:

1. **Dexamethasone 6 mg PO/IV Daily for 10 days** (or until discharge from hospital).
2. **Prophylactic-intensity dosing of LMWH** is recommended for VTE prophylaxis.
3. **Tocilizumab 400 mg IV (single dose)** in patients on recommended doses of dexamethasone (or equivalent corticosteroid) and within 14 days of symptomatic COVID-19 infection.
4. **Sarilumab 400 mg IV (single dose)** may be automatically substituted for tocilizumab due to global medication shortages (NOTE: Sarilumab currently unavailable in SHA as of January 2022)
5. **Baricitinib (4 mg PO Daily for eGFR greater than or equal to 60; OR 2 mg PO daily for eGFR 30 to 59; OR 1 mg PO daily for eGFR 15 to 29) for 14 days** is available as an alternative therapy if both tocilizumab and sarilumab are unavailable due to global medication shortages.

Therapies that are NOT currently recommended due to uncertain benefit and/or potential harm:

1. Monoclonal antibodies with supportive data in hospitalized adults (casirivimab/imdevimab) are not presently being used due to *in vitro* resistance with the dominant circulating Omicron variant. Sotrovimab has not demonstrated benefit in existing trials of hospitalized patients with COVID-19. The Recovery Trial is actively recruiting patients to assess sotrovimab in hospitalized adults.
2. Remdesivir has not demonstrated clinical benefit in this population.
3. Therapeutic anticoagulation is not recommended in patients without a clear clinical indication or high suspicion of VTE.
4. Empiric antimicrobials are not recommended unless there is concern for bacterial co-infection.

Moderately Ill Patients

Therapies that are recommended with demonstrated benefit in patients meeting detailed eligibility criteria:

1. **Dexamethasone 6 mg PO/IV Daily for 10 days** (or until discharge from hospital).
2. **Prophylactic-intensity dosing of LMWH** is recommended for VTE prophylaxis.

Therapies that may be considered despite limited benefit in patients meeting eligibility criteria:

1. Remdesivir **200 mg IV x 1 dose followed by 100 mg IV Daily x 4 days** may be considered for patients on low-flow supplemental oxygen. Administration may reduce the need for mechanical ventilation but has not demonstrated reduction in mortality or clinical benefit in severely ill patients already requiring advanced organ support.
2. Therapeutic anticoagulation may be considered in patients without other indications, not requiring advanced organ support, and at low risk of bleeding. Impact on survival is uncertain but it may reduce the need for organ support and thrombotic events while increasing risk of major bleeding events. Given small benefit and known potential harms, definitive recommendations cannot be made until further evidence is available.

Therapies that are NOT currently recommended despite demonstrated benefit due to limited medication supply:

1. Tocilizumab/Sarilumab have demonstrated benefit in patients on low-flow oxygen with elevated CRP (>75) but should be reserved for patients with severe illness to maximize benefit during global medication shortage of anti-IL-6 agents.

Therapies that are NOT currently recommended due to uncertain benefit and/or potential harm:

1. Monoclonal antibodies with supportive data in hospitalized adults (casirivimab/imdevimab) are not presently being used due to *in vitro* resistance with the dominant circulating Omicron variant. Sotrovimab has not demonstrated benefit in existing trials of hospitalized patients with COVID-19.
2. Empiric antimicrobials are not recommended unless there is concern for bacterial co-infection.

The following therapies are **NOT** currently recommended for hospitalized adults:

Chloroquine
Hydroxychloroquine
Lopinavir/Ritonavir
Ivermectin
Zinc
Interferon
Ribavirin
Fluvoxamine
Colchicine
Budesonide
ACE-I / ARB
NSAIDS
Vitamin D

Information regarding detailed clinical guidance for specific therapies is available:

Saskatchewan Health Authority

saskatchewan.ca/COVID19
CV-19 G0166 February 8, 2022

Point of Care Risk Assessment (PCRA)

The point of care risk assessment (PCRA) is a routine practice which should be conducted before every patient/client/resident (hereafter 'patient') interaction by a trained health care worker (HCW) to assess the likelihood of exposing themselves and/or others to infectious agents. This assessment informs the selection of appropriate actions and Personal Protective Equipment (PPE) to minimize the risk of exposure. This is a general tool. The questions and actions may need to be adapted for specific health care settings and roles.

1 Before each patient interaction, an HCW must assess the following:

THE PATIENT

- ☐ What are the patient's symptoms (e.g., frequent coughing or sneezing)?
- ☐ Does the patient require additional precautions (contact/droplet/airborne) for other diseases?
- ☐ What is the patient's health status (e.g., immunocompromised)?
- ☐ Is the patient able to practice respiratory etiquette and perform hand hygiene?

THE TASK

- ☐ What type of task am I carrying out (e.g., providing direct face-to-face care, performing an aerosol generating medical procedure), coming into contact with body fluids, personal care, non-clinical interaction)?
- ☐ Am I trained, equipped and ready for the task?

THE ENVIRONMENT

- ☐ Where am I doing my task?
- ☐ Is there triage or screening?
- ☐ Is the client in a separate room? Is the bathroom shared?
- ☐ Can physical distancing be maintained?
- ☐ Is there adequate environmental cleaning and disinfection?

2 Choose appropriate actions and PPE including the following:

- ☐ **Hand hygiene** (e.g., before and after a task, before and after PPE use, before and after contact with patient).
- ☐ **Respiratory etiquette** (e.g., support patient to cover their coughs with a tissue or their elbow).
- ☐ **Patient separation** (e.g., prioritize the patient for a single room).
- ☐ **Physical distancing** (e.g., encourage patient to maintain a 2 metre physical distance if direct care is not involved).
- ☐ **Environmental and equipment cleaning and disinfection** (e.g., clean re-usable equipment between each use).
- ☐ **Implement Additional Precautions if required** (e.g., Droplet and Contact precautions for COVID-19).
- ☐ **Select appropriate pieces of PPE**, as below and per the ***Provincial Mask Use in Health Care Settings Policy***.

Selecting PPE

Will my hands be exposed to blood or body fluids?	Will my eyes or face be splashed/sprayed with blood or body fluids? Am I within 2 metres of a coughing or vomiting patient?	Will my clothing or skin be soiled from splashes/sprays or come into contact with blood or body fluids?	Is the patient on airborne precautions (e.g., measles, tuberculosis)? Am I performing an AGMP on a patient with COVID-19 risk?
YES	YES	YES	YES
Wear gloves	Wear medical mask and eye protection	Wear gown	Wear N95 respirator or equivalent*

*HCW must be fit-tested and trained in performing the aerosol-generating medical procedure (AGMP).

BRITISH COLUMBIA | Ministry of Health | BC Centre for Disease Control

Our "Personal Risk Assessment"

What if we applied "risk assessment" in the community, in public settings?

1 Before going out, let's assess the following:

The individual

- ☐ Are you sick right now? do you have symptoms?
- ☐ Can you practice respiratory etiquette and hand hygiene?

The Task

- ☐ Is it necessary to go out, or can the task wait until you are better?
- ☐ Will I be interacting with others, will I come into contact?
- ☐ Are you a care provider that will have contact with others, & unable to maintain physical distancing?

The Environment

- ☐ will you be in a public space?
- ☐ Is it indoors?
- ☐ Can physical distancing be maintained?
- ☐ Are there compromised people around me? (Keep in mind, you likely don't know everyone!)

2 Decide if you need a mask, to protect others from getting your virus!

- ☐ Try to stay home if unwell
- ☐ Wear a medical mask if you're sick
- ☐ Follow respiratory etiquette
- ☐ Try to maintain physical distancing
- ☐ Carry some hand gel with you

ANPANMAN BAIKINMAN

THANKS FOR LISTENING!