Hot topics in Massachusetts epidemic infectious disease

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Agenda

- Monkeypox
- Respiratory viral infections
- Ebola

Monkeypox

- Rare zoonotic infection
- Endemic in west and central Africa
- Caused by monkeypox virus
- Specific animal reservoir unknown, but likely small mammals

Outbreak history

- 1958 – identified in laboratory monkeys
- 1970 – DRC/Zaire: first human case
- 2003 – US outbreak: 71 cases, source = exotic animal trade
- 2017 – Nigeria outbreak: sexual transmission, international spread
- 2022 – Global outbreak: primarily men who have sex with men

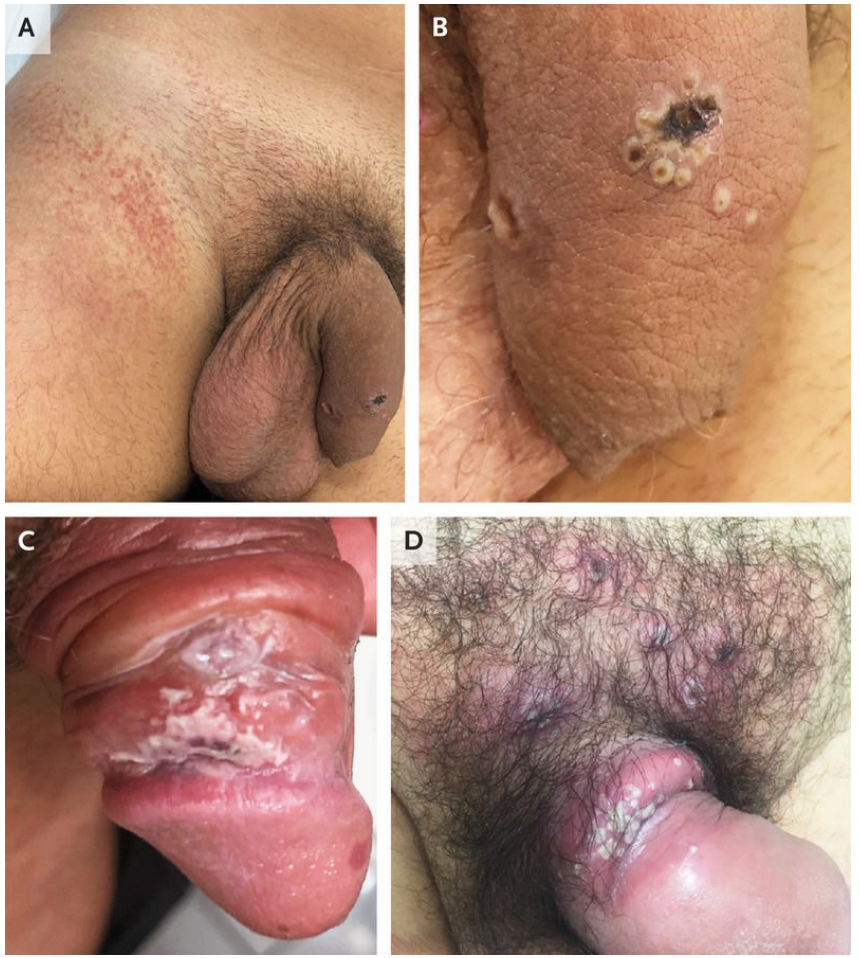
Increasing incidence likely tied to decreasing herd immunity following discontinuation of routine smallpox vaccination (1972)

Transmission

- Can spread from person-to-person
  - Intimate skin-to-skin contact
    - Lesions
    - Infected body fluids (e.g., fluid from vesicles and pustules)
  - Fomites (e.g., shared towels, contaminated bedding)
  - Respiratory secretions
- 21-day incubation period

Clinical hallmark = rash

- Classic evolution: maculopapular papules vesicles scabs
  - All contain viable virus
- Appearance can be protean
- Develops at sites of skin contact with infected lesion
  - Anogenital >70%
  - Mucosal >40%
- Auto-inoculation possible



Partrocinio-Jesus R., et al. N Engl J Med. 2022; 387:66

Clinical manifestations

- Nonspecific prodrome: fever, malaise, sore throat, LAD
- Lesions are painful !! proctitis, dysuria, pharyngitis
- Uncommon complications: encephalitis, cellulitis, pneumonia, sepsis, abscess, keratitis
- Death is rare (two deaths in US to date)

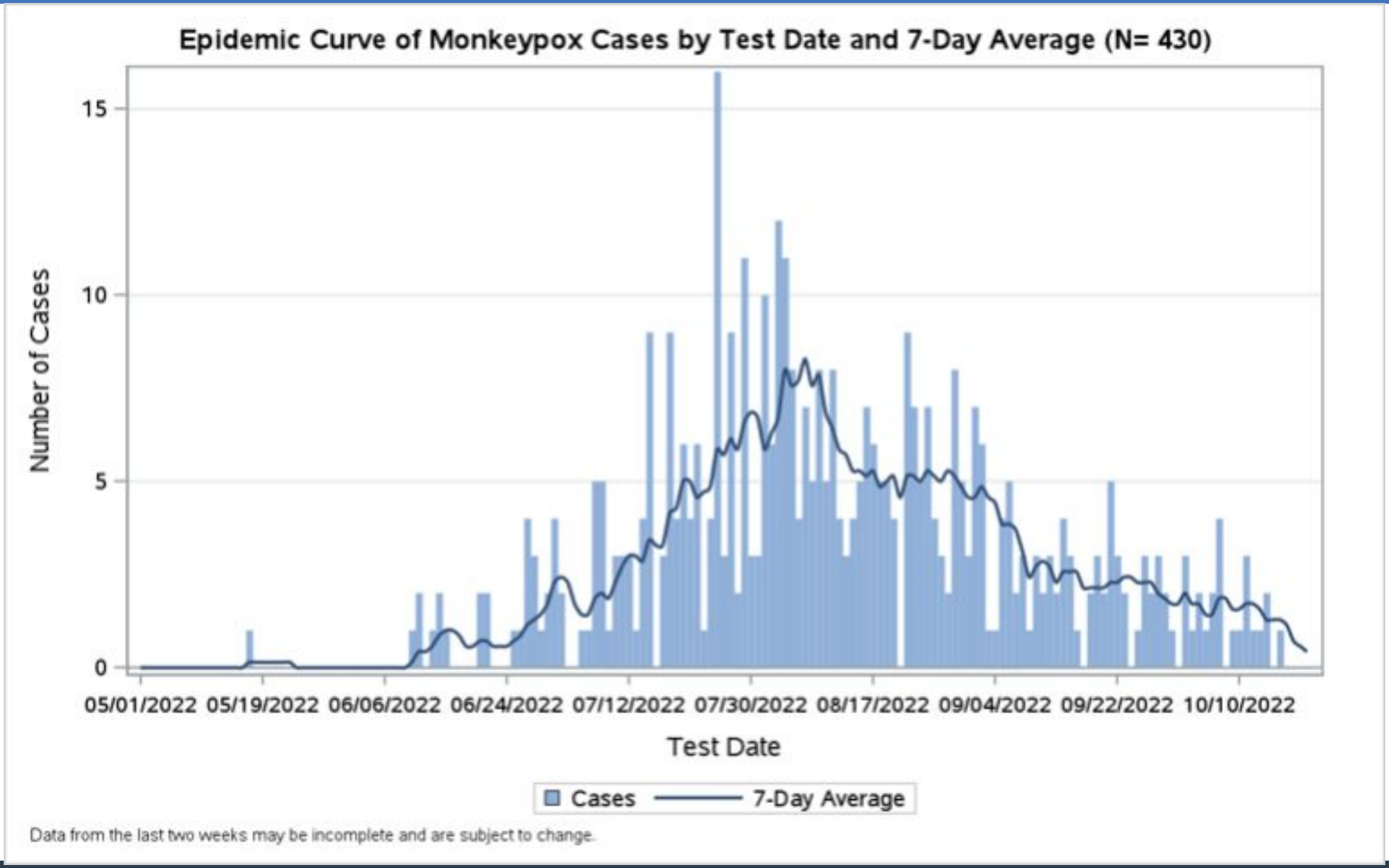
2022 Multinational Monkeypox Outbreak

- WHO public health emergency declared 7/23/22
- CDC public health emergency declared 8/4/22

Burden (10/14/22)

- Global: 73,288 confirmed cases (109 countries)
- US: 27,317 cases – highest count among all countries
- MA: 423 cases

Monkeypox incidence in MA – 10/20/22



Epidemiologic risk factors

- Men make up 99% of cases
- Race/ethnicity:
  - 46% White
  - 31% Hispanic
  - 14% Black
- CDC: people with monkeypox (n = 1969) have higher than expected rates of HIV and STIs
  - 38% living with HIV
  - 41% with at least one reportable STI in the past year

Curran et al, MMWR 71(36; 1141-1147

Testing for monkeypox

Indications for testing

1. Close contact with known case
2. Close contact with individual with compatible rash
3. MSM or transgendered man with high-risk proximate contact
4. Residence or travel in endemic area

How to test

1. Dry swab of a lesion for presence of monkeypox virus
2. Nucleic acid amplification test

Note: Clinicians should also rule out more common causes of rash illness while considering monkeypox.

- herpes, secondary syphilis, chancroid, varicella-zoster virus

Testing

- Commercial labs (Aegis, Labcorp, Mayo, Quest, Sonic)
- SPHL without preapproval for individuals with high pre-test probability
  - Clinically compatible patients with a known risk factor; OR
  - Patients for whom there is a strong clinical suspicion of monkeypox who are hospitalized; OR
  - Patients for whom there is a strong clinical suspicion of monkeypox and are at high risk of more severe disease; OR
  - Patients for whom there is a strong clinical suspicion of monkeypox in a congregate setting; OR
  - Patients for whom cost of commercial testing is a concern.

CDC Exposure Risk Classification

	Characteristics	Monitoring	PEP
High	• Unprotected contact between skin and infected lesion, skin, fomite • Exposure to aerosols without N95	Yes	Yes
Intermediate	• Within 6 ft of unmasked patient for >3 hrs • Contact between clothing (no gown) and infected skin, lesion fomite	Yes	Yes (risk v benefit)
Low	• Within 6 ft of unmasked patient for < 3 hrs	Yes	No
No		No	No

Infection control

Isolation:

- Until all lesions are resolved (healthy intact skin at previous lesion site)
- Lesions should remain covered (and individual should remain masked) in public if strict isolation not possible

FDA-approved orthopox vaccines

- Jynneos
  - Live, attenuated, nonreplicating vaccinia
  - Intradermal or subcutaneous, two doses, 28 days apart
  - Well tolerated
  - Safe for immunocompromised
- ACAM2000
  - Live, replication-competent, vaccinia virus
  - Percutaneous, multipuncture single dose
  - “Take” lesion; side effects (pain, fever, LAD, myocarditis/pericarditis)
  - Contraindicated in immunosuppressed

Vaccination strategy

Post exposure prophylaxis

- Known contacts to someone with monkeypox who are identified by public health authorities

Enhanced post exposure prophylaxis (PEP++)

- Presumed contacts who know that recent sex partner within the past 14 days was diagnosed with monkeypox
- Presumed contacts who have sex with multiple partners in a geographic area where monkeypox transmission is occurring

Pre-exposure prophylaxis guidance

- Gay, bisexual, and other men who have sex with men, transgender or nonbinary people who
  - Have a diagnosis of or have sought testing for a sexually transmitted diseaseone or more nationally reportable sexually transmitted diseases (i.e., chancroid, chlamydia, gonorrhea, or syphilis) in the past year
  - Are living with HIV infection
  - Are on or are eligible to be on HIV PrEP
  - Have recently had more than one sex partner
- People who have had any of the following in the past 6 months:
  - Have had sex at a private or commercial sex venue
  - Have had sex in association with a large public event in an area where monkeypox transmission is occurring
- Sexual partners of people with the above risks
- People who anticipate experiencing the above risk

Jynneos roll out in Massachusetts

- **Doses administered in MA (10/20/22): 30,339**
  - **18,718 individuals vaccinated**
- Phase I (7/5/22) – high volume health care providers in high burden communities: OCHS, MGH SHC, BMC, FH
- Phase II (7/13/22) – geographic and equity-based expansion: Cambridge, Dorchester, Framingham, Lawrence, New Bedford, Randolph, Springfield, Worcester plus mobile vax unit
- Doses of Jynneos are available for any health care facility to manage a high-risk contact on an as-needed basis

Monkeypox treatment = tecovirimat (TPOXX)

- First drug approved by the FDA that is specifically indicated for the treatment of smallpox disease
- Developed through Project BioShield; held at the Strategic National Stockpile (two million doses)

Tecovirimat efficacy

- Inhibits the function of a major orthopox envelope protein required for production of extracellular virus blocks cellular transmission of virus
- Animal studies of lethal monkeypox exposure show improved survival compared to placebo
- No human efficacy studies
- Anecdotal reports of faster resolution of lesions, decreased pain

Tecovirimat indications

- Severe disease
  - Hemorrhagic disease, confluent lesions, encephalitis
- Involvement in anatomic area with serious sequel (stricture or scarring)
  - Oropharynx
  - Penis, vulva, vagina, urethra
  - Rectum, anus
  - Bacterial superinfection
- Risk for severe disease
  - HIV or other immunocompromise
  - Pregnancy
  - Atopic dermatitis or other exfoliative skin conditions
  - Children

Tecovirmat

- Dosage: 600 mg (three 200 mg caps) BID x 14 days
- 600mg TID if weight >120kg
- Well tolerated
- Contraindicated in severe renal impairment (GFR < 30)
- No hepatic dose adjustment required
- Minimal drug-drug interactions
- IV formulation available

https://www.nytimes.com/2022/08/06/health/monkeypox-treatment-tpoxx.html

Access to tecovirimat

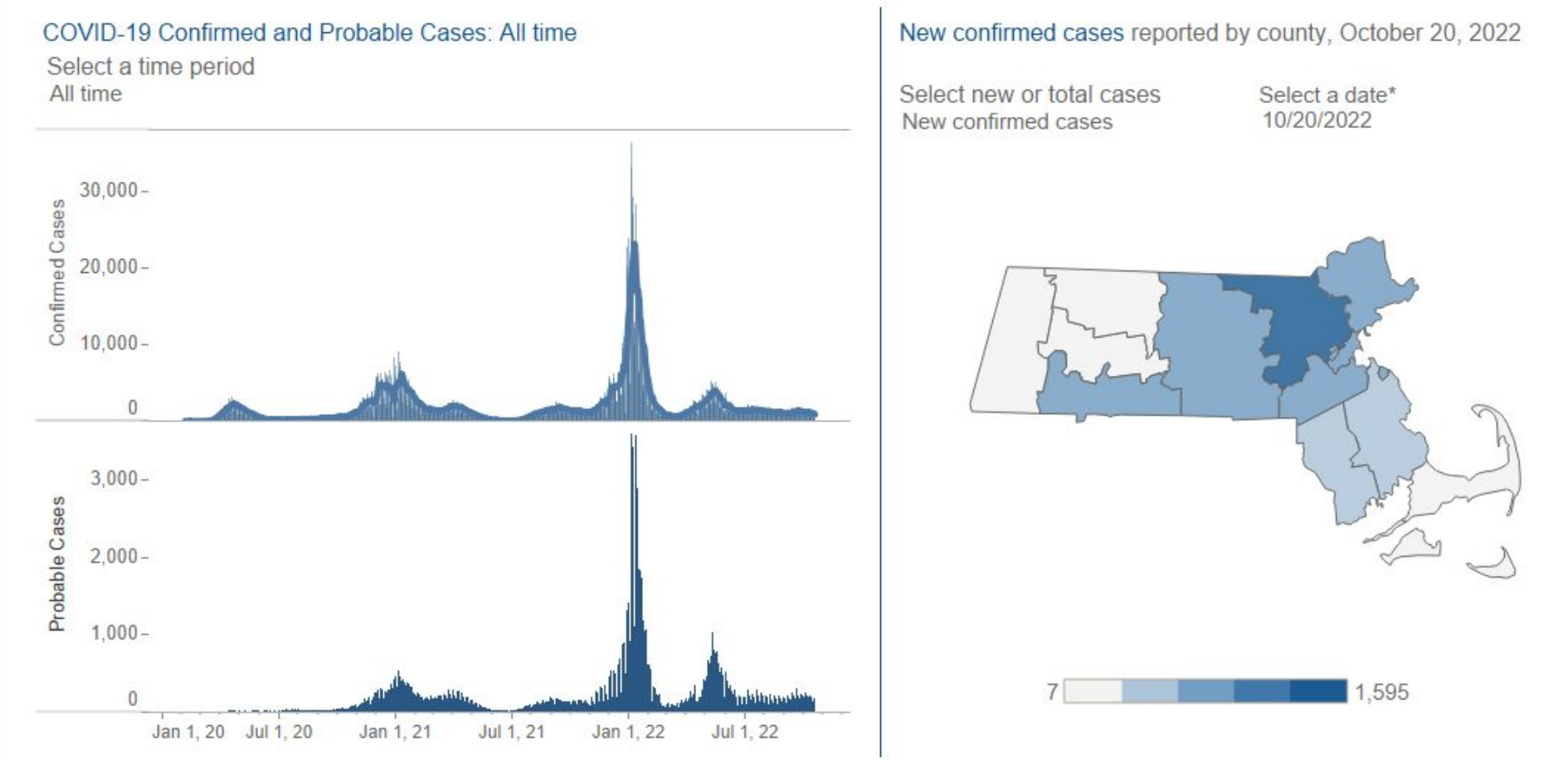
- **Individuals treated in MA (10/20/22): 193**
- Available under Early Access-Investigational New Drug (EA-IND)
- Healthcare facility application
  - FDA 1572 (one per facility)
  - Informed consent and patient intake form (one per patient)

- DPH hold the state supply; distributes courses as needed (through healthcare facility pharmacies)
  - Ordering: https://www.mass.gov/info-details/obtaining-and-using-tpoxx

Monkeypox – waning outbreak

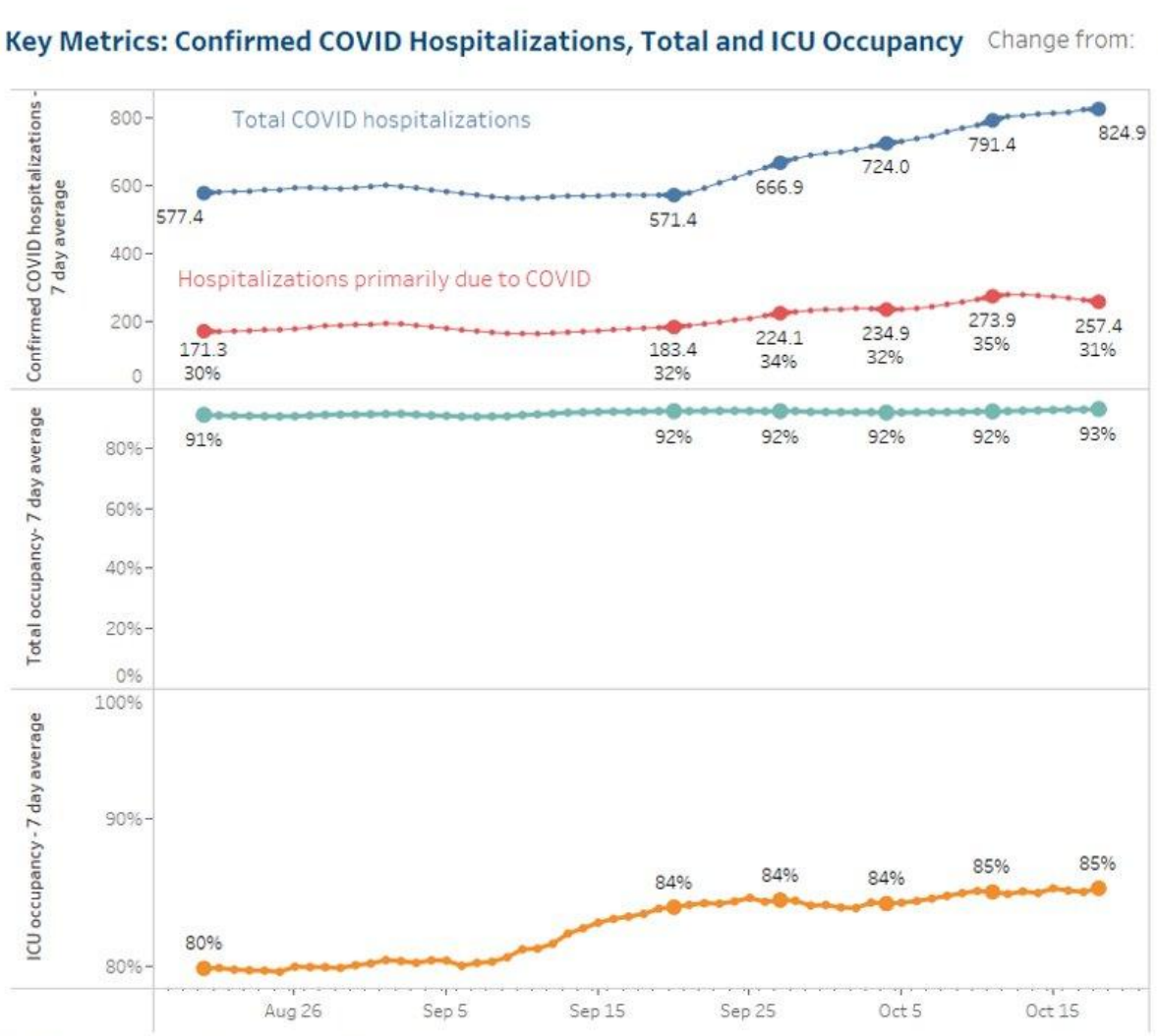
- Why are we seeing fewer cases?
  - Depletion of susceptible hosts (natural infection versus vaccine)
  - Changing behavior
- What is the future of monkeypox in MA?
  - Eradication
  - Simmering, low incidence, sexually transmitted infection

COVID-19 cases in MA (10/20/22)



All data included in this dashboard are preliminary and subject to change. Data Sources: COVID-19 Data provided by the Bureau of Infectious Disease and Laboratory Sciences and the Registry of Vital Records and Statistics; Created by the Massachusetts Department of Public Health, Bureau of Infectious Disease and Laboratory Sciences, Division of Surveillance, Analytics and Informatics. Case counts for specific cities, towns, and counties change as data cleaning occurs (removal of duplicate reports within the system) and new demographic information (assigning cases to their city or town of residence) is obtained.
*The most recent 10 report days of data are viewable on this map. To view data outside of this range, please visit our data archive and download the raw data.

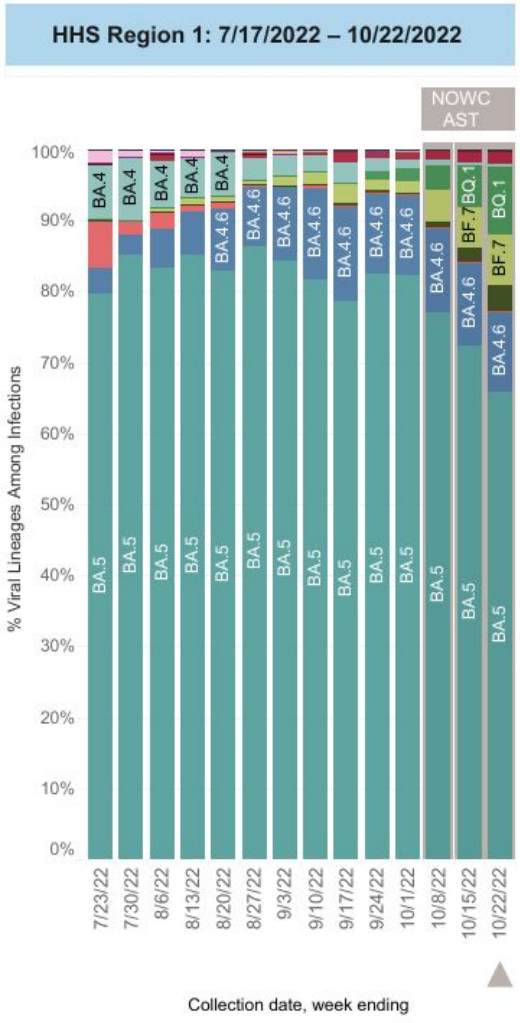
Rising COVID hospitalizations



Includes data through October 18, 2022

COVID variants threaten treatment effectiveness

CDC COVID Data Tracker: Variant Proportions



HHS Region 1: 10/16/2022 – 10/22/2(

Region 1 - Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont

WHO la..	Lineage..	US Class	%Total	9..
Omicron	BA.5	VOC	65.8%	
	BA.4.6	VOC	11.5%	
	BQ.1	VOC	9.7%	
	BF.7	VOC	7.1%	
	BQ.1.1	VOC	3.6%	
	BA.2.75	VOC	1.5%	
	BA.2.75.2	VOC	0.5%	
	BA.4	VOC	0.3%	
	BA.2.12.1	VOC	0.0%	
	BA.1.1	VOC	0.0%	
	BA.2	VOC	0.0%	
	B.1.1.529	VOC	0.0%	
Delta	B.1.617.2	VBM	0.0%	
Other	Other*		0.0%	

* Enumerated lineages are US VOC and lineages circulating above 1% nationally in at least one week period. "Other" represents the aggregation of lineages which are circulating <1% nationally during all weeks displayed.
** These data include Nowcast estimates, which are modeled projections that may differ from weighted estimates generated at later dates
# AY.1-AY.133 and their sublineages are aggregated with B.1.617.2. BA.1, BA.3 and their sublineages (except BA.1.1 and its sublineages) are aggregated with B.1.1.529. Except BA.2.12.1, BA.2.75, BA.2.75.2 and their sublineages, BA.2 sublineages are aggregated with BA.2. Except BA.4.6, sublineages of BA.4 are aggregated to BA.4. Except BF.7, BQ.1 and BQ.1.1, sublineag..

- BQ.1 and BQ.1.1 likely resistant to bebtelovimab (therapeutic mAb)
- BQ.1, BQ.1.1 and BA.4.6 resistant to Evusheld (prophylactic mAb)

COVID-19 treatments

Treatment is available for people who have mild to moderate COVID and risk factors for severe disease

- Paxlovid (oral antiviral) - most effective
- Remdesivir (IV antiviral) - second choice given emerging resistance
- Bebtelovimab (IV mAb)
- Molnupiravir (oral antiviral) - less effective

COVID-19 booster

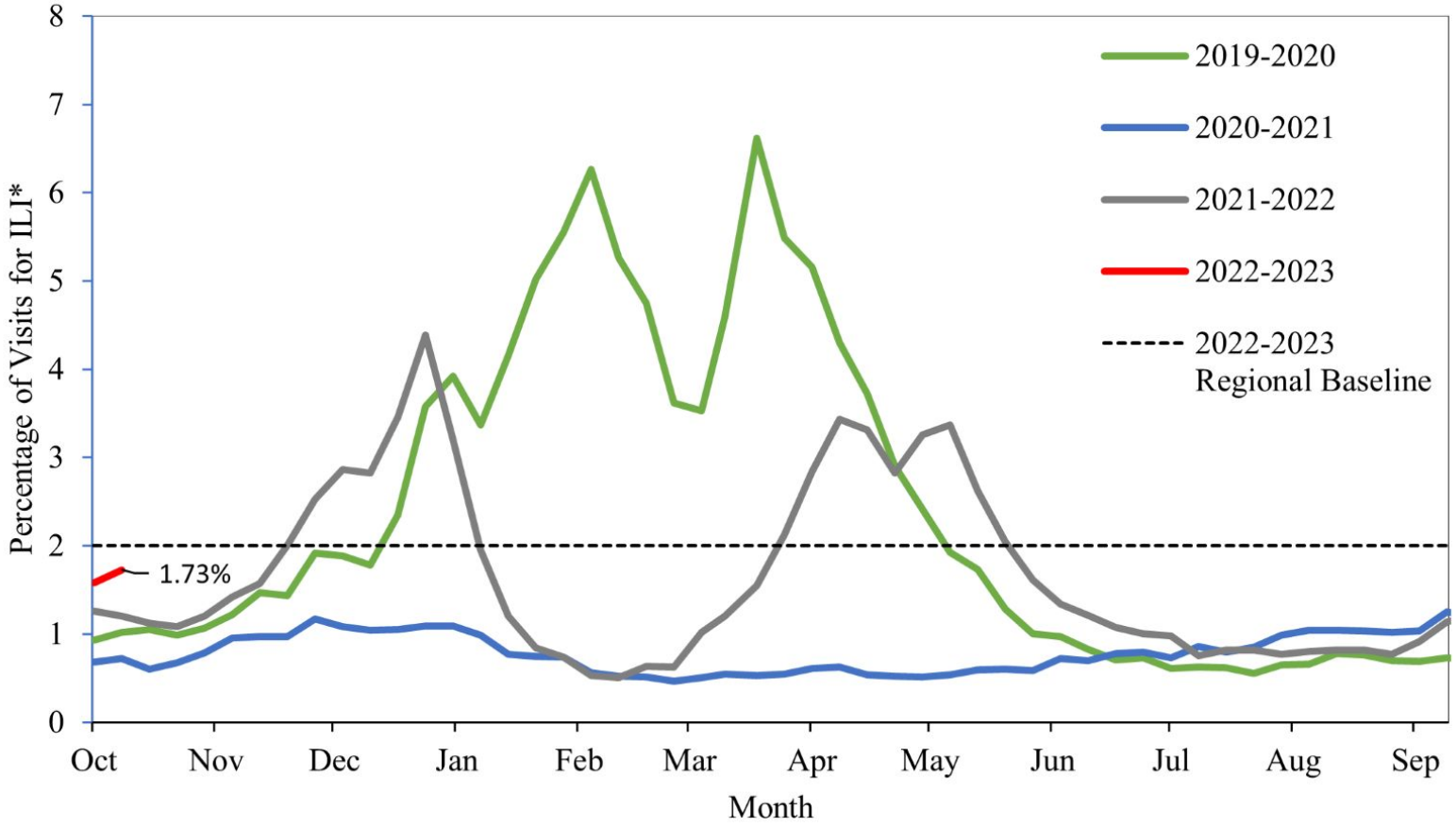
- Updated bivalent booster available 9/2/22
  - Manufactured by Pfizer and Moderna
- Recommendation
  - All people 5 years and older should receive one updated booster if it’s been at least 2 months since their last covid 19 vaccine dose.
- Can delay booster for three months following COVID-19
- "Up-to-date" = completed the primary series and the most recent booster dose recommended by the CDC

Influenza in 2022/2023

- Widespread influenza activity in the United States and globally
- Current severity level in MA: low
  - Boston and Central regions are reporting low ILI activity; all other regions are reporting minimal ILI activity
  - Influenza A > influenza B positive specimens reported by hospitals and outpatient facilities in Massachusetts

Influenza-like illness trending upward in MA

Figure 1. Percentage of Visits for Influenza-Like Illness (ILI) Reported by Sentinel Provider Sites in Massachusetts October 2, 2022 - October 15, 2022

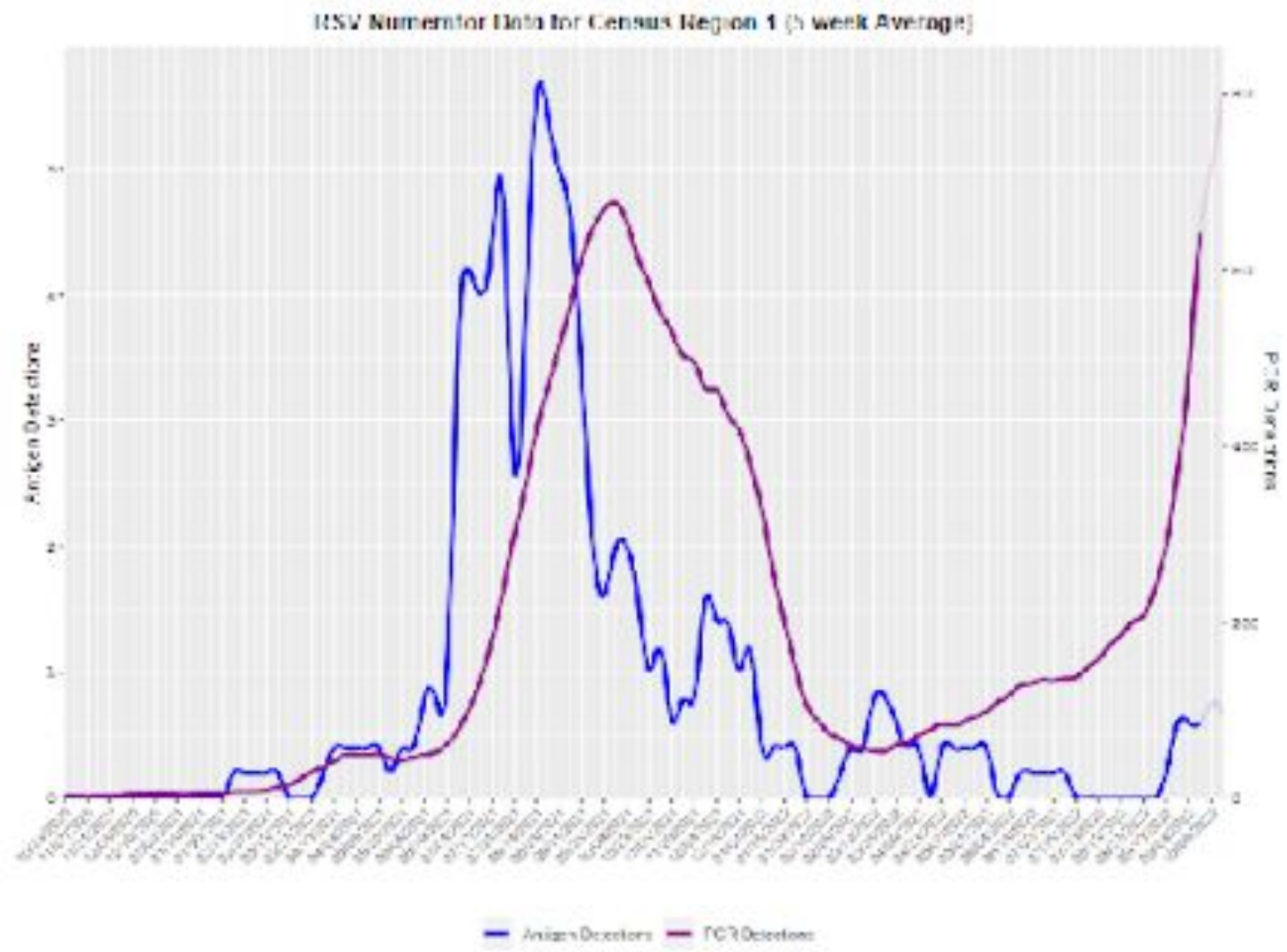


*Influenza-like illness (ILI, defined by fever ≥100F and cough and/or sore throat), as reported by Massachusetts sentinel surveillance sites. ILI reported by sentinel sites which report via ED syndromic surveillance include cases meeting the ILI definition and cases with a diagnosis indicating influenza infection The 2022-2023 regional baseline is 2.0%, for more information on how this baseline is calculated please visit https://www.cdc.gov/flu/weekly/overview.htm.

Respiratory syncytial virus (RSV)

- Seasonal respiratory viral illness
- High impact on populations at the extremes of age
  - Children < 5 years old
    - 2.1 million outpatient visits
    - 58,000 hospitalizations
    - 100-300 deaths
  - Adults > 65 years old
    - 177,000 hospitalizations
    - 14,000 deaths

RSV incidence rising sharply in MA



Tripledemic

- Confluence of COVID-19, influenza and RSV outbreaks
  - Waning immunity for RSV and flu leading to clinical disease (some severe)
  - Increased demand for hospital beds, especially in pediatric intensive care units
- Recommendations
  - Vaccinate children against influenza and COVID-19 (simultaneous vaccination okay)
  - Holding children out of school or social gatherings if ill (even if COVID testing negative)
  - Good hand and cough hygiene

Ebola virus disease (EVD) outbreak in Uganda

- Ongoing outbreak in Uganda beginning in September 2022
- Caused by Sudan ebolavirus

- 64 confirmed cases -> 25 deaths (10/20/22)
- Outbreak predominantly in Mubende district (but detected in five districts)
  - no transmission yet in Kampala

EVD transmission and clinical syndrome

- Transmission via contact with blood or bodily fluids or fomites of someone with EVD
- Clinical syndrome
  - Fever, headache, muscle pain, vomiting, diarrhea, bleeding not related to injury
  - Differential diagnosis includes malaria, typhoid fever, dengue

Testing

Warrior Panel

- DOD-developed laboratory test to identify biothreat agents
  - Ebola virus, Marburg, Q fever, tularemia, etc.
- Available at labs participating in the Laboratory Response Network, including MA SPHL

Monitoring travelers from Uganda

- MA DPH working with CDC and Division of Global Migration and Quarantine (DGMQ) to monitor travelers from Uganda
  - Contact traveler to evaluate risk, assess health status and monitor for symptoms during 21-day incubation period
- Febrile travelers are tracked by CDC
- PUI – known epidemiologic risk factor
- Risk stratification
  - High risk requires quarantine

Massachusetts Department of Public Health

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