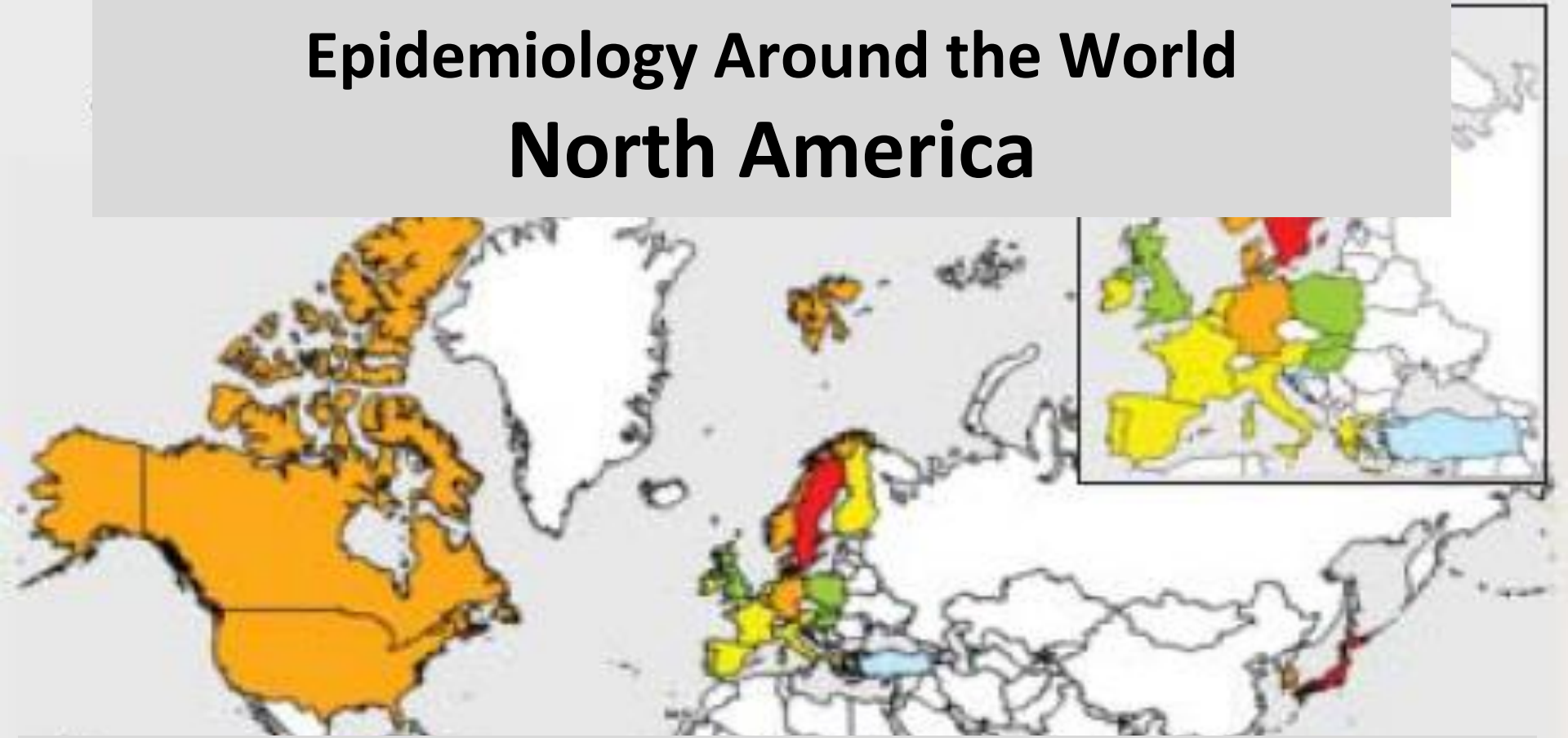
Epidemiology Around the World

North America



NTMir & UTHealth Physician/Patient Conference

Grapevine, TX

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Epidemiology NTM: North America

- Objectives

- Frequency – overall and by species
- Geography
- Temporal trends
- Mortality

Epidemiology NTM: North America

- Questions & challenges

What do we want to measure?

- All patients with “disease”

  Microbiology

  Clinical

  \+ Radiological

  = Disease

How do we measure it?

- Population-based

Not reportable

Annual Rates of NTM-PD

-North America, population based

Study	Region	Frequency*
Adjemian, AJRCCM 2012	Medicare (≥65 y) 1997-2007	~ 47
Marras, EID 2013	Ontario, population, 1998-2010	**9.8**
Prevots, AJRCCM 2010	Four US HMO / IHCDSs, 1994-2006	**5.5**
Cassidy, CID 2009	Oregon, population, 2005-6	**5.6**
Adjemian, EID 2017	Hawaii, single large HMO, 2005-13	**~18**
Winthrop, ATS 2017	US national managed care claims database, 2008-15	**11.7**
	Median (range)	**9.8 (5.5-18)**

Annualized prevalence / 100,000; average or final year of study; excludes *M. gordonae

NTM population burden

- Period prevalence

Study	Methods	Period Prevalence / Cumulative Incidence
Winthrop, AJRCCM 2010 (Oregon, 2005-6)	Portland tri-county Clinical record review	2-year PP All ages = 8.6/100,000 ≥50 yrs = 20.4/100,000
Prevots, AJRCCM 2010 (4 US IHCDS, 1994-2006)	Four US IHCDS ATS micro definition with some validation	3-year CI <60 yr ~ 4/100,000 60-69 yr ~ 40/100,000 70-79 yr ~ 100/100,000 ≥80 yr ~ 220/100,000
Adjemian, AJRCCM 2012 (Medicare 1997-2007)	Representative 5% Medicare sample (≥65yr) - ICD9	≤11-year PP ≥65 yrs = 112/100,000
Adjemian, Ann ATS 2017 (Hawaii 2005-13)	Single large HMO ATS micro	9 year PP >65 yrs ~350/100,000 50-65 yrs ~100/100,000
Marras, EID 2013 (Ontario, 2006-10)	Province-wide ATS micro	5-year PP All ages = 41.3/100,000

NTM epidemiology

- North America – disease by species

Study	N	Most Common Species			
New York City, single institution, 2000-4 (Bodle, EID 2008)	81	MAC (80%)	RGM (9%)	*xenopi* (6%)	*kansasii* (5%)
Oregon, state-wide, 2007-12 (Henkle, Ann ATS 2015)	1,146	MAC (86%)	*abscessus /chelonae* (7%)	*kansasii* (1.2%)	*fortuitum* (<1%)
Four US HMO / IHCDSs, 1994-2006 (Prevots AJRCCM 2010)	1,865	MAC (80%)	*abscessus /chelonae* (12%)	*fortuitum* (6%)	*kansasii* (6%)
Charlottesville VA, single institution, 2001-9 (Satyanarayana, BMC ID 2011)	83	MAC (69%)	*kansasii* (5%)	*xenopi* (5%)	*abscessus* (4%)
Hawaii, state-wide, 2005-2013, single HMO (Adjemian EID 2017)	254	MAC (67%)	*abscessus* (18%)	*fortuium (16%)*	
Ontario, province-wide, 2010 (Marras, EID 2013)	1,294	MAC (64%)	*xenopi* (23%)	*abscessus* (3%)	*fortuitum* (3%)

MAC – *M. avium* complex

RGM – rapidly growing mycobacteria

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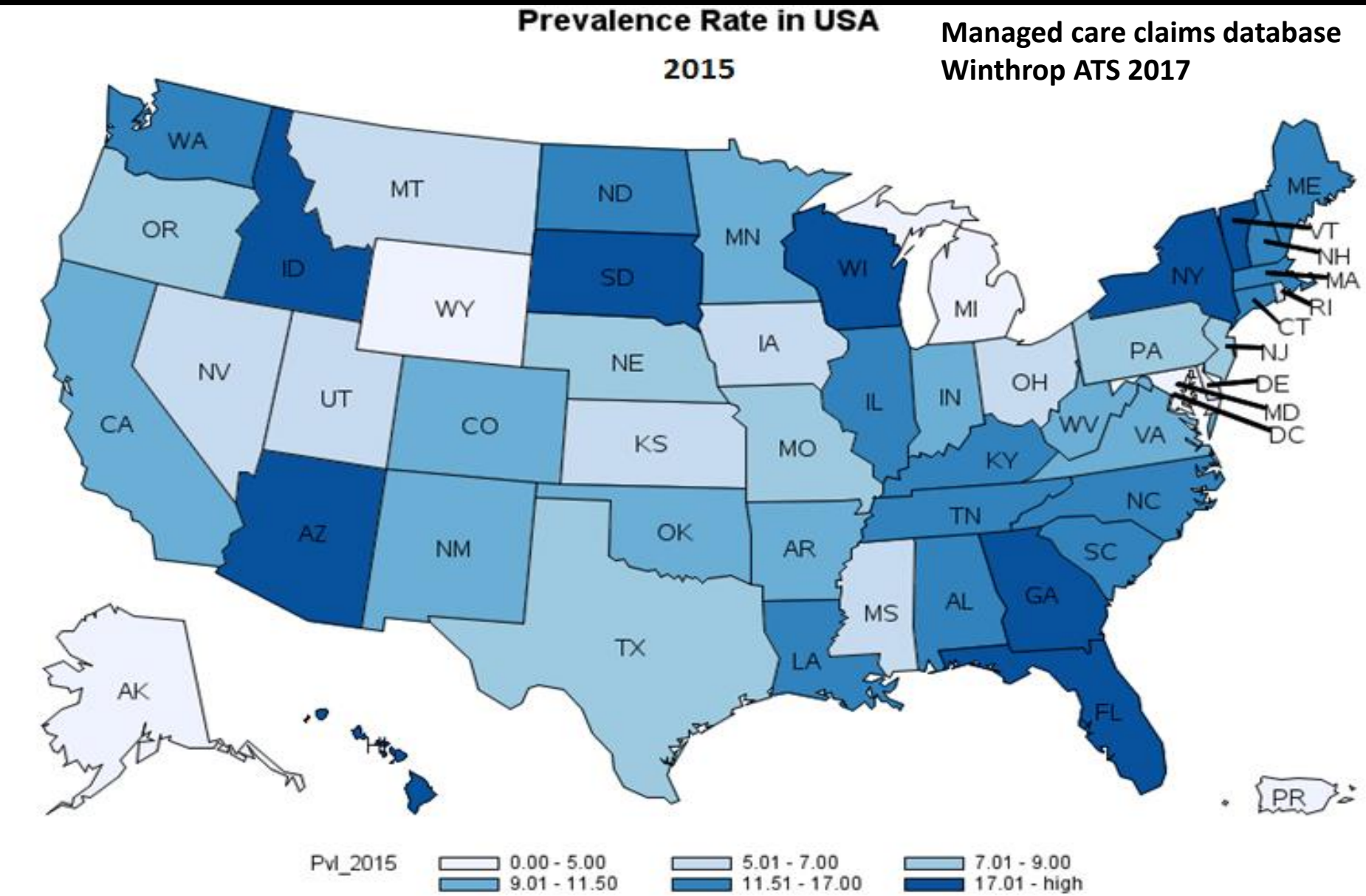
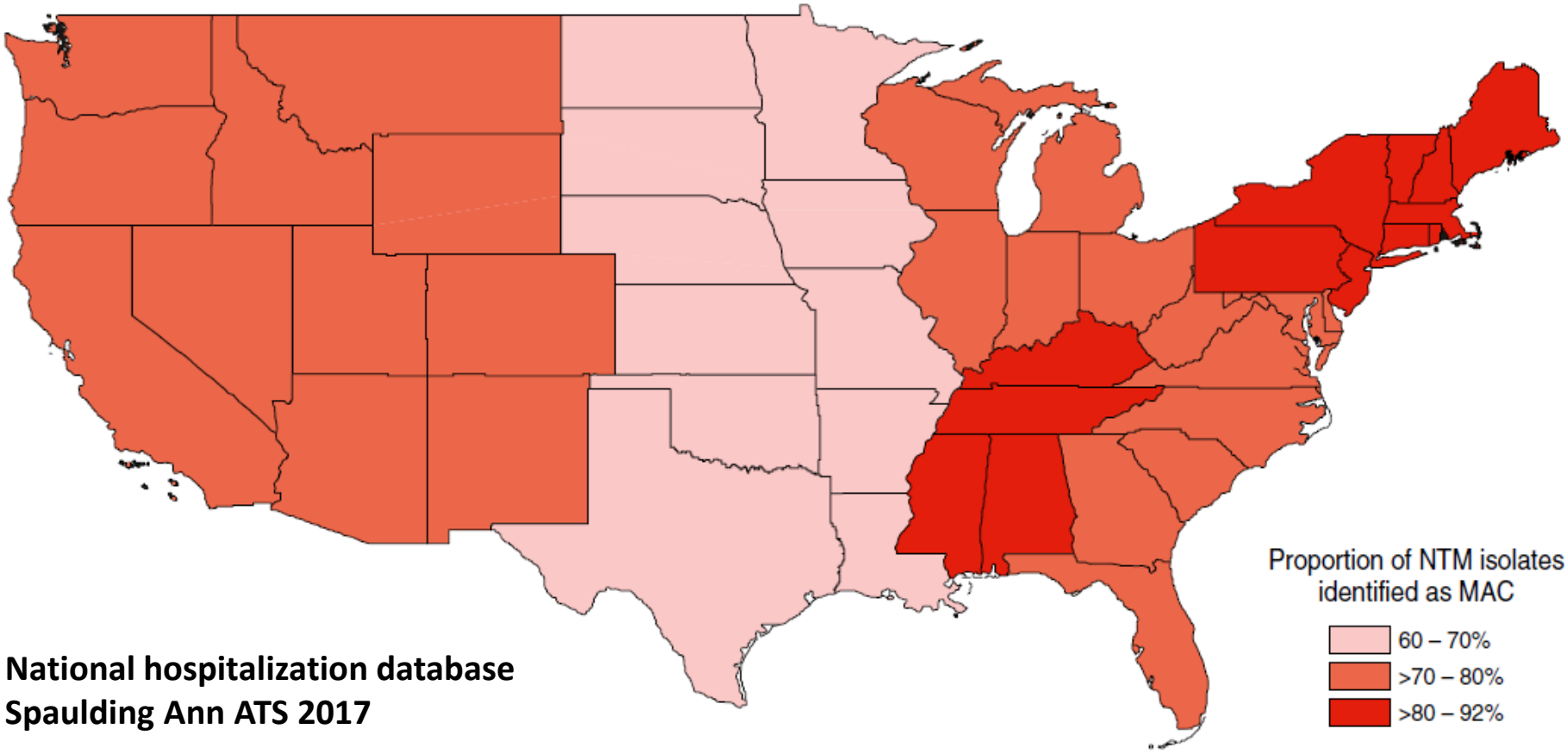
NTM epidemiology - geography

- North America – all NTM



NTM epidemiology - geography

- North America – species distribution



National hospitalization database
Spaulding Ann ATS 2017

Recent temporal disease trends

- North America

Study / Region / Cased definition	Annual increase
Prevots AJRCCM 2010 (4 US IHCDS, 1994-2006) - *Micro + ICD9*	**2.6-2.9%** (prevalence)
Alhouqani, Chest 2012 (Ontario, Canada, 2003-2008) - *ATS micro*	**10%** (MAC prevalence)
Adjemian, AJRCCM 2012 (US Medicare '97-'07) - *ICD9*	**8.5%** (prevalence)
Henkle, AnnATS 2015 (Oregon, state-wide, 2007-2012) - *ATS micro*	**2.2%** (incidence)
Adjemian, Ann ATS 2017 (Hawaii state-wide, single HMO, 2005-2013) - *ATS micro*	**9.6%** (prevalence)
US managed care claims database, 2008-2015 (Winthrop ATS 2017) – *ICD-9/10*	**5.2%** (incidence) **7.5%** (prevalence)
Median (range) **Incidence** **Prevalence**	**3.7 (2.2-5.2)** **8.5 (2.8-10)**

Survival in NTM-PD

- Population-based

Study	Population	Comparison	Mortality risk HR (95% CI)
Marras et al. EID 2017	Ontario, Canada (all, 2001-2013) **n=8,469** ATS micro criteria	Uninfected general pop. Matched 1:1 by age, sex, propensity score	**1.63 (1.56-1.70)**
Marras et al. Resp Med 2018	US managed care insurance database (2007-2016) **n=2,005** Claims-based (≥2 claims, ≥30d apart)	Uninfected ,same coverage period Matched 3:1 by age, sex MV adjustment: demographics, comorbidity	**2.06 (1.52-2.79)**
Marras et al. ID week 2018	Medicare 2008-2015 **n=38,981** ICD-9/10 (≥2 codes, ≥30d apart)	Uninfected, same coverage period Matched 2:1 by age, sex MV adjustment: demographics, comorbidity, Charlson CI	**1.30 (1.25-1.35)**

Epidemiology NTM: North America

- Summary

- **Frequency** → moderate (MAC, *M. abscessus ,* others)
- **Geography** → drives variability
- **Temporal trends** → rising
- **Mortality** → substantial