



# Evolution of HIV-1 drug resistance mutations in NSW

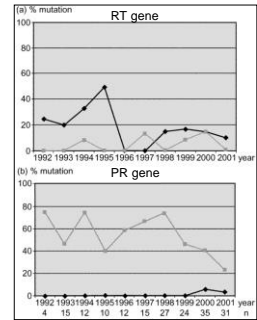
Angie Pinto | 17<sup>th</sup> September 2015

## Evolution of HIV-1 drug resistance mutations in NSW

### Background

#### No statewide drug resistance surveillance

- NSW has greatest burden of HIV in Australia (52%)<sup>a</sup>
- In 2014, 9140 people living with HIV in NSW were on ART<sup>b</sup>
- HIV drug resistance peaked in mid-1990s then stabilised<sup>c</sup>
- Since 2007 drug resistance testing at baseline recommended by WHO as standard of care<sup>d</sup>



2 a) Annual Surveillance Report 2014; b) NSW HIV Strategy 2012-15; Data Report; c) Ammaranond et al. AIDS. 17(2):264-267, January 24, 2003; d) DHHS, BHIVA, EACS, Australia TG DHHS Guidelines

## Evolution of HIV-1 drug resistance mutations in NSW

### Background

#### Genotypic antiretroviral resistance testing (GART)

1. SydPath
  2. RPA
  3. ICPMR
- Lacks clinical data
  - Ancillary testing
  - Coded identifiers
  - Repeat testing



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## Evolution of HIV-1 drug resistance mutations in NSW

### Aims

#### To define rates of HIV-1 resistance mutations

- overall rates of prevalent drug resistance
- transmitted drug resistance (TDR): seroconverters, naïve
- acquired drug resistance (ADR): treatment experienced

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## Evolution of HIV-1 drug resistance mutations in NSW

### Methods

#### Retrospective statewide analysis 2004-2013

- Viral genotypes from plasma viral RNA – 3 assays used
- Reformatted, deidentified database
- Sequence analysis: Stanford HIVdb 7.0
- WHO SDRM (surveillance drug resistance mutations) classification
- Prevalence of mutations calculated yearly
- Inclusion:
  - Single sequence/ individual per year
- Exclusion:
  - Duplicates within year
  - Integrase resistance mutations

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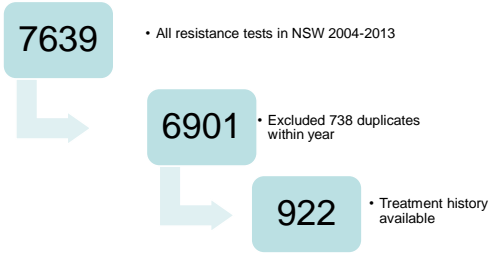
### Methods



a) <https://www.abbotmolecular.com/us/products/infectious-diseases/sequencing/hiv-1-genomic-mutations-ViroSeq.html>  
 b) Gillors R, Lee JF, Zhou SY, Kouchik J, Han S, Poley S, Shuler RV (2009). The calibrated population resistance tool: standardized genotypic estimation of transmitted HIV-1 drug resistance. *Bioinformatics*, 2009 Mar 20.

**Results**

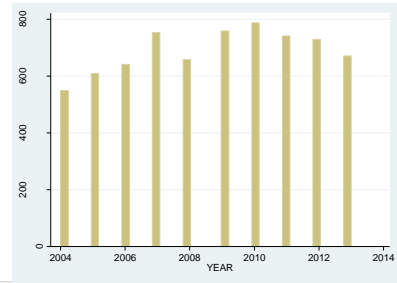
**Number of GART performed**



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**Results**

**Number of GART performed**



8

**Results**

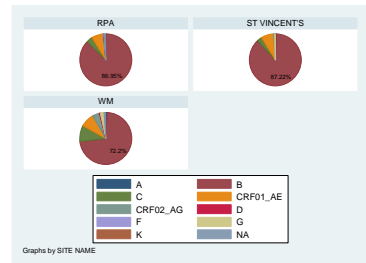
**Baseline demographics**

Gender, n(%)	5028 (90%)
Age years, (range, SD)	41 (0-90, 11)
SydPath, n(%)	3342 (48.43)
RPA, n(%)	2782 (40.31)
ICPMR, n(%)	777 (11.26)
Subtype B, n(%)	5895 (85.42)
Treatment data available, n(%)	922 (13.36)

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**Results**

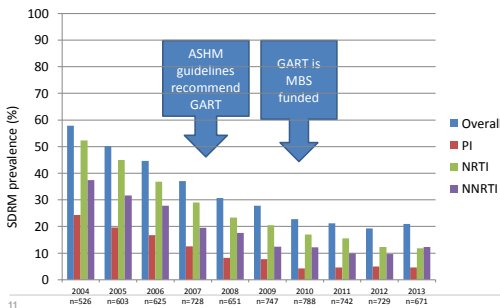
**Age and subtype distribution**



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**Results**

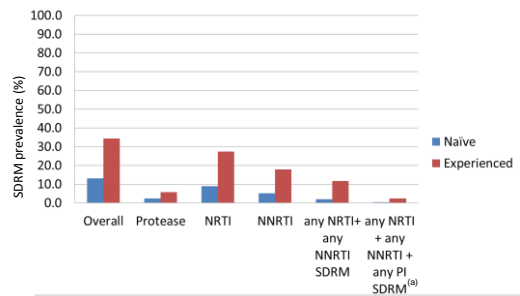
**Rates of SDRM over time**



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**Results**

**SDRM prevalence overall (2009-2013)**

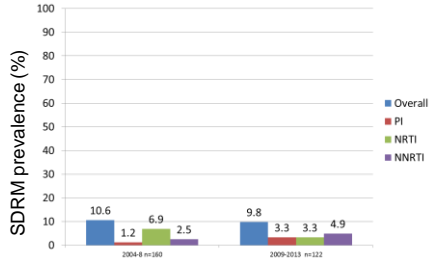


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a) Tong et al. Intern Med J. 2010 Sep;40(9):657-61.

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**Results**

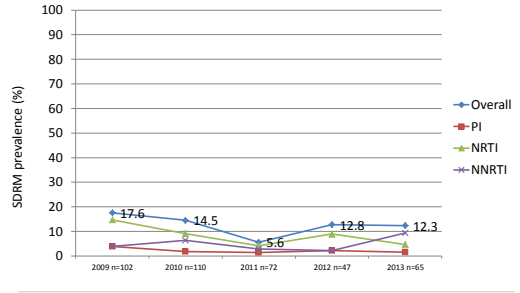
**Transmitted drug resistance -seroconverters**



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Evolution of HIV-1 drug resistance mutations in NSW  
**Results**

**Drug resistance in treatment naïve**

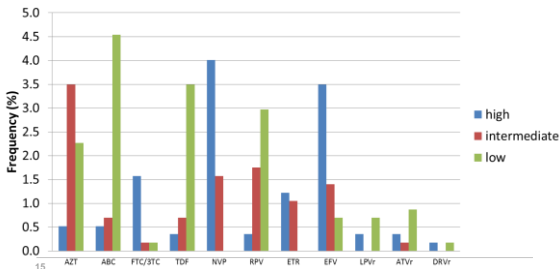


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**Results**

**Drug resistance in treatment naïve**

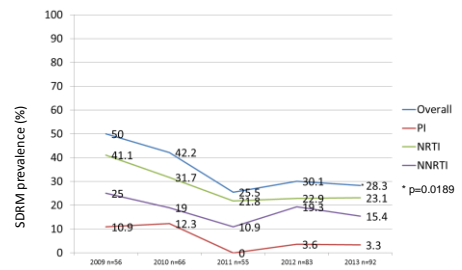
**Levels of predicted resistance**



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Evolution of HIV-1 drug resistance mutations in NSW  
**Results**

**Drug resistance in treatment experienced**

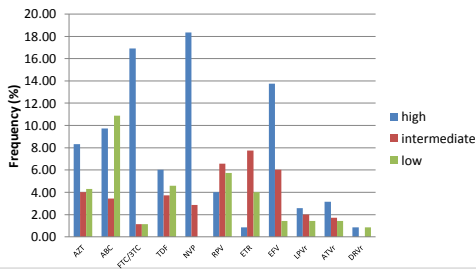


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Evolution of HIV-1 drug resistance mutations in NSW  
**Results**

**Drug resistance in treatment experienced**

**Levels of predicted resistance**



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Evolution of HIV-1 drug resistance mutations in NSW  
**Limitations**

- Retrospective
- Changing testing paradigms
- Limited clinical data
- Incomplete dataset – treatment cascade

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## Conclusions

### First statewide database of SDRM

- Decreased overall acquired drug resistance over 5 years
- Low rates of transmitted drug resistance
- Need for prospective surveillance of SDRM

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## Future directions

### Prospective study proposal

- Partnership grant substudy proposal 2015-2020
- Data linkage with HIV notifications database and laboratory resistance database
- Evaluate impact of NSW HIV strategy and treatment guidelines on drug resistant mutations

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## Acknowledgements

### Supervisors

- Kathy Petoumenos
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- David Cooper

### Collaborators

- STVH: Alex Carrera
- AMR: Phillip Cunningham
- RPA: Hanan Salem, Roger Garsia
- ICPMR: Kiran Thapa, Dominic Dwyer
- Database manager: Ansari Shaik

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