A syphilis epidemic among Black MSM in the context of endemic HIV: what do the venue affiliation networks look like over time?

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Background
• Baltimore, Maryland has one of the most severe syphilis epidemics with a co-occurring HIV epidemic among Black men who have sex with men (MSM).
• Key to transmission dynamics is the presence of disease and network structures to support infection propagation.
• Sex partner meeting places can be used as points of access for interventions and the network structure of meeting places may have important implications for epidemics.
• The objective was to describe temporal changes in the network structure of venue affiliation networks of syphilis and/or HIV infected MSM over five years during a local MSM syphilis epidemic.

Methods
• Public health surveillance data from MSM diagnosed with syphilis and/or HIV and reporting ≥ 1 sex partner meeting venue from 2012-2016 were examined.
• Venue affiliation network graphs and whole network structure measures (density, compactness) were generated using UCINET to assess whole network structure changes over time.
• Density: a measure of the total number of ties divided by the total number of possible ties
• Compactness: an average reciprocal measure of the distances and geodesic distances (shortest paths) between nodes. Compactness is 1 when all nodes are adjacent to each other.

Results
• 497 syphilis and/or HIV infected MSM were included (syphilis only 30.1% (n=154), HIV only 27.4% (n=136), both 42.5% (n=207)). 63.8% (n=317) were Black MSM. 137 unique venues were nominated, of which 55 venues were reported by >1 MSM and were included in this analysis.
• Comparing 2012 to 2016, the density of the network increased 23.8% (0.09 to 0.11), and the compactness of the network increased 16.3% (0.22 to 0.26) (Figure 1)
• The proportion of venues nominated by MSM with HIV and/or syphilis (vs. only one diagnosis) in the main network component increased 17.1% (80.0% to 93.7%) (Figure 2)

Conclusions
• Venue affiliation graphs of sex partner meeting places of syphilis and/or HIV infected MSM suggest a discrete set of potential intervention places and increasing co-nomination, density and compactness of the venue network structure during syndemics of syphilis and HIV.
• The network structure changes over time may suggest higher rates of transmission and increased difficulty of interrupting network transmission through fragmentation.

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