Abstract
Salt Lake County is currently experiencing an emerging gonorrheal epidemic. There has been a 5-fold increase in total cases in the county since 2010. This report utilizes Salt Lake County Department of Public Health’s databases to analyze the epidemic, to evaluate the patient populations who are most highly affected, understand the social factors contributing to the epidemic and to direct effective intervention to control the gonorrheal epidemic. The results show that the highest incidence age group affected by gonorrhea is slightly older in Salt Lake County (25-34 years of age) than the national average (15-24 years of age). It was found that the rate of gonorrhea in females is rising more rapidly than in males in a F:M ratio of gonorrhea cases jumped from 0.23 to 0.58 in 2010 to 2014 respectively. Additionally, there is a decreasing percentage of males who are diagnosed with gonorrhea who identify as men who have sex with men (MSM). Overall, the epidemic is most highly affecting the west side of Salt Lake County. The data leads to the conclusion that social factors have affected the distribution of gonorrhea in Salt Lake County. These social factors include people underestimating their risk of contracting the disease; a transition of gonorrhea from predominantly the MSM population into other sexually identifying populations; and a lack of awareness on the part of healthcare providers in screening for and intervening in cases of gonorrhea.

Introduction
Gonorrhea is a commonly diagnosed sexually transmitted infection (STI) caused by Neisseria gonorrhoeae, a gram-negative diplococcus. Gonorrhea can lead to major complications in women such as pelvic inflammatory disease (PID), tubal infertility, ectopic pregnancy and chronic pelvic pain while men may experience chronic proctitis, misdiagnosis of ulcerative colitis and infertility. Increased HIV (human immunodeficiency virus) transmission has been associated with gonorrhea outbreaks (1), which makes control of gonorrheal epidemics critical to public health.
Since 2010, Salt Lake County has experienced a dramatic 5-fold increase in gonorrhea cases. The incidence of gonorrhea in 2010 was 2.6 cases per 100,000 population. In 2014, the incidence jumped to over 10.3 cases per 100,000 population (2). However, The CDC reported that the national incidence of gonorrhea only increased from 100.2 cases per 100,000 population in 2010 to 110.7 cases per 100,000 population (2). Since 2008, the national incidence rate of gonorrhea has been consistently between 98 –111 cases per 100,000 population. This research analyzes the gonorrhea data collected by the Salt Lake County Department of Public Health from 2010-2014 in order to understand social behaviors precipitating the epidemic, identify the populations that were most highly affected; and develop a plan to focus resources at their most effective point to prevent new cases of gonorrhea.

Methods
Cases of gonorrhea in Salt Lake County have been tracked by Salt Lake County Department of Public Health. Data was de-identified from the electronic database for each year from 2010-2014. Each case of gonorrhea tracked by the health department was evaluated for patient gender, age, sexual preference, patient’s home zip code and the type of diagnostic facility. This data was analyzed to look for a correlation between any of these items and gonorrhea infection during the outbreak in Northern Utah. Percent increase was calculated by dividing the difference in 2014 and 2010 cases by the number of cases in 2010.

Results
The age distribution of gonorrhea from 2010-2014 in Utah was older than that seen nationally with the highest rate in the 25-34 year old (rather than the 15-24 year old nationally) (1). Interestingly, there was a more dramatic increase in the 45-64 year old group but not reported cases in any patients over the age of 65. Similar to the national incidence, the majority of cases are still seen in teens and young adults. Older adults were much less affected.
Traditionally, gonorrheal infection rates are higher in males especially in MSM populations. Salt Lake County has seen an increase in the F:M ratio. Furthermore, the ratio of men who identify as MSM who were diagnosed with gonorrhea from 2010 to 2014 has decreased. This suggests that gonorrhea transmission has transitioned into the heterosexual population.
One possibility for this transition is that the interview only allows for patients to identify as MSM or not MSM, excluding other sexual preferences. The patient reported (anecdotally) increase in use of social media dating increases the anonymity of sexual partners and preference which could be an additional contributing factor to the shift in gender trends as well as creating more difficulty in contact tracing.
PreP (pre-exposure prophylaxis for HIV) has also been introduced during this time and may play a role in frequency of condom use since PreP users may feel protected from being infected with HIV and be less concerned with other STIs.
Hispanic populations, specifically Hispanic females, have seen a greater percent increase in gonorrheal diagnosis than non-Hispanic populations. This signifies an area where outreach could be directed to Hispanic females to slow the gonorrheal epidemic.
Socio-economic factors may be contributing to the rise of gonorrhea in Salt Lake County. The free clinics showed the lowest rise in cases of gonorrhea diagnosed. Hospitals and clinic facilities consistently diagnosed the highest number of cases of gonorrhea in Salt Lake County from 2010 to 2014 with a rapid spike in 2013 and 2014. These data suggest that patients with access to healthcare in clinics and hospitals are contracting gonorrhea at the highest rates.
One of the consistently highest zip codes for gonorrhea cases was the 84119 zip code which includes the jail in Salt Lake County. However, the number of cases actually diagnosed in the incarcerated population does not account for this rate. This may represent individuals who are transitioning from incarceration back to society. Recent funding issues in Salt Lake County led to a policy in the incarcerated population of testing but not empirically treating patients with gonorrheal syndromes. It is difficult to know if the discordance between high rates of cases in 84119 and the confirmed diagnosis seen in the incarcerated population is a function of decreased testing in the jail.
The gonorrheal epidemic in Salt Lake county appears to concentrate on the west side of the valley. It will be worthwhile to focus limited resources here with a goal toward educating patients to recognize, seek treatment and protect against future infections as well as educating them on how they may access treatment. Training clinical staff on current guidelines for gonorrhea treatment is important as the health department has reported that multiple providers have requested guidance on treating gonorrhea due to previous limited exposure to this infection.
The data from this report has already allowed the health department to implement strategies to slow the epidemic including:
1) providing education to incarcerated, drug treatment and homeless populations
2) condom distribution in highly affected areas
3) interviews with patients in highly affected areas to understand their social habits
4) providing health care providers with the tools to screen for, recognize the symptoms, and treat cases of gonorrhea.

Discussion

References

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