Targeting Regional Pediatric Congenital Hearing Loss Using a Spatial Scan Statistic

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Disclosures

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Infant Hearing Loss a Public Health Issue

- The development of speech, language, and cognition is intimately related to early infant hearing.
- Screening diagnostic testing by 1 month of age
- Diagnosis $\rightarrow$ 3 months, Treatment $\rightarrow$ 6 months
- Inequities in the availability of diagnostic and intervention services may compound the risk of non-adherence with recommended testing
Localizing Healthcare Disparity

- 20% of the U.S. population resides in rural areas.
- Socioeconomic, educational, and geographic barriers influence hearing healthcare timing.
- 97% of children are screened yet 45% miss follow-up
- Can we identify geographic regions with the highest rates of failed screening tests and cases of congenital hearing loss
The purpose of this study is to use a novel statistical method to identify regions and hospitals within Kentucky with the highest rates of failed infant hearing and permanent congenital hearing loss (PCHL).
Methods

• De-identified Kentucky EHDI database (2009-2011)
• Examined county rates of failed newborn screening and rates of pediatric hearing loss
• Assessed hospital screening methods.
• Spatial scan statistic method employed to identify clusters of counties with high rates of failed screens and hearing loss
Results

- 162,043 births, 6968 failed screens, 285 cases of PCHL
- 4 clusters of counties with significant higher rates of failed newborn hearing screens → rural
- Rate of failed screening test 5.55% in 54 hospitals
- OAE alone (9.65%) vs. ABR (4.82%)
Rates of Failed Newborn Screening
Rates of PCHL

Cluster: RR=3.08, p<0.001

- 10.5/1000 births (p<0.02)
- 3.5/1000 births (p<0.01)
- 5.3/1000 births (p<0.01)
- 2.8/1000 births (p=0.03)
- 7/1000 births (p<0.01)
Limitations

1. Clustering method may miss counties of elongated or irregular shape
2. Under-reporting of hearing loss diagnoses
3. Lack of generalizability of the results to other regions
Conclusions

1. Spatial scan statistics are useful in identifying congenital hearing loss in large geographic areas.

2. This information can be used to mobilize hearing healthcare services to target regions.

3. High infant hearing screening failures may be related to testing modality.
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Questions?

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