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Neighborhood Disadvantage Correlates with Outcomes in Muscle Invasive Bladder Cancer

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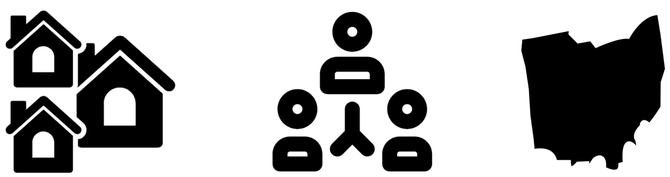
Background and Purpose

- Area Deprivation Index (ADI): integrated metric of neighborhood socioeconomic disadvantage (NSD) that incorporates factors including income, employment, education, and housing quality to reflect the material disadvantage of a local area determined by zip code
- ADI has been shown to predict adverse health outcomes[1] but is understudied in the context of bladder cancer
- ADI was associated with higher likelihood of 90-day mortality following radical cystectomy (RC).[2]

Study Goal

To evaluate the possible association between **ADI (NSD), demographics, and pathologic outcomes** for Ohioans diagnosed with MIBC treated by RC at a tertiary medical center.



Methods

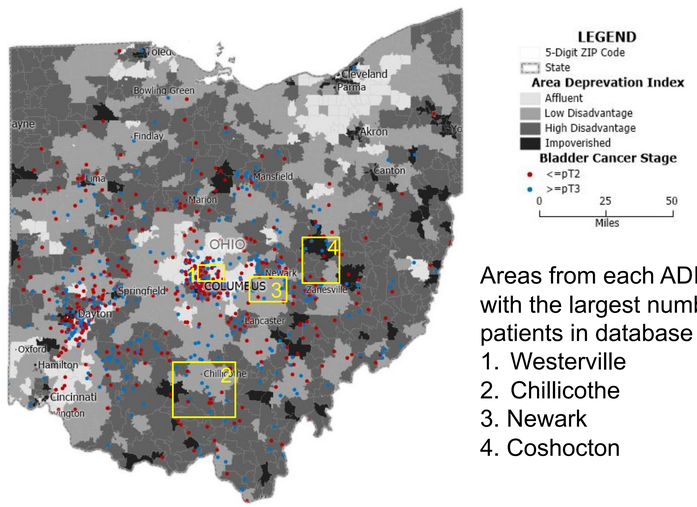
- A RC database was created via retrospective chart review ranging from 2012 – 2018.
  - Inclusion criteria: reside in the state of Ohio, have a known ZIP code, and have an ADI value
  - 742 patients were included
- Clinical, pathological, and surgical characteristics were compared across ADI quartiles (least, low, high, or most NSD).
  - ADI values range from 1 – 10 (least – most disadvantaged).
- Chi2 test (categorical) and ANOVA (continuous) was used to determine the association between NSD and proportion of low-income resident or racial/ethnic minority MIBC patients.
- Maptitude geocoding software was used to link patient ZIP code with US Census location for ADI data.
  - Patients were stratified based on pathological diagnosis to ≤pT2 or ≥pT3.

Table 1. Selected Patient Characteristics by Area Deprivation Index (ADI) Grouping

	Area Deprivation Index (ADI) Quartile of the Patient Neighborhoods				
	Least Disadvantaged (N = 253)	Third-Most Disadvantaged (N = 175)	Second-Most Disadvantaged (N = 151)	Most Disadvantaged (N = 163)	P-value†
Demographic information N (%)					
Female	41 (16.2%)	42 (24.0%)	33 (21.8%)	36 (22.1%)	0.203
Non-White	5 (2.0%)	12 (6.8%)	9 (6.0%)	11 (6.9%)	0.152
Smoking History N (%)					
Active	31 (12.3%)	31 (17.7%)	46 (30.5%)	44 (27.0%)	< 0.0001
Neoadjuvant Chemotherapy N (%)					
Yes	117 (46.2%)	72 (41.1%)	64 (42.4%)	64 (39.3%)	0.520
Pathologic T Staging N (%)					
≥pT3	97 (30.3%)	60 (37.7%)	65 (43.1%)	80 (49.1%)	0.009
Pathologic N Staging N (%)					
N+	50 (19.8%)	33 (18.9%)	32 (21.2%)	54 (33.1%)	0.014
Positive Soft Tissue Margins N (%)					
Yes	7 (2.8%)	13 (7.4%)	6 (4.0%)	11(6.7%)	0.106
Lymphovascular Invasion N (%)					
Yes	54 (21.3%)	41 (23.4%)	43 (28.5%)	52 (31.9%)	0.075

†A p-value of <0.05 was used to indicate statistical significance

Figure 1. Geocoding of Patient Characteristics



Areas from each ADI quartile with the largest number of patients in database

1. Westerville
2. Chillicothe
3. Newark
4. Coshocton

Table 2. "Hot Spot" data by Area Deprivation Index (ADI)

	Hot Spots From Each ADI Quartile			
	Westerville (ADI = 1) Total Population: 91,055	Chillicothe (ADI = 5) Total Population: 57,110	Newark (ADI = 6) Total Population: 61,243	Coshocton (ADI = 9) Total Population: 18,514
Demographics (%)				
Male	48.2	53.4	47.8	48.6
White	83.4	88.9	93.3	96.2
College Degree or Higher	55.5	15.0	17.0	12.0
Household				
Median income (USD)	95,025	44,780	42,887	39,318
Public Assistance (%)	0.8	4.5	5.0	4.4
In Poverty (%)	3.0	14.2	15.4	10.1
Median Home Value (USD)	233,600	112,900	125,100	87,500
Employment (%)				
Unemployed	3.5	9.2	8.6	7.1
Manufacturing	6.9	16.2	13.3	25.8
Health				
Total Healthcare Providers	1,890	1,290	873	254
Healthy Foodie (%)	28.6	23.1	31.2	0

Conclusions

- MIBC patients treated by cystectomy who come from neighborhoods with high socioeconomic disadvantage:
  - Are more likely to have a smoking history
  - Have higher rates of ≥pT3 and N+ disease
  - Trend towards higher rates of LVI

Implications

- Neighborhood socioeconomic disadvantage impacts patient outcomes particularly relevant in bladder cancer care
- ADI coupled with Geocoding can help identify bladder cancer "hot spots"
- Geocoding provides a more granular understanding of social determinants of health within ADI-defined patient ZIP codes

References

1. Singh, G.K., *Area deprivation and widening inequalities in US mortality*, 1969-1998.Am J Public Health, 2003. 93(7): p. 1137-43
2. Knorr JM, Campbell RA, Cockrum J, Dalton JE, Murthy PB, Berglund RK, Cullen J, Weight CJ, Almassi N, Abouassaly R, Kaouk JH, Haber GP, Lee BH. Neighborhood Socioeconomic Disadvantage Associated With Increased 90-Day Mortality Following Radical Cystectomy. Urology. 2021 Dec 30:S0090-4295(21)01174-2. doi: 10.1016/j.urology.2021.10.048. Epub ahead of print. PMID: 34974027.

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