

Racial Disparity in Healthcare: A Focus on Hemodialysis Patients

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Objectives

1. Define Racial Disparity.
2. Discuss Racial Disparity in hemodialysis outcome measures.
3. Correlate the impact of RRT outcome measures with financial burden.



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Minority Health and Health Disparities Definitions

- National Institutes of Health Minority Health and Health Disparities (NIMHD)
 - Minority Health Research
 - Health Disparity Research



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Minority Health Research

The scientific investigation of singular and combinations of attributes, characteristics, behaviors, biology, and societal and environmental factors that influence the health of minority racial and/or ethnic population(s), including within-group or ethnic sub-populations, with the goals of improving health and preventing disease.



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**BREAK
THE
CYCLE**
OF HEALTH
DISPARITIES

Health Disparity Research

A multi-disciplinary field of study devoted to:

- Gaining greater scientific knowledge about the influence of health determinants.
- Understanding the role of mechanisms.
- Determining how this knowledge is translated into interventions to reduce or eliminate adverse health outcomes.

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Population Disparity

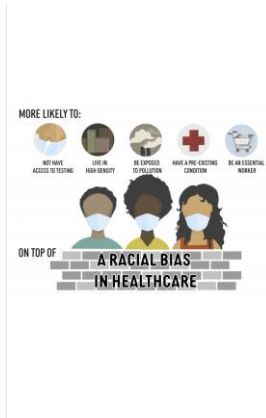


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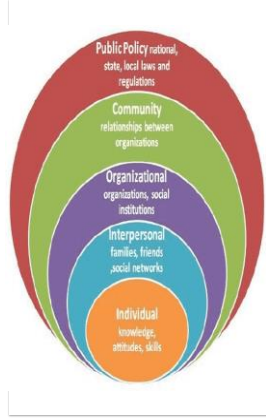
Minority Health Populations

The OMB Directive 15 defines racial and ethnic minority populations as:

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino American
- Native Hawaiian and Pacific Islander



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Populations with Health Disparities

Populations that experience health disparities include:

- Racial and ethnic minority groups
- People with lower socioeconomic status (SES)
- Underserved rural communities
- Sexual and gender minority (SGM) groups

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Minority Health and Health Disparities Definitions

- Stereotyping
- Prejudice
- Discrimination
- Racial Bias



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Stereotypes, Prejudice & Discrimination


Stereotype: Cognitive
How do I categorize and "label" a person?

Prejudice: Affective
How do I feel about a person? What are my attitudes towards him/her?

Discrimination: Behavioral
How do I act towards a person?

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Bias in Healthcare



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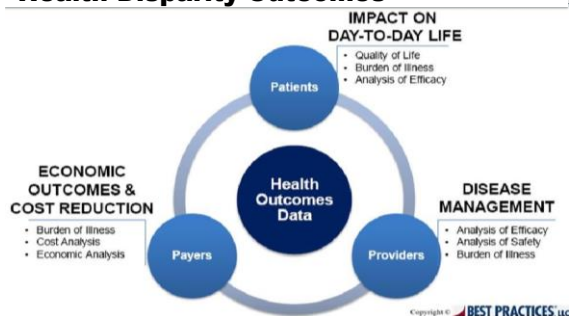
Bias in Healthcare

Racial bias
A form of Prejudice

- Negative emotions
- Negative stereotypes
- Racial discrimination

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Health Disparity Outcomes



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Renal Disease Definitions

- Chronic Kidney Disease (CKD)
- End-Stage Renal Disease (ESRD)
- Hemodialysis (HD)



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Background

- NIDDK, USRDS & ESRD Surveillance
- Kidney Disease Outcomes Quality Initiative (KDOQI)
 - Classify "Pre-ESRD" status
- Metabolic acidosis



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Background

- CKD affects almost 15% of the U.S. population
- Prevalence of ESRD is rising approximately 20,000 cases per year
- Several studies discuss racial disparity in pre-ESRD CKD associated acid-base status
 - limited to no studies after declaration



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Background

- KDOQI Guidelines and Medicare reimbursement dictate current ordering practices for hemodialysis monitoring
 - Dialysis adequacy
 - Anemia Management
 - Nutrition Markers



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Background: Dialysis Adequacy

- 3 tests
 - Urea reduction ratio (URR)
 - Kt/V ratio
 - Time on dialysis
- Patients with lower URR and Kt/V values had more health complications and greater risk of death
- Race is not documented as an evaluation metric in the NIDDK or KDOQI guidelines for dialysis adequacy.



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Background: Anemia Management

- Anemia is among the most common complications of CKD and ESRD
- Develops from
 - decreased renal synthesis of erythropoietin
 - iatrogenic
- Race is a variable in the baseline characteristics for anemia evaluation



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Background: Nutrition Markers

- Albumin is considered one of the most important, comprehensive nutrition markers of survival for HD patients
- Predictive marker with a strong association for mortality
- Electrolyte abnormalities are present in 3%-11% of all CKD patients
- Intricate physiology
 - calcium, phosphorus, and parathyroid hormone and concluded
 - improving acid-base control helped improve symptoms of secondary hyperparathyroidism



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Background: Financial Burden

- In-center hemodialysis having the highest cost per patient of all modalities
 - 34% admissions with 92% costs
 - Exceed \$18 billion annually
- Standard test ordering is mandated by Medicare reimbursement and KDOQI guidelines to completed
 - Monthly (URR, Kt/V, Hgb, Alb, K+, Ca, Phos)
 - Quarterly (Ferritin, PTH)
- Poorly controlled acid-base status leads to an increase in poor outcomes



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Why Racial Bias in Hemodialysis?

1. To evaluate clinical and financial impact of acid-base status for dialysis adequacy, anemia management, nutritional markers of hemodialysis patients
2. To determine if the utilization frequency are associated with racial disparity.



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Questions to Ponder



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- Question 1:**
Is there racial disparity associated with acid-base classification?
- Question 2:**
Is there a statistically significant difference between racial groups in the frequency of laboratory test utilization used to evaluate dialysis adequacy, anemia management, and nutrition markers associated with acid-base classification within racial groups?
- Question 3:**
Is there a financial impact of laboratory test utilization associated with acid-base classification within racial groups?

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Research design and Methodology



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Participants/Recruitment

- 2 facilities were selected to obtain convenience samples
 - UTMB Hospital-Galveston, TX
 - MH health system-Rapid City, SD

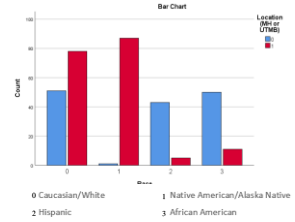
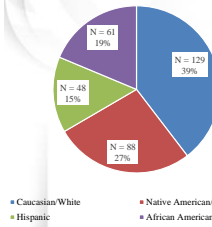
- All patients with ESRD
 - between the age of 40-75
 - hemodialysis for at least 3 continuous months
 - Race documented in EMR



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Demographics; N = 326

Study Distribution

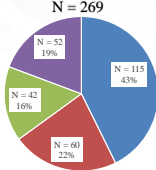


	UTMB	MH	Total
Caucasian/White	51	78	129
NA/AN	1	87	88
Hispanic	43	5	48
AA	50	11	61
Total	145	181	326

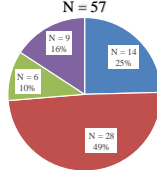
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Results - Question 1

Acid-Base Status Controlled



Acid-Base Status Poorly Controlled



- Caucasian/White
- Native American/Alaska Native
- Hispanic
- African American

Pearson $\chi^2(3, N = 326) = 17.61, p = .001, \phi = .23$
 F(3, 322) = 3.03, $p = .03$
 Significant

- Omnibus Chi-Square analysis
- One-way ANOVA
- Post Hoc Dunnett's C



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Discussion - Question 1

- Limited studies in literature discuss Race as a relationship with acid-base status for ESRD patients on hemodialysis
- Crews et al (2018), Shen et al (2020), Ross et al (2006), & Benjamin et al (2021) addresses racial disparity of acid load
- Our study indicated that racial disparity is present in the poorly controlled acid-base status; predominantly the Native American/Alaska Native population

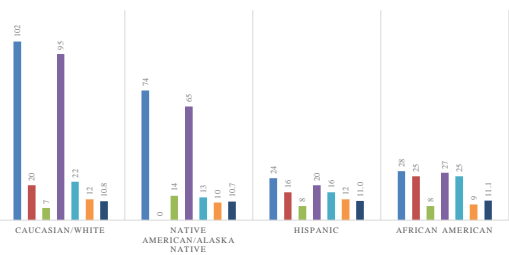


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Results - Question 2

FREQUENCY OF DIALYSIS ADEQUACY BY RACE

- URR Efficiency
- URR Null
- URR Inefficient
- Kt/V Efficiency
- Kt/V Null
- Kt/V Inefficient
- Avg Hrs per week

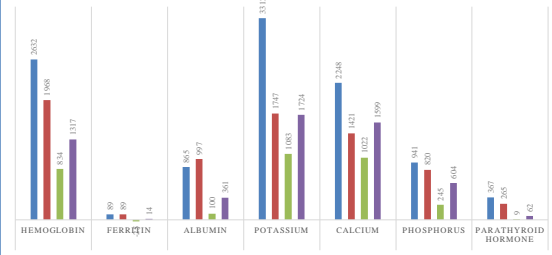


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Results - Question 2

FREQUENCY OF UTILIZATION DIFFERENCE BY RACE

- Caucasian/White (0)
- Native American/Alaska Native (1)
- Hispanic (2)
- African American (3)



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Results - Question 2

Table 1. ANOVA Table Results

Variable (1-way ANOVA)	Significance	HoV	Result	Post Hoc	Effect
URR	.01	.01	F(3, 261) = 3.84, p = .01	Dunnnett C	small
KiV	.00	.29	F(3, 246) = 6.94, p = .00	Tukey	medium
Ferritin	.00	.04	F(3, 322) = 13.69, p = .00	Dunnnett C	medium
Ferritin Difference	.00	.25	F(3, 322) = 8.60, p = .00	Tukey	medium
Albumin	.00	.04	F(3, 322) = 11.20, p = .00	Dunnnett C	medium
Albumin Difference	.00	.02	F(3, 322) = 8.29, p = .00	Dunnnett C	medium
Potassium Difference	.04	.04	F(3, 322) = 2.78, p = .04	Dunnnett C	small
Calcium	.03	.01	F(3, 322) = 2.93, p = .03	Dunnnett C	small
Calcium Difference	.00	.03	F(3, 322) = 4.93, p = .00	Dunnnett C	small
Phosphorus	.02	.20	F(3, 322) = 3.29, p = .02	Tukey	small
PTH	.00	.00	F(3, 322) = 13.29, p = .00	Dunnnett C	medium
PTH Difference	.00	.00	F(3, 322) = 11.75, p = .00	Dunnnett C	medium
Overall Nutrition Mgmt	.00	.03	F(3, 322) = 8.24, p = .00	Dunnnett C	medium
Overall anemia/nutrition	.00	.22	F(3, 322) = 4.82, p = .00	Tukey	medium
Overall Dialysis	.00	.22	F(3, 246) = 5.88, p = .00	Tukey	medium
Variable (2-way ANOVA)					
KiV	.02	.12	F(7, 242) = 3.40, p = .02	Tukey	none
PTH	.02	.00	F(7, 318) = 3.32, p = .02	Dunnnett C	none

* p < 0.05

Discussion - Question 2

- Native American/Alaska Native had the most patients not meeting efficiency standards; however, was the only race that reported on all patients
- No racial disparity noted for hemoglobin, but have been noted for ferritin studies
 - Our study supports this with significance of ferritin by race but not significant with hemoglobin by race
- Nutrition markers are used to monitor overall health status and used as predictive markers for mortality and dialysis quality overall.
- Poorly controlled acid-base status leads to an increase in the ordering practices of laboratory tests; however, this study did not find this correlation as no significance was found with any variable to acid-base status

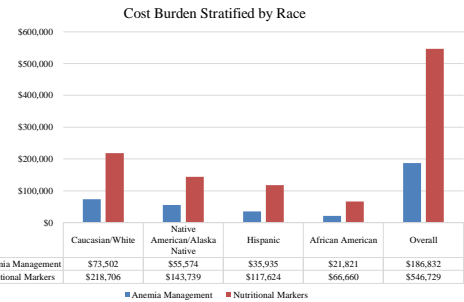
Results – Question 3

Table 2. Estimation of Financial Burden

Test	Charge: Commercial Lab #1	Charge: Commercial Lab #2	Average of Commercial Lab charge	Number of Overutilization cases	Excess Financial Burden (\$\$)
Hemoglobin	\$29.00	\$25.00	\$27.00	6751	\$182,277
Ferritin	\$29.00	\$26.00	\$27.50	166	\$4,556
Albumin	\$19.00	\$19.00	\$19.00	2323	\$44,137
Potassium	\$33.00	\$25.00	\$29.00	7866	\$228,114
Calcium	\$29.00	\$23.00	\$26.00	6290	\$163,540
Phosphorus	\$28.00	\$23.00	\$25.50	2610	\$66,555
Parathyroid Hormone	\$64.00	\$59.00	\$61.50	722	\$44,383

Estimated annual cost burden –\$733,561

Results – Question 3



Estimated annual cost burden –\$733,561

Discussion – Question 3

Results demonstrate racial disparities of financial burden

- The Native American/Alaska Native
 - 29% population, but 31% cost burden
- The Hispanic population
 - 15% of the study, but 21% cost burden
- The African American population
 - 19% of the study, 12% cost burden



Discussion – Question 3

- Poorly controlled acid-base status leads to an increase in poor outcomes, extrapolates to an increase in the ordering practices of laboratory tests
 - Reducing the number of routine laboratory tests draws from monthly to every 6 weeks, that an average cost savings of \$85 per patient year (or \$1.7 million for the 20,000 Canadian HD patients)
- Potential savings of \$380 per patient year
 - \$135,102 for the 326 studied
- According to NIDDK (2020)-- Nearly 786,000 people in the United States are living with ESRD, with 71% on dialysis
 - approximately 558,060 people → ~\$212 Million

Discussion – Question 3

- According to NIDDK (2020)
 - Nearly 786,000 people in the United States are living with ESRD, with 71% on dialysis
 - Approximately 558,060 people

→ **~\$212 Million**

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Limitations

- Not all health disparities integrated into the study
- Covid-19 pandemic
- Retrospective study - Potential bias
- Convenience sample & population demographics
- Patient compliance with hemodialysis
- Complications unrelated to hemodialysis
- Physician compliance with ordering of appropriate laboratory testing per KDOQI guidelines
- Not all information was in test results, several were narrative by nephrology team.
- Dialysis monitoring results integrated with diagnostic values

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Implications

- Future research should focus on determining the reasons for deviation from the current guidelines
- Assess whether current guidelines are appropriate
- More advanced statistical analysis, a larger cohort, and more racial groups represented
- More studies involving extensive analysis of charges, costs, and correlation with demographic groups is needed
- Use of templates to designate “dialysis” monitoring from diagnostic testing

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Conclusion

- The results of this study show racial disparity of 49.1% of Native American/Alaska Native population demonstrating poor control with acid-base status
- Racial disparity is present within test frequency utilization
 - Dialysis adequacy—however, may be confounded due to null counts present
 - Anemia Management—significant overutilization overall with ferritin showing racial disparity
 - Nutrition markers—significant overutilization overall with albumin, potassium, calcium, phosphorus; and PTH showing racial disparity

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Conclusion

- Hemodialysis has the highest cost per patient of all modalities, it is important to adhere to current guidelines and review for appropriate test utilization
- This was a small study and this topic merits further consideration and research to improve patient care, patient outcomes, and cost reduction

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THANK MOOOOOO!



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QUESTIONS

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