KIRUDDU NATIONAL REFERRAL HOSPITAL
Republic of Uganda

Emergencies in HIV Disease

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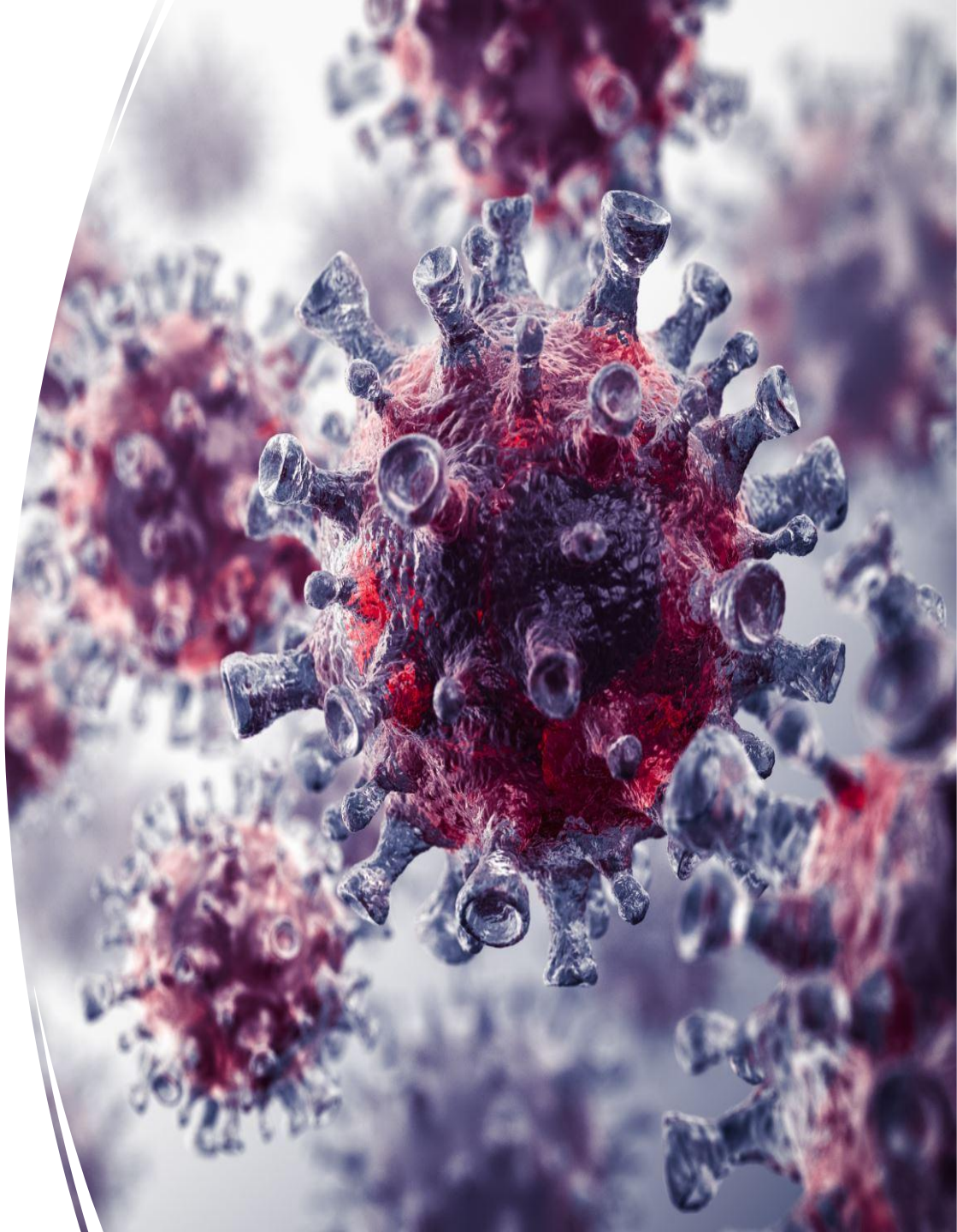

Overview

Uganda still documents more than 50,000 new HIV infections each year.

Despite readily available antiretroviral therapy (ART), about 17,000 Ugandans die from HIV-related complications annually.

In-patient HIV mortality is reportedly high but supporting data is scarce.

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Mortality and associated factors among people living with HIV admitted at a tertiary-care hospital in Uganda: a cross-sectional study

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Ref: https://pubmed.ncbi.nlm.nih.gov/38388345/

Findings

- 5,827 HIV+ inpatient admissions
- Period: March 2020 – March 2023
- Study site: Kiruddu National Referral Hospital
- 36% were not on ART
- 39% had advanced HIV disease (CD4+ cell count < 200 cells)
- Mortality: 1,524 (26%)
- Median time to death: 3 days (1-7 days)

Variable	Discharged (N=4,303)	Died (N= 1,524)	Total (N=5,827)	p value
Median Age (IQR)	39(31-48)	40(31-50)	39 (31-49)	
Sex				
Female	2,483 (57.70)	810 (53.15)	3,293 (56.51)	0.002
Admission status				
New admission	3,790 (88.08)	1,390 (91.21)	5,180 (88.90)	0.001
Readmission	513 (11.92)	134 (8.79)	647 (11.1)	
ART Status at Admission				
Active on ART	2,824 (65.63)	886 (58.14)	3,710 (63.67)	<0.001
ART Naïve	717 (16.66)	256 (16.80)	973 (16.70)	
ART Interruption	762 (17.71)	382 (25.07)	1,144 (19.63)	
Median Days of Hospital Stay (IQR)	6 (3-11)	3 (1-7)	5 (2-10)	
Median Viral Load (n=216)	50 (0-13,900)	95(0-119,000)	50(0-28,290)	
Median CD4 cell count (µL, IQR)	133 (30-380)	57 (16-197)	109 (25-343)	
CD4+ cell counts				
CD4+ ≤200 cells/µL	1,624 (37.74)	647 (42.45)	2,271 (38.97)	<0.001
CD4+ >201 cells/µL	1,189 (27.63)	255 (16.73)	1,444 (24.78)	
CD4+ Not Documented	1,490 (34.63)	622 (40.81)	2,112 (36.25)	
Function Assessment				
ECOG Score 1-2	3,175 (73.79)	427 (28.02)	3,602 (61.82)	<0.001
ECOG Score 3-4	1,128 (26.21)	1,097 (71.98)	2,225 (38.18)	

Clinical Diagnoses among Hospitalized PLHIV	Discharged (N=4,303)	Died (N= 1,524)	Total (N=5,827)	p value
1. Tuberculosis	1,429 (33.21)	525 (34.45)	1,954 (33.53)	0.378
2. Co-infections	**910 (21.15)**	**457 (29.99)**	1,367 (23.46)	<0.001
3. Cardiovascular disease	757 (17.59)	218 (14.30)	975 (16.73)	0.003
4. Malnutrition	**475 (11.04)**	**332 (21.78)**	807 (13.85)	<0.001
5. Cryptococcal Disease	558 (12.97)	181 (11.88)	739 (12.68)	0.271
6. Anaemia	**454 (10.55)**	**192 (12.60)**	646 (11.09)	0.029
7. Kidney Disease	**338 (7.85)**	**176 (11.55)**	514 (8.82)	<0.001
8. Candidiasis	331 (7.69)	112 (7.35)	443 (7.60)	0.664
9. Diabetes Mellitus	304 (7.06)	86 (5.64)	390 (6.69)	0.057
10. Liver Disease	**214 (4.97)**	**124 (8.14)**	338 (5.80)	<0.001
11. Neurologic disorders	191 (4.44)	38 (2.49)	229 (3.93)	0.001
12. Chronic Lung Disease	148 (4.04)	37 (2.86)	185 (3.73)	0.053
13. COVID-19	**114 (2.65)**	**77 (5.05)**	191 (3.28)	<0.001
14. Cancer	108 (2.51)	39 (2.56)	147 (2.52)	0.916
15. Toxoplasmosis	102 (2.37)	40 (2.62)	142 (2.44)	0.580
16. Kaposi Sarcoma	91 (2.11)	33 (2.17)	124 (2.13)	0.906

Predictors of Mortality among Hospitalized PLHIV	**Unadjusted Odds Ratio (95% CI)**	**p value**	**Adjusted Odds Ratio (95%CI)**	**p value**
Sex: male	1.20 (1.07 – 1.35)	0.002	1.13 (0.99 – 1.29)	0.064
Address: >20km from hospital	1.32 (1.14 – 1.53)	<0.001	1.23 (1.04 – 1.46)	0.014
Admission Status: Readmission	0.71 (0.58 – 0.87)	0.001	0.70 (0.56 – 0.88)	0.002
ART Status at Admission				
ART Naïve	1.14 (0.97 – 1.34)	0.116	1.03 (0.85 – 1.23)	0.787
ART Interruption	1.60 (1.38 – 1.85)	<0.001	1.33 (1.13 – 1.57)	0.001
CD4 Documentation status				
CD4+ ≤200 cells/µL	1.88 (1.59 – 2.21)	<0.001	1.59 (1.33 – 1.91)	<0.001
CD4+ Not Documented	1.96 (1.66 – 2.32)	<0.001	2.08 (1.73 – 2.50)	<0.001
Function Assessment				
ECOG Score 3-4	7.23 (6.34 – 8.24)	<0.001	7.35 (6.42 – 8.41)	<0.001
Clinical Diagnoses				
Liver disease	1.69 (1.35 – 2.13)	<0.001	1.77 (1.36 – 2.30)	<0.001
COVID-19	1.96 (1.46 – 2.63)	<0.001	1.70 (1.22 – 2.37)	0.002
Co-infections	1.60 (1.40 – 1.82)	<0.001	1.53 (1.32 – 1.78)	<0.001
Diabetes Mellitus	0.79 (0.61 – 1.01)	0.057	0.82 (0.62 – 1.08)	0.157
Chronic lung disease	0.70 (0.48 – 1.01)	0.054	0.62 (0.41 – 0.92)	0.019
Neurologic disorders	0.55 (0.39 – 0.78)	0.001	0.46 (0.32 – 0.68)	<0.001

Systemic presentation of HIV Disease Emergencies

Cardiac Emergencies in HIV Disease

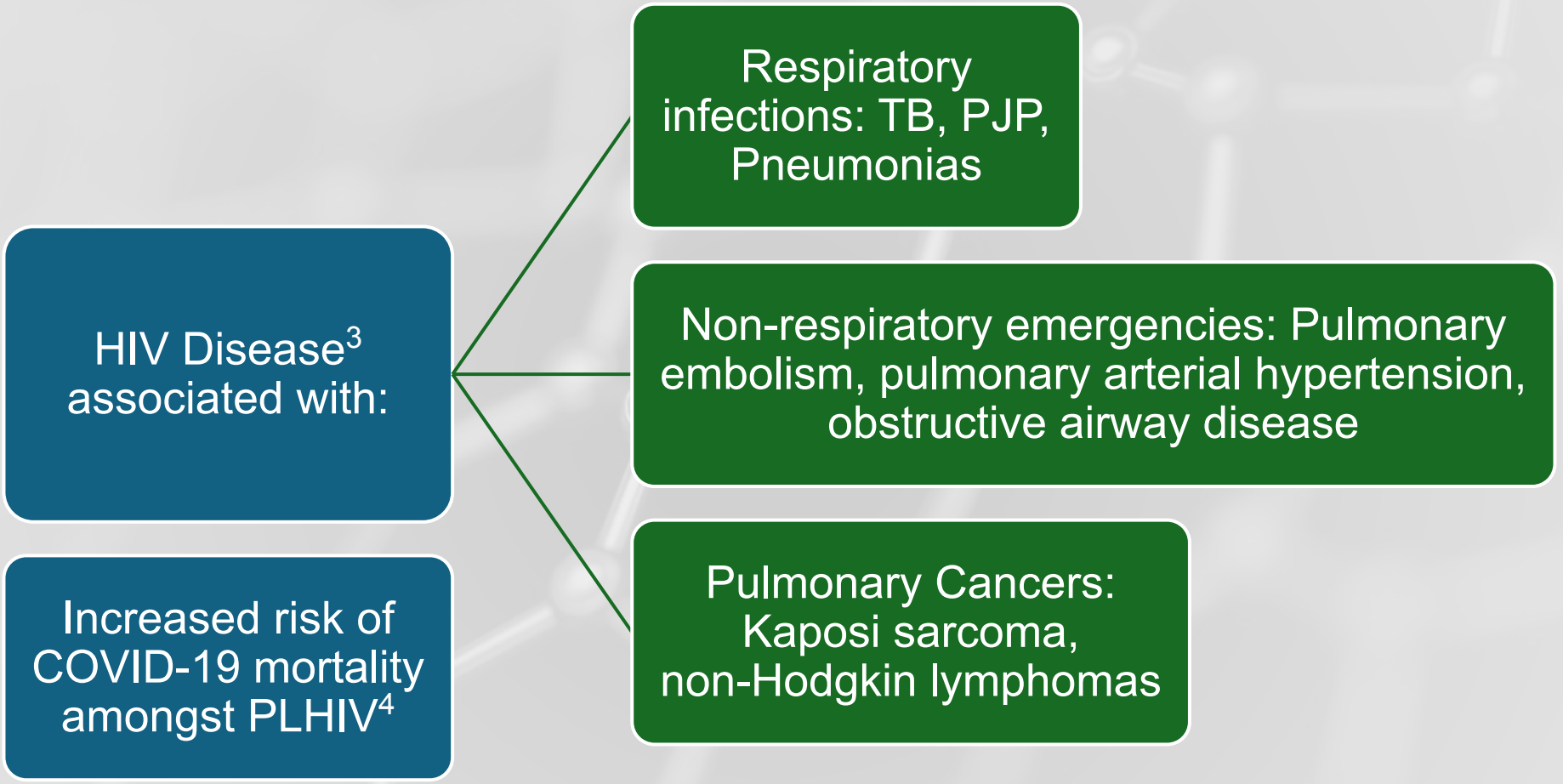
HIV disease[1] increases the risk of:

- Coronary arterial disease
- Dyslipidemia and metabolic syndrome
- Pericarditis/Pericardial effusion: 11% in Pre-ART era, 3% in ART era
- Dilated cardiomyopathy and heart failure: 30% in Pre-ART era,
- Potential of myocardial infarction with protease inhibitor treatment

Non-virologic suppression is associated with increased risk of cardiovascular complications[2]

1: Cardiac emergencies in patients with HIV - PubMed (nih.gov)
2: https://pubmed.ncbi.nlm.nih.gov/18753925/

Respiratory Emergencies in HIV Disease



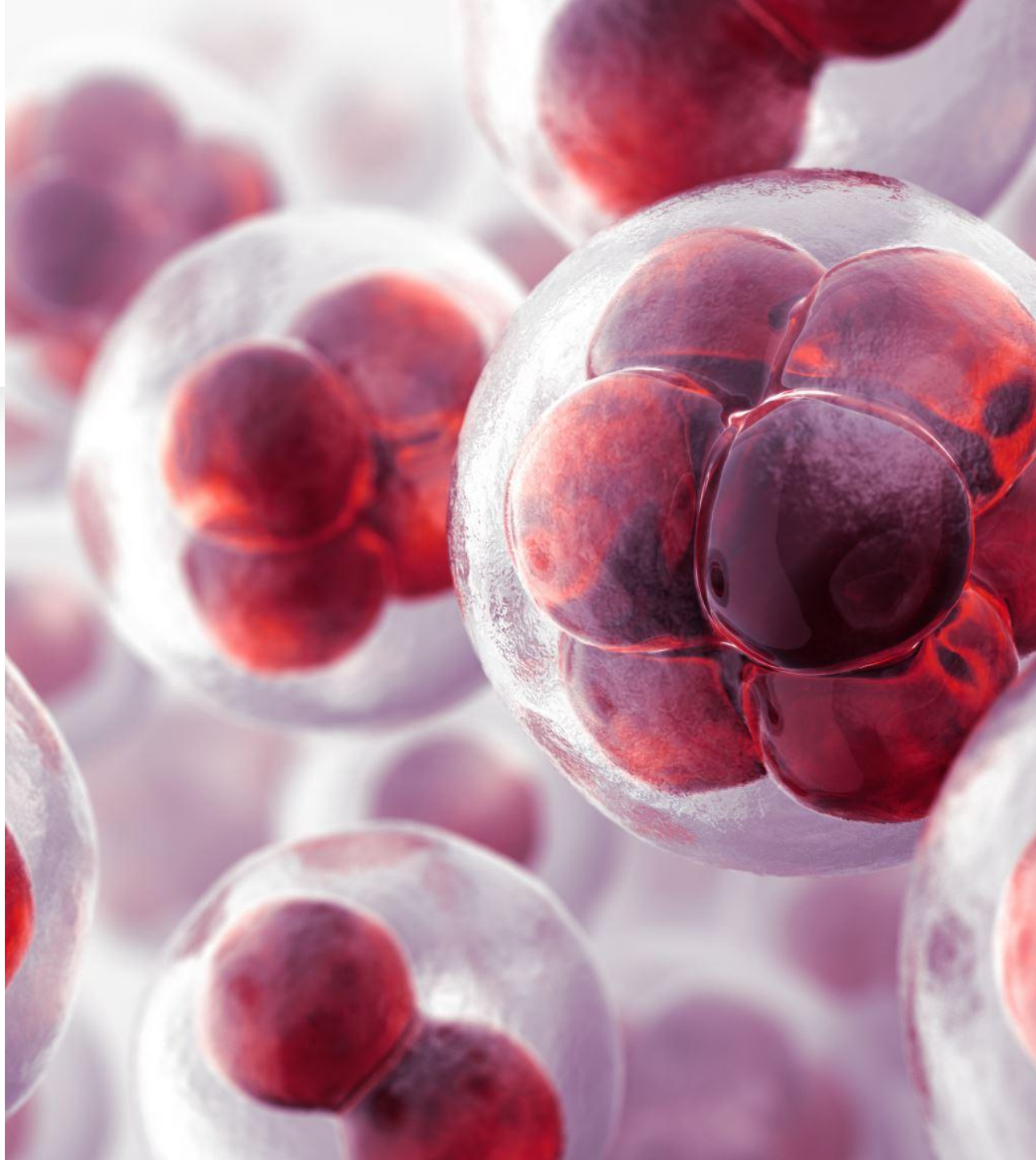
3: Respiratory emergencies in HIV-infected persons - PubMed (nih.gov)

4: Risk Factors for Coronavirus Disease 2019 (COVID-19) Death in a Population Cohort Study from the Western Cape Province, South Africa - PubMed (nih.gov)

Gastrointestinal Emergencies in HIV Disease

- Risk of mortality higher among PLHIV diagnosed with liver disease[5]
- Common presentations:
  i. Drug induced liver injury from ART or Anti-TB medication[6]
  ii. Chronic viral hepatitis infections[7]
  iii. Liver fibrosis[8]
  iv. Alcoholic liver disease[9]

5: https://pubmed.ncbi.nlm.nih.gov/38388345/ ; 6: Burden of antituberculosis and antiretroviral drug-induced liver injury at a secondary hospital in South Africa - PubMed (nih.gov) ; 7: The liver in HIV in Africa - PubMed (nih.gov) ; 8: High prevalence of liver fibrosis associated with HIV infection: a study in rural Rakai, Uganda - PubMed (nih.gov) ; 9: Alcohol use, viral hepatitis and liver fibrosis among HIV-positive persons in West Africa: a cross-sectional study - PubMed (nih.gov)



Neurologic Emergencies

- CNS Infections especially TB and cryptococcal meningitis[10]
- Seizure disorders e.g. status epilepticus[11]
- Neurocognitive impairment[12]
- Mood disorders e.g. depression and suicide[13]
- Non-CNS malignancies[14]

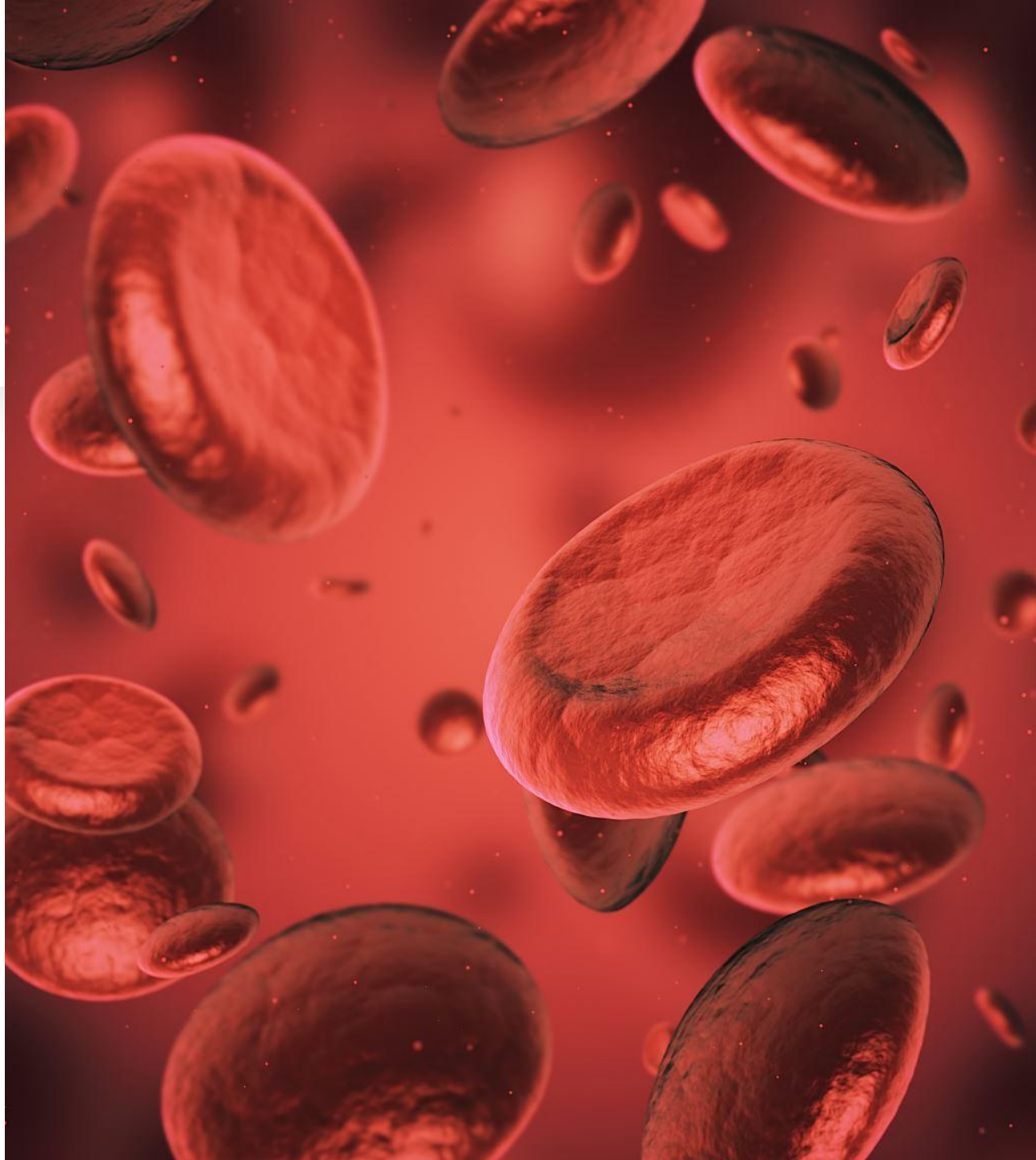
10: https://pubmed.ncbi.nlm.nih.gov/38388345/ ; 11 : Mortality & recurrent seizure risk after new-onset seizure in HIV-positive Zambian adults - PubMed (nih.gov) ; 12: Prevalence and variability of HIV/AIDS-associated neurocognitive impairments in Africa: a systematic review and meta-analysis - PubMed (nih.gov) ; 13: Excess mortality associated with mental illness in people living with HIV in Cape Town, South Africa: a cohort study using linked electronic health records - PubMed (nih.gov) 14: Neurological disorders in HIV in Africa: a review - PMC (nih.gov)

Kidney Emergencies in HIV Disease

- HIV increases risk of acute kidney failure and associated complications[15]
- Increased progression to chronic kidney failure amongst PLHIV[16]

15: Acute renal failure in hospitalized patients with HIV: risk factors and impact on in-hospital mortality - PubMed (nih.gov)

16: HIV and the aging kidney - PubMed (nih.gov)



Causes of Cardiac Arrest (6H's & 5T's)

Physiologic Emergency	Physiologic Derangement	Examples of Associated Medical illnesses
Hypoxemia	SPO2 < 90%	Severe Pneumonia, Severe Anemia, Shock etc
Hypoglycemia	Blood sugar < 3.5 mmol	Co-infections
Hypotension	Systolic BP < 90mmHg	Infections, Dehydration, Heart failure
Hypothermia	Temperature < 35 celcius	Frost bite
Hydrogen ions (Acidosis)	Resp. >30, Reduced consciousness	Diabetic ketoacidosis, Infections, kidney failure
Hypokalemia or **Hyperkalemia**		Renal failure, Severe vomiting/diarrhea, Infections
Toxins	Reduced level of consciousness	Drug overdose, organophosphate poisons, uremia, liver failure, snake bites, Sepsis etc
Tension Pneumothorax	Resp rate>30, Systolic BP <90mmHg, Reduced consciousness	Chest trauma
Thrombosis to lung (PE)		Deep venous thrombosis, Infections (e.g. COVID19)
Thrombosis to heart (MI)		Myocardial Infarction,
Cardiac **Tamponade**		Pericarditis, Chest trauma,

Poorly managed Emergencies?

Poorly Managed Emergencies at the ED

By Rank	Potential Reason	Corrective Action
1. Hypotension	• Inadequate resuscitation • Inadequate monitoring • Inadequate diagnosis of underlying cause	• Aggressive resuscitation • Frequent monitoring of BPs • Improve the rapid diagnosis of underlying cause
2. Potassium Disorders	• Inability to use ECG to identify potassium disorders • Delay in return of chemistry results	• Improve training on ECG Improve availability of ECG monitors and electrodes • Improve turnaround time of chemistry results
3. Myocardial Infarction	• Misdiagnosis: varied presentation of angina pectoris – typical, atypical or silent presentation	• Improve clinical acumen and investigation of potential MI cases

Conclusion

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- Mortality amongst hospitalized PLHIV is high (25%)
- HIV Disease affects multiple organ systems resulting in physiologic derangements (6H & 5T) and cardiac arrest
- Approach to addressing medical emergencies in HIV:

i. Identify and correct underlying physiologic derangement
ii. Identify and treat underlying cause
iii. Optimize organ support and care
iv. Monitor vital signs and clinical progress