

From ER Overload to Smart Care

Predict

7.6M

SVH Encounters

Prepare

92.3%

Never Screened

Prevent

1.97×

Housing ER Risk

$R^2=0.97$

Model Accuracy

SVH

Stormont Vail Health · Topeka, Kansas · 2022–2025 Patient Data

Social Determinants of Health · ER Demand Forecasting · Staffing Intelligence

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Team Solo

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THE RUSH: When It Happens & Who Drives It

SVH Encounters 2022-2025 | N = 1,048,263 validated records

15,071

ED peak
3 AM visits

58,196

ED visits
3-9 AM window

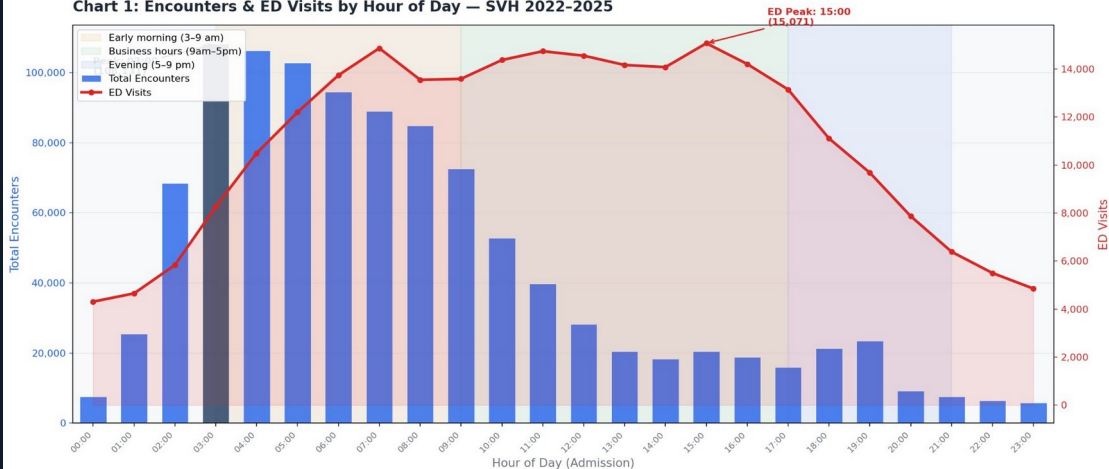
76.7%

3-9 AM window
ED share

7.5%

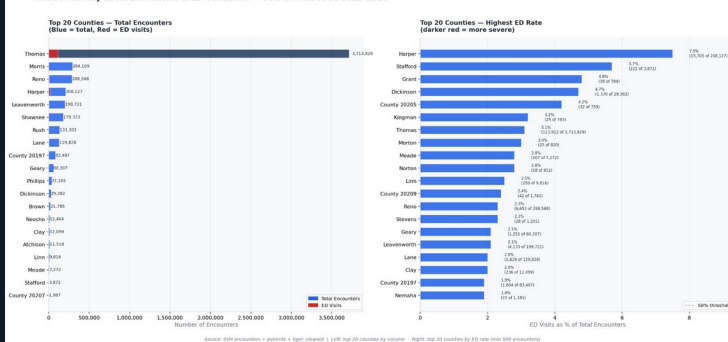
Harper County
highest ED rate

Chart 1: Encounters & ED Visits by Hour of Day — SVH 2022-2025



Source: SVH encounters_cleaned | N=1,048,263 encounters with valid admission time | Amber = 3-9 am · Green = 9am-5pm · Blue = 5-9 pm | Peak total: 03:00 · Peak ED: 15:00

Chart 3: County-Level Encounters & ED Utilization — SVH Service Area 2022-2025



KEY INSIGHT

ED demand peaks at 3 AM (15,071 visits) and the entire 3-9 AM window accounts for **76.7%** of all afternoon/evening ED volume. Thomas County dominates total volume, while **Harper (7.5%)** leads in ED rate — a signal of rural care access gaps.

2

Model the Answer: What to do when?

This slide show how my model is working

SVH Staffing
Predictor

DataFest 2026 — Stormont Vail
Health

Select Month

January

Select Department

Emergency Depart...

Focus Day

Show detail for:

Monday

Model: Gradient Boosting
Regressor
Trained on 7.6M SVH encounters
(2021–2025)
Features: Hour, Day, Month, Dept,
Cyclical encodings

6,392

Predicted Encounters
Est. for January

261

Predicted ED Visits
Est. for January

4.1%

ED Share of Visits
of all encounters

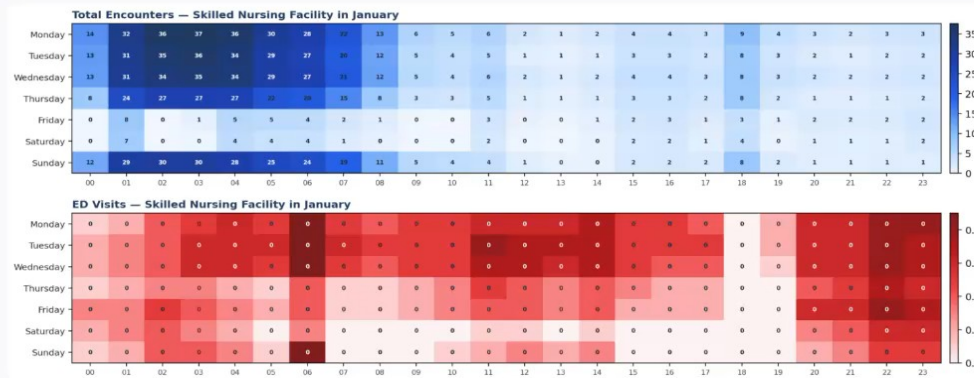
Mon 03:00

Busiest Slot
Total encounters peak

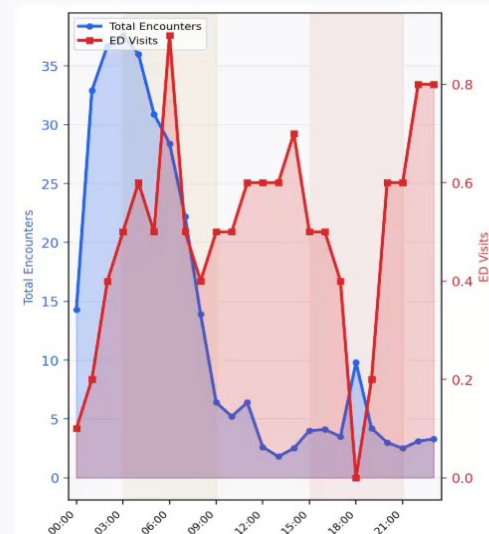
Mon 06:00

Peak ED Slot
ED visits peak

Weekly Rush Heatmap — Encounters by Day × Hour



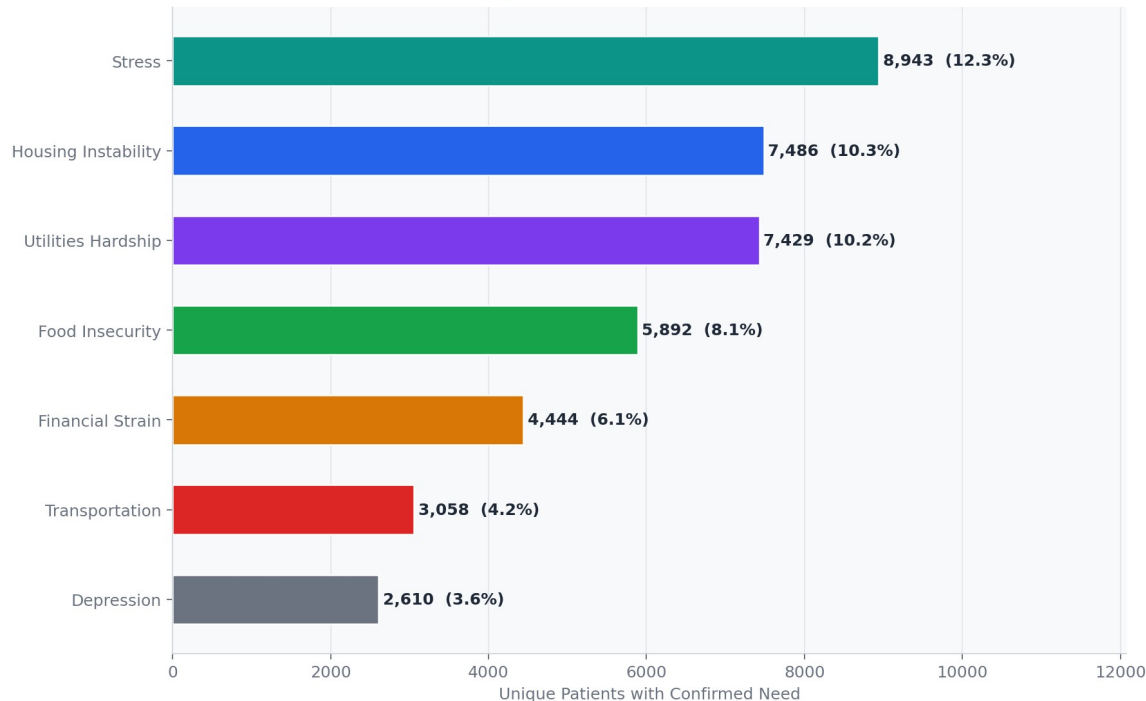
Focus: Monday — Hour by Hour



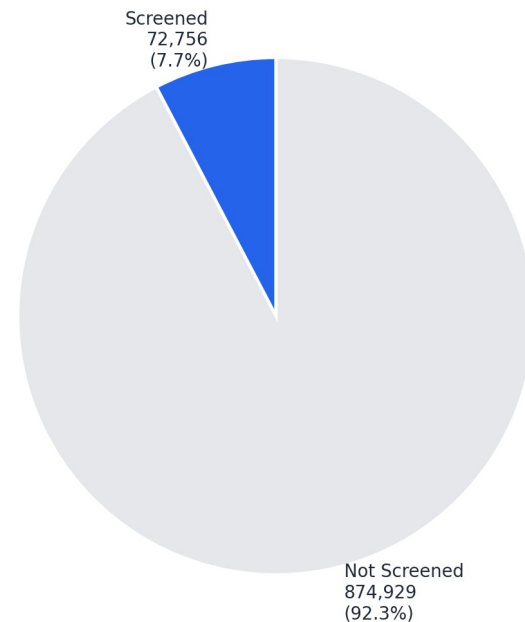
Data Understanding: Social needs at Stormont Vail Health

Screened patients only | Social need prevalence among patients

Based on 72,756 screened patients | Screened ≠ all patients
Social Need Prevalence Among Screened Patients



Not all patients were screened — missing ≠ no need
Screening Coverage Warning



Important: Unscreened patients are excluded from all rates. True burden of social need is likely higher than shown.

THE CAUSE: Social Barriers Drive ER Dependence

Screened patients only | Social needs linked to elevated ED visit rates across all domains

45.1%

ED rate for patients
with social needs

39.6%

ED rate — no
social needs

67.7%

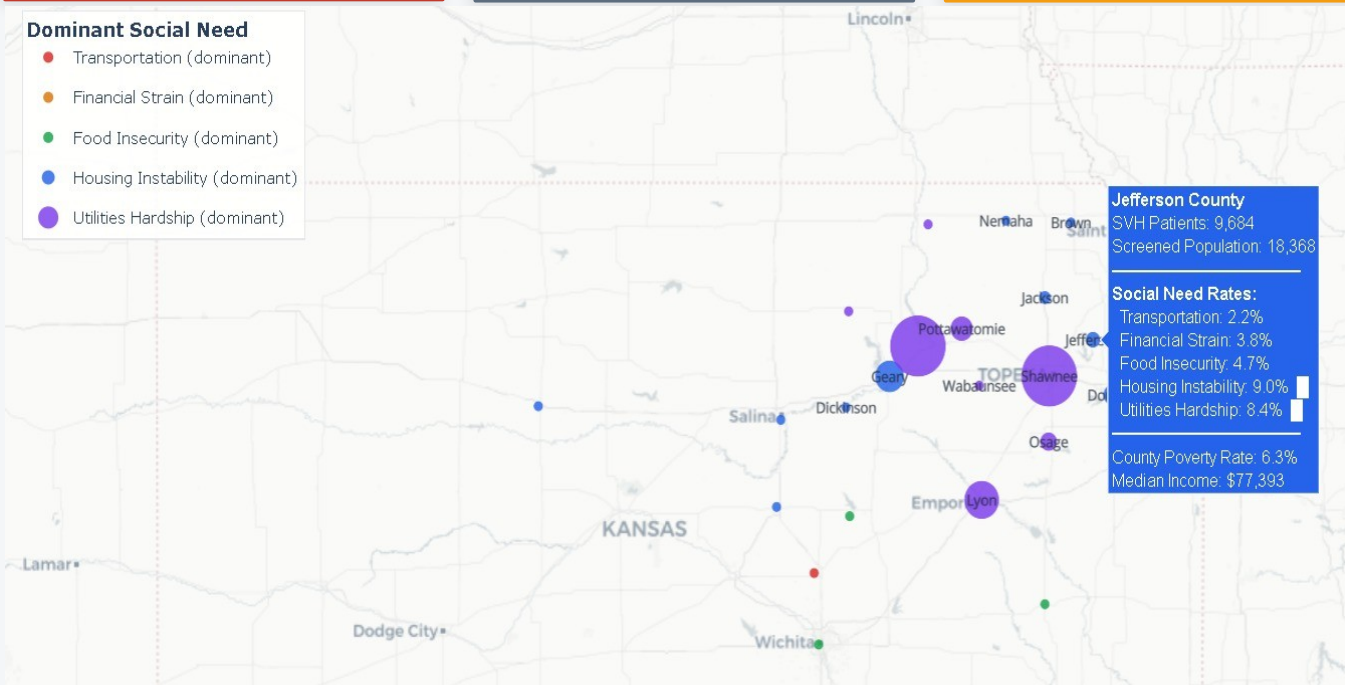
Transportation need
→ highest ED rate

1.97×

Housing instability
ER odds ratio

Dominant Social Need

- Transportation (dominant)
- Financial Strain (dominant)
- Food Insecurity (dominant)
- Housing Instability (dominant)
- Utilities Hardship (dominant)



WHY IT MATTERS

Transportation need

67.7% ED rate — rural patients use ER as primary care

Financial strain

62.3% ED rate — co-pay barriers delay care until crisis

Housing instability

1.97× ER odds ratio — strongest social predictor

Model AUC: 0.628

Logistic regression correctly stratifies risk across 4,184 patients

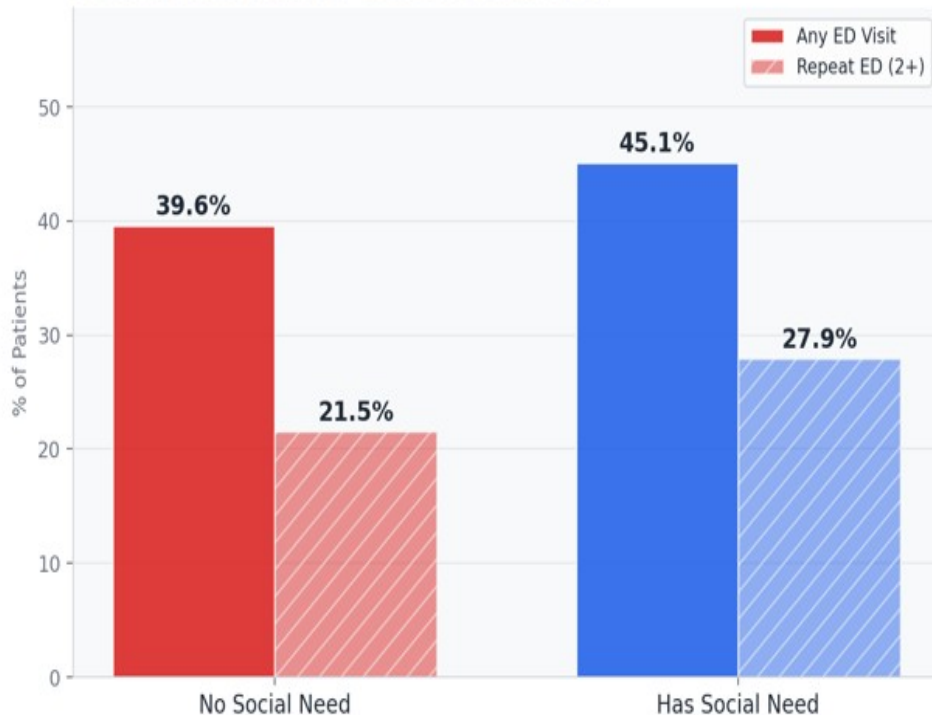
Needs cluster

One barrier rarely comes alone — multi-domain interventions needed

THE SOLUTION: What's Coming In & How to Prepare

3-9 AM window | ICD-10 diagnosis mix + targeted county-level intervention framework

ER Visit Rate: With vs. Without Social Need



Transportation

ED Rate: 67.7%

↓ 15-25% avoidable ER

NEMT + ride-share partnerships (Lyft Health)

Financial Strain

ED Rate: 62.3%

↓ 15-25% avoidable ER

Financial counselors at ED triage + Medicaid enrollment

Food Insecurity

ED Rate: 58.2%

↓ 15-25% avoidable ER

Food prescriptions + pantry referrals at discharge

Housing Instability

ED Rate: 57.3%

↓ 15-25% avoidable ER

Housing-first case management + social work warm handoffs

Utilities Hardship

ED Rate: 54.8%

↓ 15-25% avoidable ER

LIHEAP utility referrals + community health worker outreach
3 PM-9 PM: Injury & Poisoning + Respiratory are top acute clusters → staff trauma, imaging & respiratory support