

Background



Vitamin B12 deficiency (B12D) can lead to neuropsychiatric symptoms and hematologic abnormalities¹⁻², which mimic common disorders among inpatients.

Body stores of vitamin B12 (mainly in the liver) can maintain adequate levels for ≥1.5 years even with no B12 intake.³

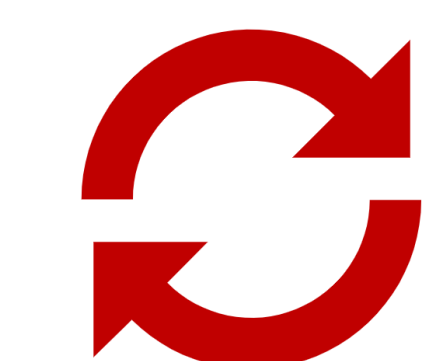


Physicians have been found to repeat tests in the community at intervals that are excessive according to practice guidelines.⁴

Objectives



Characterize the **ordering frequency and pattern of vitamin B12 testing**, and its clinical utility in hospital



Assess **appropriateness of repeat** vitamin B12 measurements

Methods

Inclusion Criteria

- ❖ Patients aged ≥19 years
- ❖ ≥2 vitamin B12 tests during admission(s) to St. Paul's Hospital in 2018

Chart Review

- Risk Factors for B12D
- Reason for testing
- Serum B12 levels
- Total number of vitamin B12 tests
- Testing intervals

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Results

Patient Characteristics

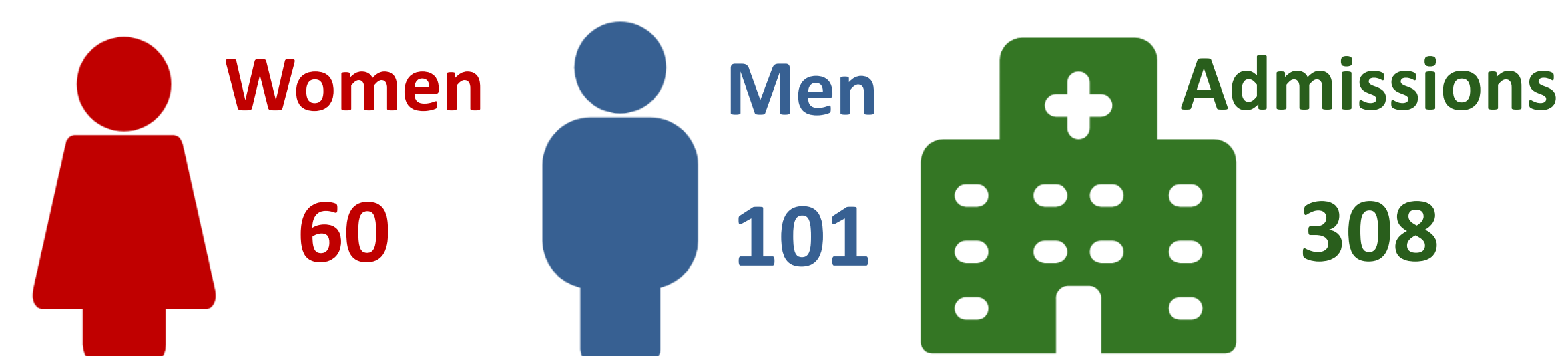


Figure 1. Risk Factors for B12 Deficiency (Per Admission)

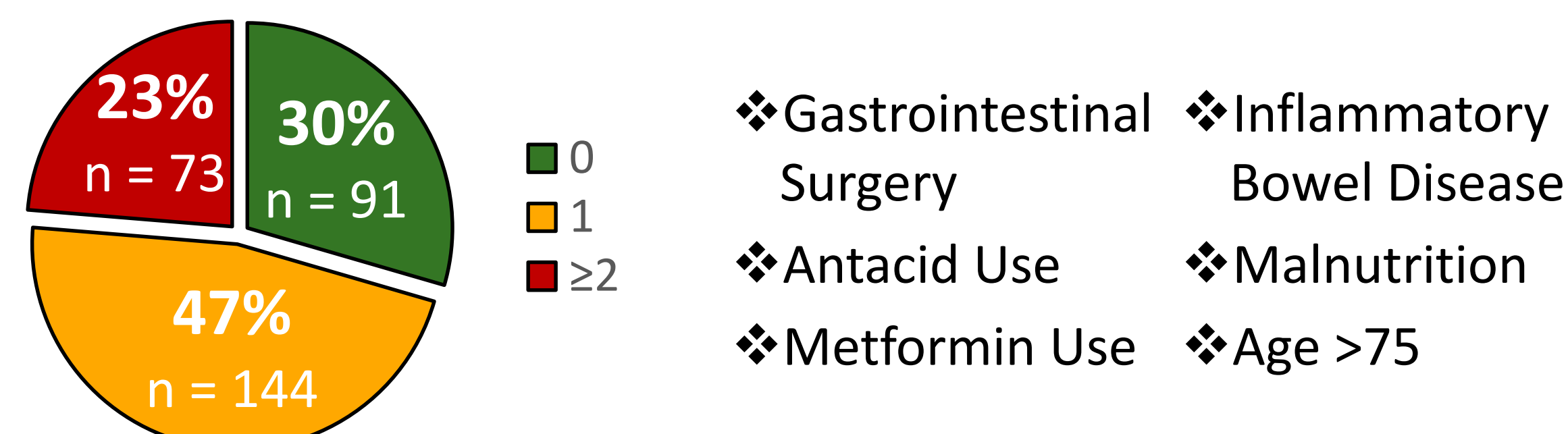
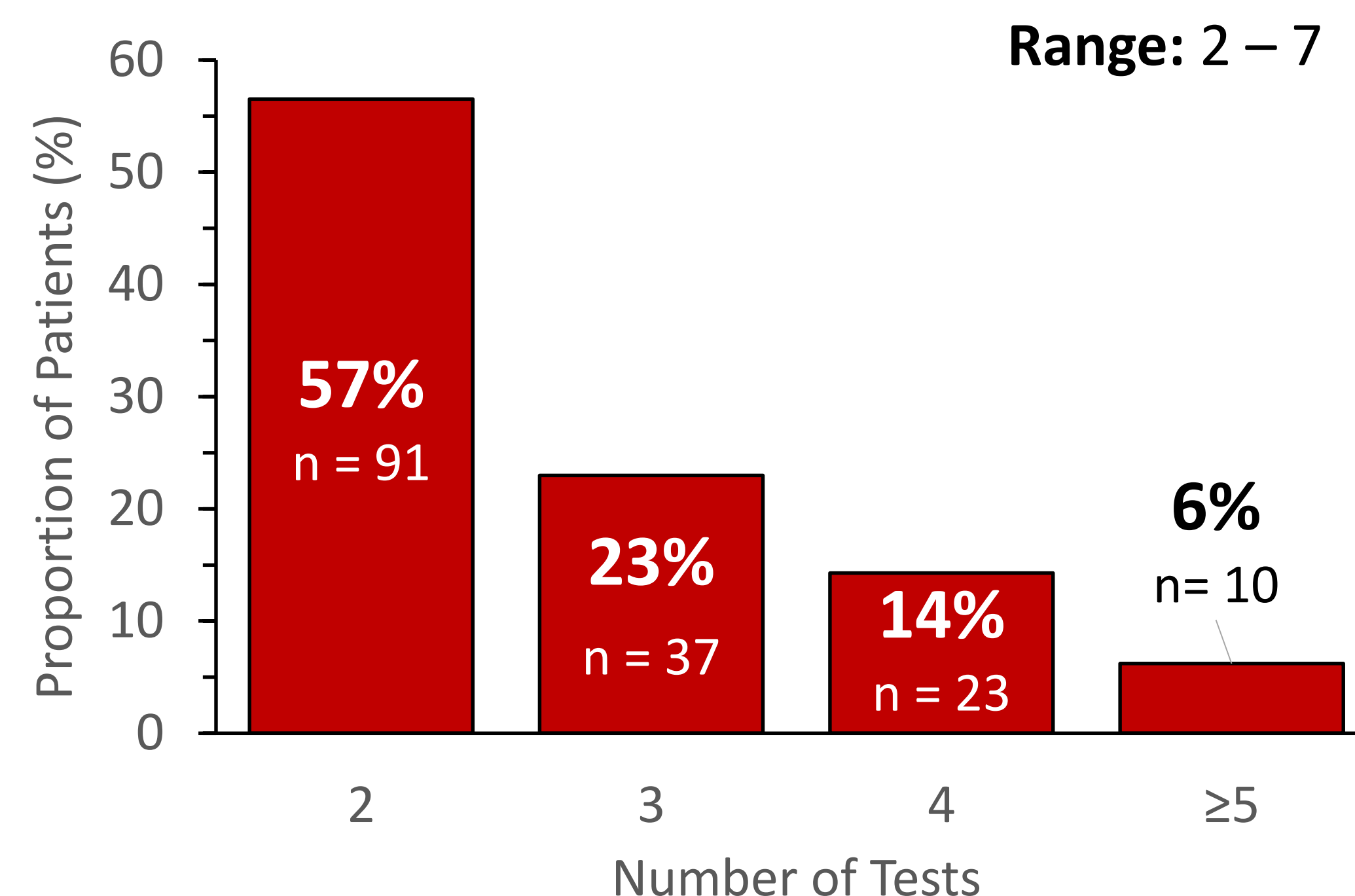
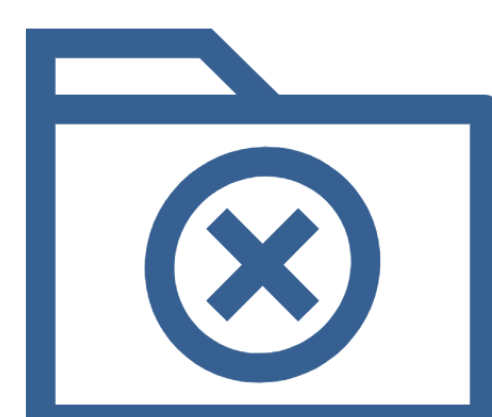


Figure 2. Total Inpatient Tests in 2018 (Per Patient)



Discussion and Significance



Most inpatient vitamin B12 tests were repeated at inappropriately short intervals and **50 TO 83%** of repeat inpatient tests were **UNNECESSARY**



SYSTEMIC FLAWS (e.g. allowing duplicate tests) and **COGNITIVE BIASES** (e.g. shotgun approaches) result in vitamin B12 test overutilization, which may **INCREASE HEALTHCARE EXPENDITURE** associated with test reagents, phlebotomy, and laboratory services.



B12D was rarely seen among inpatients. Testing B12 levels should be considered if **HIGH CLINICAL SUSPICION** based on patient risk factors and the absence of a more likely alternative diagnoses.

Test Results and Characteristics

487 Total Vitamin B12 Tests
440 Total Inpatient Vitamin B12 Tests

Biochemical Vitamin B12 Deficiency
7/440 = 2% of all inpatient tests

Common Reasons for Testing



Neuropsychiatric Symptoms
n = 184



Cytopenia(s)
n = 163

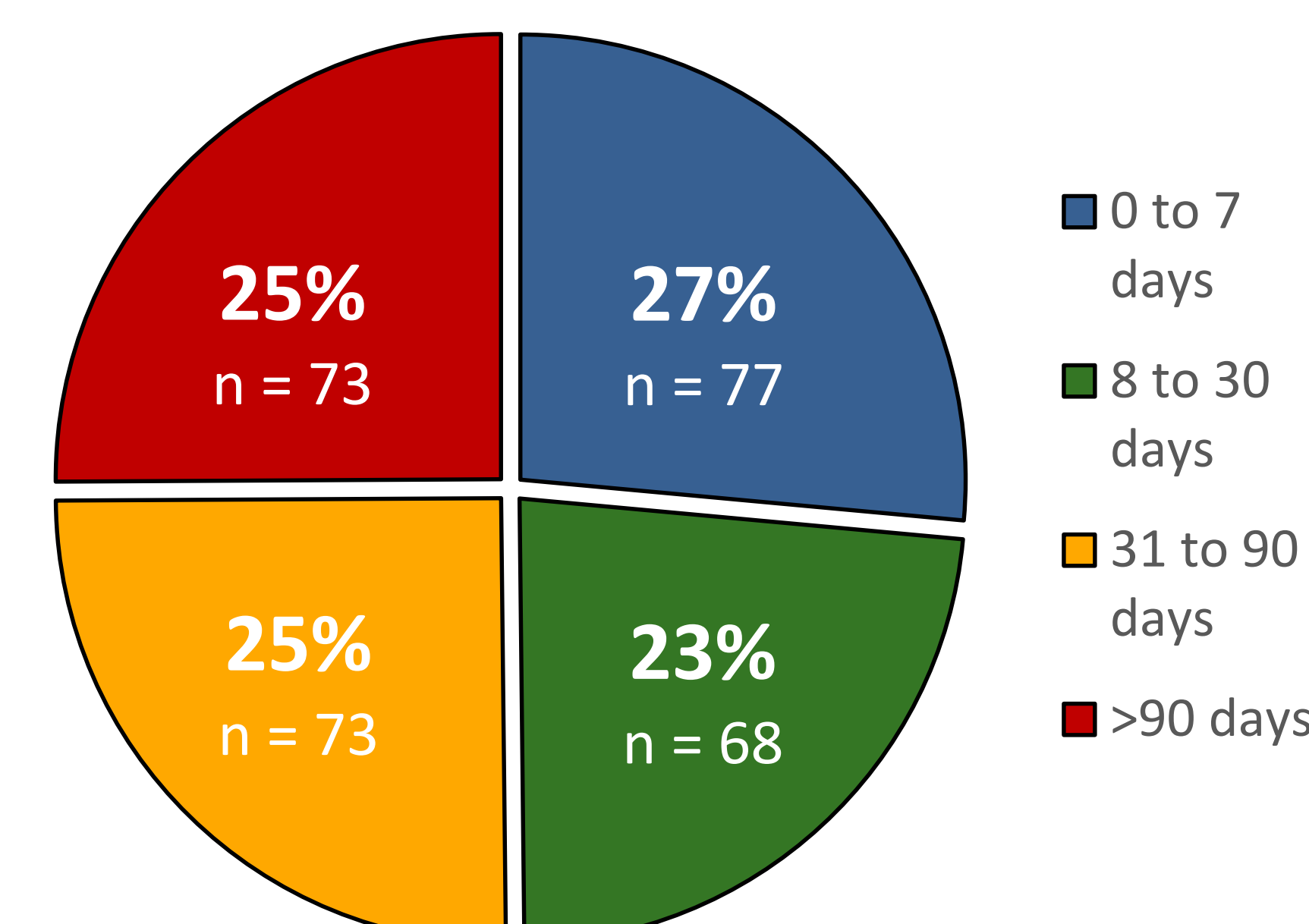


Malnutrition
n = 44

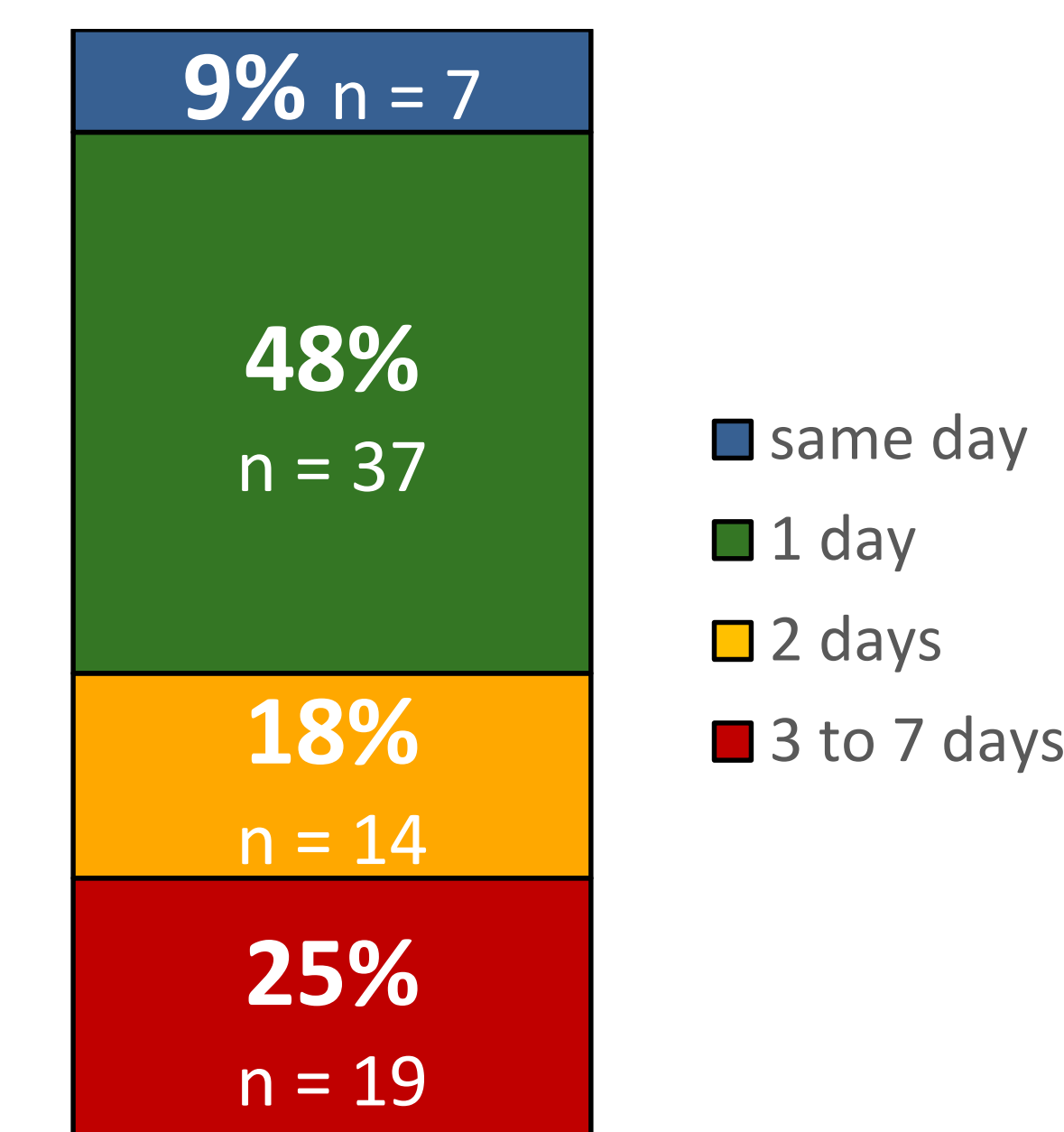
Testing Frequency

Figure 3. Time Interval between Repeat Vitamin B12 Tests

A) All Repeat Inpatient Tests (N=291)



B) Repeat Inpatient Tests in ≤7 Days (N=77)



Future Directions

- ❖ **Educate** health professionals (students, residents, physicians) on inpatient units and during rounds
- ❖ **Establish** a message alert on the clinical information system/electronic patient records to prevent unnecessary testing or duplicate orders
- ❖ **Examine** other commonly ordered inpatient tests to assess for appropriateness (e.g. HbA1c)

References

1. Langan, R et al. (2017). *Am Fam Physician* **96**(6): 384-389.
2. Stabler, S. (2013). *New Engl J Med* **368**(2): 149-160.
3. Institute of Medicine (US). (1998). *Washington, D.C.: National Academy Press*: 527-530.
4. Chami, N et al. (2017). *Clin Biochem* **50**: 822-827.