

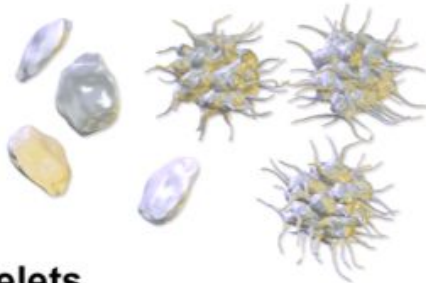


Forecasting Platelet Blood Bag Demand to Reduce Inventory Wastage at the Stanford Blood Center

Stanford Data Science for Social Good
Emily Guthrie, Qian Zhao, Chelsea King



Platelets are valuable resources



Platelets

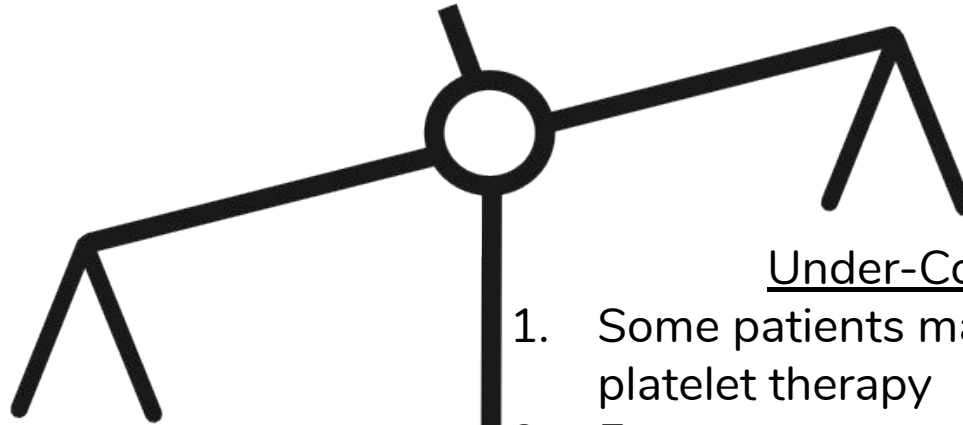


Clot
formation



- Needed in emergency situations
 - Trauma
 - Surgery
 - Active bleeding
- 3-day shelf life

There are difficulties with platelet inventory



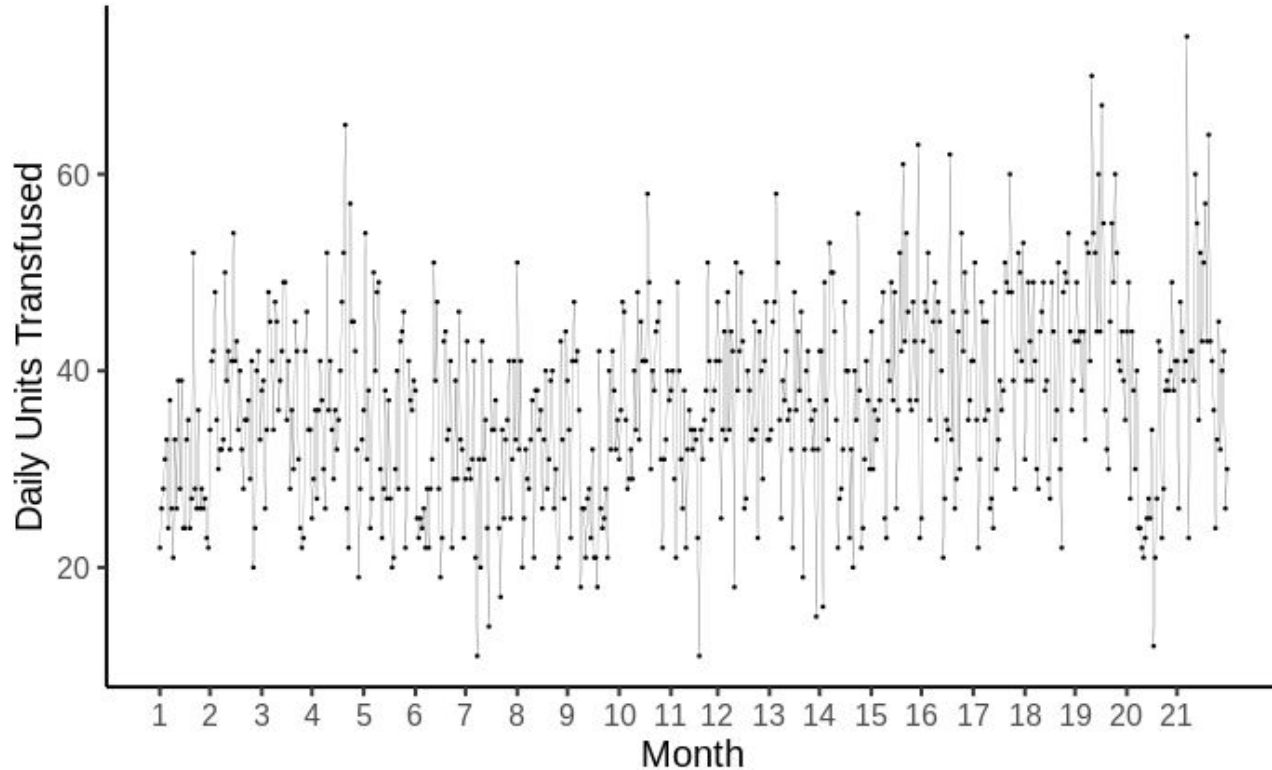
Over-collect

1. Guarantees platelets available
2. Expensive - costs \$1 million annually
3. Donors spend 2 hrs donating
4. Donors can only donate 24x/year

Under-Collect

1. Some patients may go without platelet therapy
2. Ensures no wasted products

Daily platelet usage patterns are highly variable



Guan and colleagues (2017) tried to solve this issue

- Reduced wastage from 10.5% to 3%
- Avoided shortages
- Model not implemented because inventory managers don't trust it



Guan, L., Tian, X., et al. (2017). "Big data modeling to predict platelet usage and minimize wastage in a tertiary care system." PNAS (43) 114: 11368 - 11373. Retrieved from: www.pnas.org/cgi/doi/10.1073/pnas.1714097114

Project trajectory



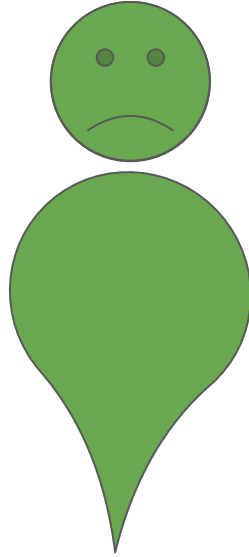
Our task

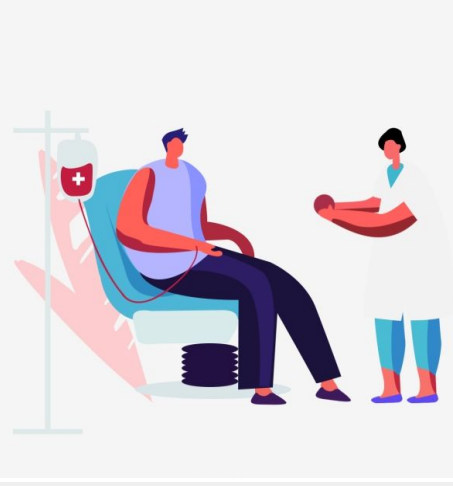
**Blood center's
eventual goal**

Our datasets include 2 years of data

In-patient records	315,000 adult hospital records
Blood test results	8 million blood tests
Transfusions	100,000 blood transfusions
Surgery	106,000 surgeries

Meet Em





Monday

Tuesday

Wednesday

Thursday

Em receives a blood test
and their results show
abnormal platelet count

Em receives a platelet
blood transfusion

Em needs immediate
cardiac surgery

Em is assigned a bed in
the hospital so they can
recover from surgery

BLOOD TEST

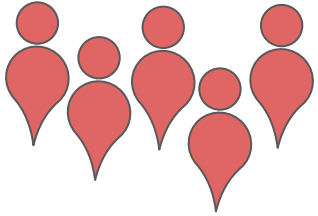
TRANSFUSION

SURGERY

INPATIENT
RECORDS

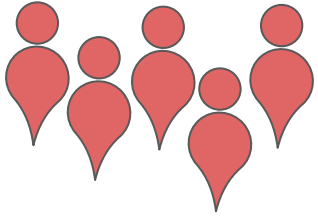
Strategy: Create four different models for each patient group

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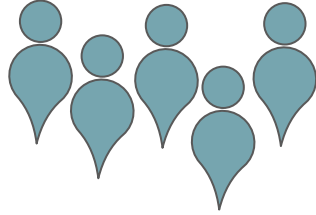


Child
patients

Strategy: Create four different models for each patient group

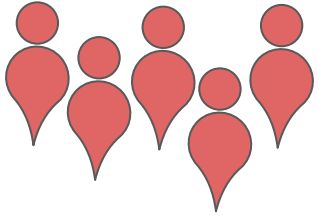


Child
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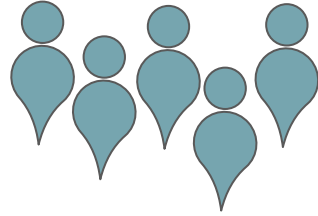


Adult
inpatients

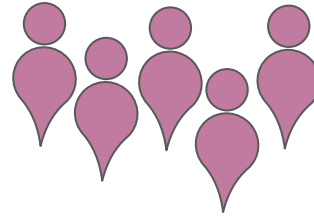
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Child
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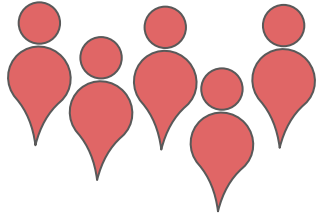


Adult
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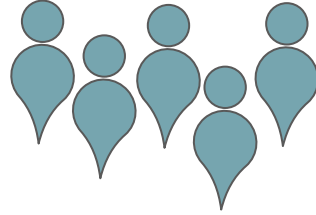


Surgery
patients

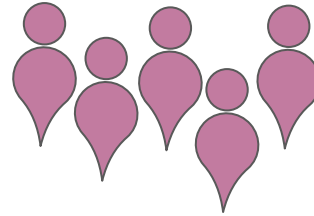
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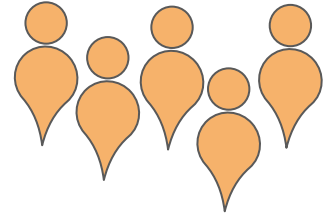
Child
patients



Adult
inpatients

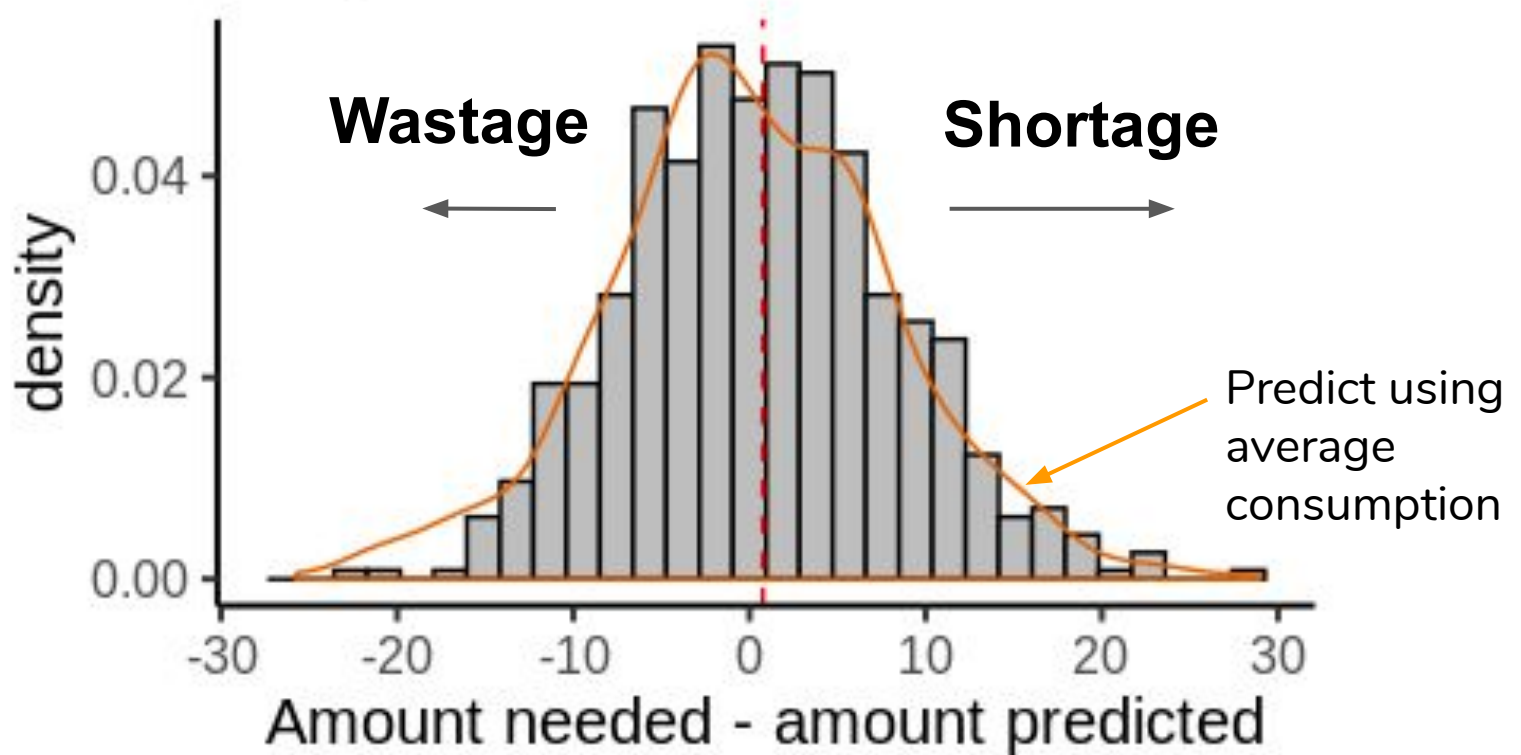


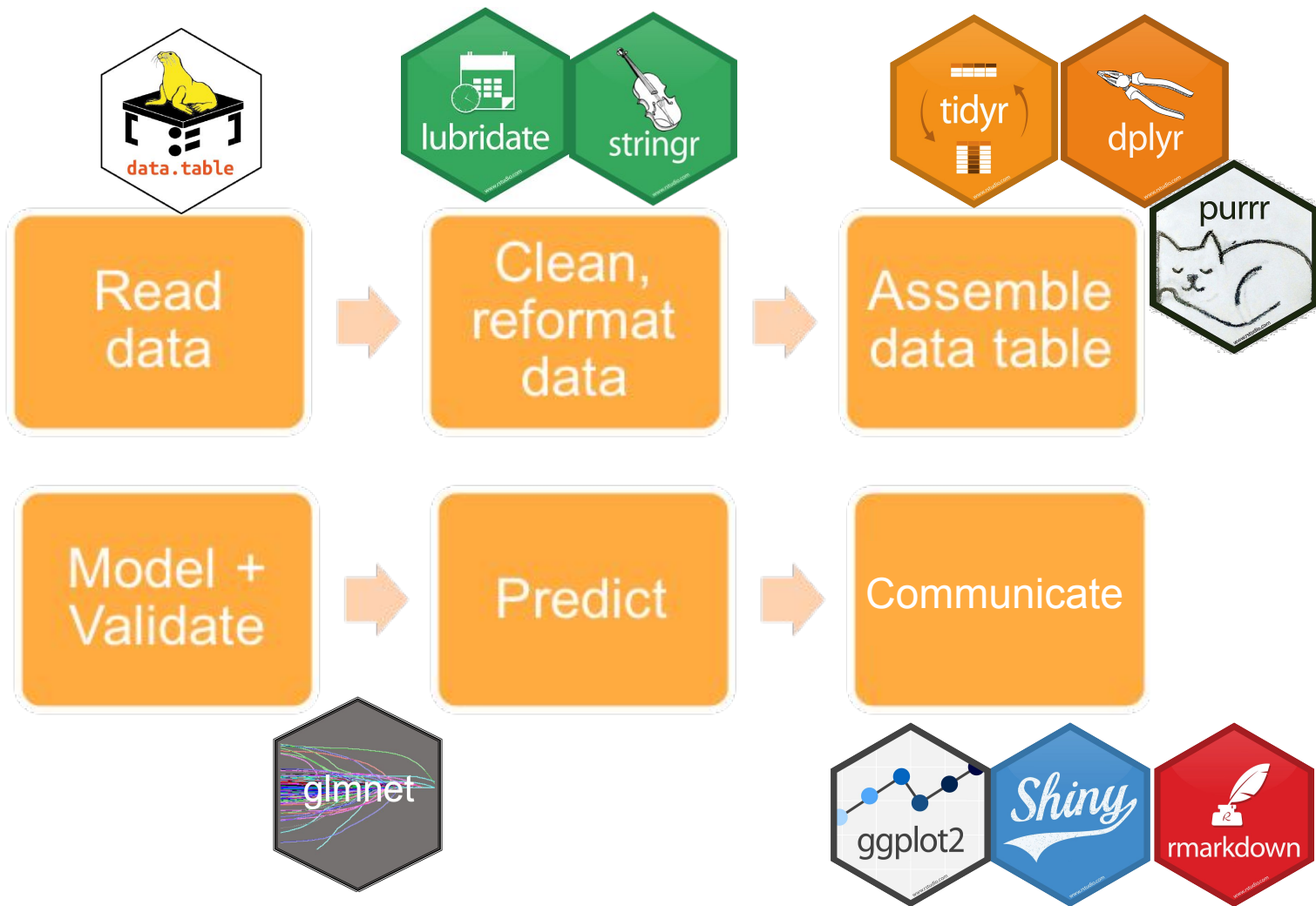
Surgery
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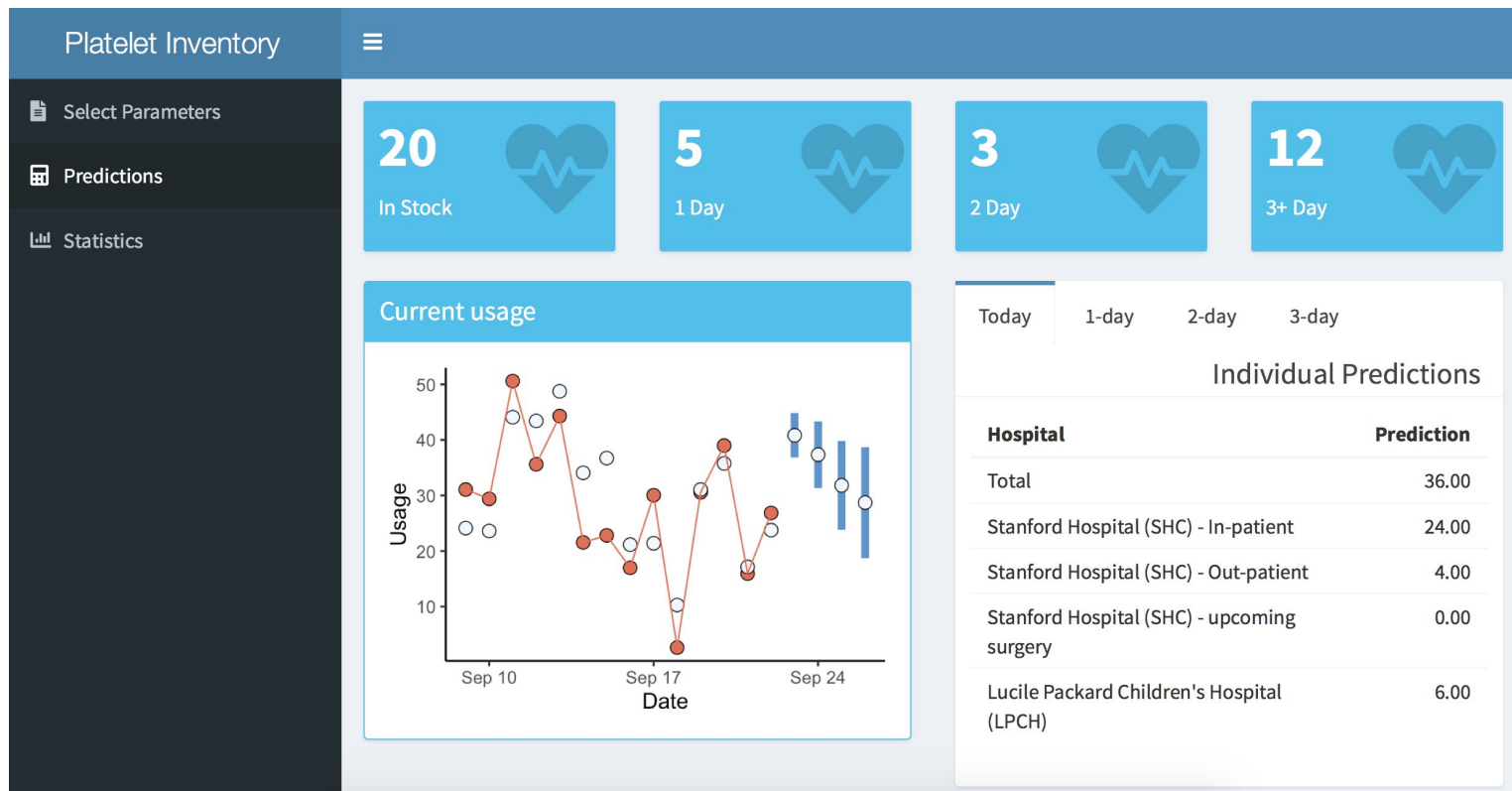
Random
arrivals

Model out-performs using weekday-weekend average





Visualize model predictions



Generate summaries and reports



Conclusion

Communicate with community partners

Design interpretable algorithms

Create automated pipeline to process data, fit model and make predictions

Enable users to interact with the software



Thank you!