



JOHNS HOPKINS

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**Center for
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Optimizing Hospital Discharge Processes to Improve Patient Flow

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1. Executive Summary

The discharge process is a crucial part of hospital operations, which directly has an impact on hospital capacity and patient flow efficiency. Johns Hopkins Bayview Medical Campus has a target discharge time at noon 12, but according to hospital capacity meetings-Sep 2024, 92% of patients are still being discharged after noon [A]. The prolonged discharge time leads to congestion in patients' admission and is an urgent problem to solve.

During these 6 weeks, the team observed various hospital departments such as the emergency, patient care room, Med A&B, outpatient pharmacy and interviewed several stakeholders, including doctors, nurses, and hospitalists. By using methods like time analysis, case studies, and literature reviews, we found that delays were primarily caused by doctors' tight schedules, nurses not checking information promptly, prescription filling in the pharmacy, and transportation issues. Based on these findings, we have made the following targeted recommendations to reduce hospital discharge time by 29%:

3-step solution: use priority list, pre-order drugs, turn on notifications on EPIC.

Use AI to assist in med reconciliation and transportation

Incentive program: Public recognition and rewards, leadership acknowledgement and balanced approach

Create an incentive program for high-performing departments and individuals.

2. Problem Introduction

Efficient patient discharge workflows are crucial for hospitals to maintain optimal bed availability and enhance overall patient flow. Inefficiencies in the discharge process can cause significant delays and extended patient stays, impacting patient satisfaction and reducing the hospital's capacity to admit new patients, thus affecting revenue and operational efficiency. Addressing these inefficiencies is essential for improving bed turnover rates and ensuring the smooth functioning of hospital operations.

A significant issue is that around 60% of discharges occur between 3-7 pm, whereas the hospital's target is to discharge the maximum number of patients before noon. Delays in patient discharges can be caused by various barriers throughout the discharge process, leading to prolonged patient stays. Optimizing the discharge procedure is key to mitigating these delays and improving patient flow.

This project focuses on conducting a detailed examination of each step within the discharge process to identify and address key barriers. By streamlining the discharge workflow, the goal is to enhance bed availability, allowing for the timely admission of new patients and improving the overall efficiency of hospital operations.

The official problem statement for this project was: "The hospital's discharge workflow is currently inefficient, causing delays and extended patient stays. This project aims to conduct a detailed examination of each step within the discharge process to identify and address key barriers to optimize the discharge procedure, improve bed availability, and enhance overall patient flow within the hospital."

3. Our Methodology

3.1 Scope of Work

The scope of this project involves a comprehensive analysis and optimization of the patient discharge workflow to reduce delays. This includes collecting and analyzing data on current discharge times, conducting time studies to map out each step in the discharge process, and identifying specific barriers and inefficiencies. The project was focused on getting feedback from key stakeholders and proposing cost-effective improvements to streamline the discharge procedure, aiming to increase efficiency and meet the hospital's discharge targets.

Location: Johns Hopkins Bayview Medical Center

Hospital Capacity: 320+ Beds

Area in focus: Patient discharge process

Project Duration: 6 weeks

3.2 Literature & Policy review

To gain a comprehensive understanding of current hospital policies and the overall throughput process, we reviewed both the hospital's policy documents, and literature provided by our host. This included records from monthly hospital capacity meetings where relevant stakeholders discussed issues and progress from previous meetings. Additionally, the literature featured internal surveys and analyses focused on the problem of delayed discharges. These documents helped us gather valuable data on the current situation and identify gaps in the discharge process.

List of literature and policies reviewed:

Hospital Capacity Meeting - 7.24.24 [PPT]

Hospital Capacity Meeting - 6.26.24 [PPT]

Hospital Capacity Meeting - 9.25.24 [PPT]

Discharge by noon [PDF]

Improving Hospital Capacity: Enhancing Pharmacy Operations in Discharge Medication [PDF]

When Patients Get Stuck [PDF]

3.3 Stake holder interview

3.3.1 Purpose

After reviewing the relevant literature provided by the host doctor and other sources, we conducted stakeholder interviews to gain deeper insights into the discharge process and identify any additional reasons for delays. The goal was also to assess whether real-world challenges differed from those documented in the literature. By interviewing stakeholders involved in various aspects of the discharge process, we aimed to gather specific information to help us identify the exact causes of the delays.

3.3.2 Approach

To do this, we prepared tailored questionnaires for each department and role involved in the process. We conducted offline surveys to collect data.

3.3.3 Categories

To ensure a structured approach we categorized stakeholder interviews based on their roles.

Host doctor – Dr. Renee Blanding

Doctor – Doctors play a central role in initiating the discharge process by making the final decision on when a patient is ready to leave.

We interviewed 5 doctors namely- Dr. Amy Knight, Dr. Venkat Gundareddy, Dr. Che M. Harris, Dr. Shahida Khan and Dr. Edward Bessman.

Nurses - Nurses are directly involved in patient care and the day-to-day discharge process. Along with that nurses ensure pharmacy receives prescribed medications order.

We interviewed nurses namely – Leilani, Kathleen Duffy, Nicole Johnson, Paul, Lee, April, Lavina, Anne, Nora, Bonne, Anita, Necka and Grace.

Pharmacy - We interviewed the pharmacy staff, recognizing the pharmacy as a key step in the discharge process.

Prescription fulfillment is one of the final tasks before a patient can be discharged, making its efficiency crucial.

Hospital Floors at Bayview - We conducted interviews in ED, Med A, Med B, Burton Pavilion and outpatient pharmacy.

3.4 Time study analysis

3.4.1 Definition

Time analysis is a tool used to observe, record and evaluate the time taken to complete tasks in a workflow. In the hospital context, the method is mainly used to collect and record the time spent by various departments and roles (doctors, nurses, case manager, social worker, pharmacy, transportation, etc.) in the discharge process to complete their respective tasks.

3.4.2 Purpose

As the final interaction between patients and hospital teams, the discharge process is influenced by various factors. It's also the stage where all the treatments and procedures the patient has undergone are recorded [B]. Therefore, discharge time is a crucial indicator of workflow efficiency, and we can use the data to figure out inefficiency, reduce time waste and set up standard.

Identify inefficiency: It helps in understanding which steps in a discharge process take too long, and by analyzing how time is spent, we can streamline the tasks, find out where delays lie in, and improve discharge methods to achieve timesaving.

Standardization: After collecting the task completion times, combined with the hospital's target time(12p.m.), we can establish standard times for specific tasks, ensuring consistent in the future.

Data-driven decision making: These quantitative data can help case managers make evidence-based decisions about process improvements.

4. Observations

4.1 Observations based on provided literature: Hospital capacity meeting & introductory meetings with Dr. Blanding

It was observed that the peak hours for patient discharge are between 3pm-7pm which accounts for close to 50% of cases.

Only 8% of the patients were discharged before noon.

Doctor's Assessment and Discharge Note: The doctor conducts a thorough assessment of the patient's condition before signing the discharge note.

Nurses play a vital role in coordinating the arrival of prescribed drugs before they can hand over the discharge papers to the patient.

Ambulance Scheduling: In certain cases, an ambulance needs to be scheduled for transporting the patient to a rehabilitation facility or their home.

Social Case Worker Involvement: For patients without insurance, social case workers may need to be involved to assist with discharge planning and post-discharge care.

Prescription of Equipment/Drugs: The doctor should also prescribe any necessary equipment or drugs that the patient will need after discharge.

4.2 Result of Time study analysis

Based on our observations and analysis, we obtained the time range for each step, as shown in the figure below.

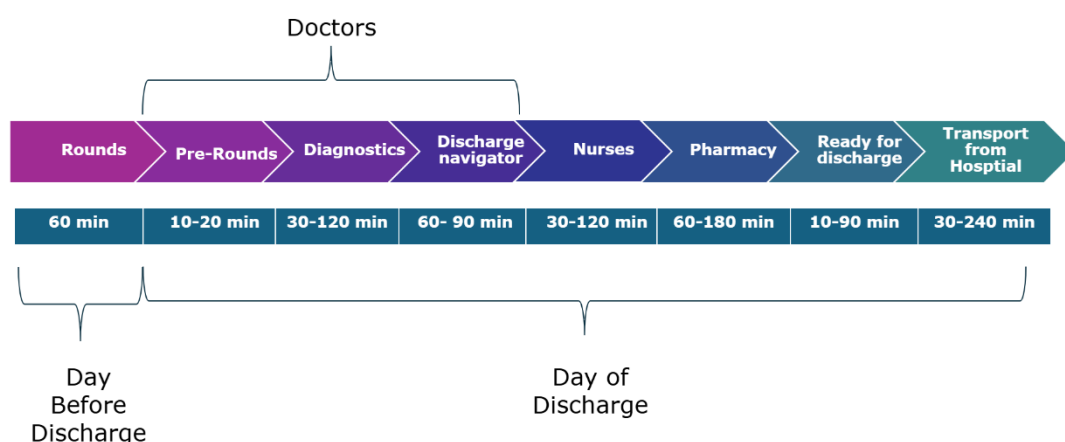


Fig. 1 Flow Chart for Discharge Process

According to data above, we summed up all the time intervals to determine the longest and shortest times for the discharge process, as shown in the figure and table below.

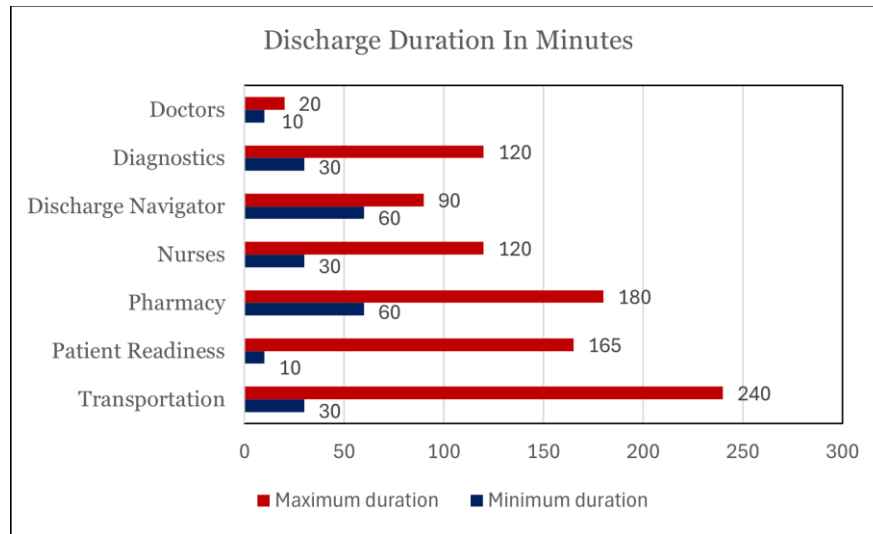


Fig. 2 Time Duration for Influencing Factors

Minimum Discharge Time	3 hrs 50 mins
Maximum Discharge Time	15 hrs 38 mins

Table. 1 Maximum & Minimum Discharge Time

4.3 Factors affecting discharge based on our observations

4.3.1 Hospitalists-Related Delays

Discussion with nurse Lee: A doctor is usually responsible for multiple patients. According to observations and comments from Lee, doctors often need to communicate with patients to discuss the next steps in their treatment plans [C]. If a patient's condition is more complex, this discussion may take longer, which can result in delays. These delays can prevent doctors from visiting patients who are ready for discharge in a timely manner, leading to further discharge delays.

Discussion with Dr. Che Harris & Nicole Johnson: Doctors need to review patients' test results and notes/orders from other departments on EPIC daily. This process can take hours, as sometimes the system's information is not updated in time, or medication responses cause delays in test results [D]. These delays can add significant time to the discharge process, as the necessary information may not be available when needed for decision-making.

Discussion with Dr. Amy Knight: To issue discharge order, doctors should review patients' home medical history first, and then have med reconciliation, finally issue new discharge order. The fact is that only 60-70% of patients have helpful home medical history, which may take more time to review [E].

4.3.2 Patient-Related Delays

Discharge delays often occur due to various patient-related factors:

- **Reluctance to Leave:** Some patients refuse to discharge when treatment suggests rehabilitation, but they prefer to avoid it and end up staying. Others lack family support, making home care difficult [F].
- **Unexpected Complications:** Delays can also arise from accidental injuries that limit patient mobility, paperwork issues, or the need for specialized post-discharge services like home care or ambulance transfers, especially for COVID-19 patients [F].
- **Practical Barriers:** Some patients cannot arrange transportation due to lack of access to mobile phones or ride services, while others face challenges like insurance approval or medication availability.

4.3.3 Nurse-Related Delays

Nurses also face several challenges that contribute to discharge delays:

- **Workload:** Each nurse is responsible for multiple patients (5 per nurse), managing tasks like medication pickup from MedStation, ensuring availability of supplies, and addressing patient needs.
- **Communication Gaps:** Nurses use the EPIC system to receive orders from doctors, but they must check it manually as there are no notifications for new orders. This can result in delayed updates to discharge processes.
- **Medication Coordination:** Nurses play a crucial role in ensuring patients receive prescribed medications before discharge. Medication reconciliation and final approval from doctors often create bottlenecks [G].

4.3.4 Pharmacy-Related Delays

Pharmacy plays a vital role in the time taken for a patient to get discharged. After the doctor writes the discharge note for a patient, they must complete their medical reconciliation process too [H]. This updates the EPIC with all the medication the patient will need after their departure from the hospital. These details are then sent to the outpatient pharmacy for the prescription to be filled. The Pharmacy receives 100-150 prescriptions per day and there are only two employees to fulfill the requirements. This results in a usual delay of about two hours per prescription, delaying the discharge procedure. Nurses find 10 out of 10 patients need to wait for their prescription before getting discharged. Receiving the discharge notes along with the necessary prescription by 10 AM ensures that the patient cannot be discharged before 12 PM.

4.3.5 Transport-Related Delays

After interviewing with nurses April, Lee, Paul, Grace and Bonne, we identified several factors contributing to patients being ready for discharge but unable to leave the hospital due to transportation issues:

- Family members are unable to pick up the patient on time on weekdays due to work or another contingency.
- Many patients (such as those infected with COVID-19) must be transported to other facilities via ambulance. In our case study, ambulances failed to arrive on time to transfer patients ready for discharge in 80% of cases [I]. The main reasons include limited availability but high demand for ambulances and traffic congestion.
- Some patients are discharged over the weekend, but hospital transportation resources are limited on weekends.

4.3.6 Social worker

A social case worker is assigned at the time of admission to those patients who demonstrate financial incapacity or are homeless. These case workers are responsible for arranging low-cost insurance for covering the treatment and post treatment costs. Discharges are delayed due to social workers only a few times within a month. This delay is because the social case workers are not able to provide low-cost rehab facilities for the respective patients. Waiting for insurance approvals or dealing with authorization denials can slow down the discharge process, especially if alternative plans need to be made.

4.3.7 Case managers

Case managers play a crucial role in coordinating patient care by conducting comprehensive assessments, developing individualized care plans, and ensuring the seamless transition of patients from hospital to home or other care facilities. They collaborate with interdisciplinary teams to align treatment plans, manage resources efficiently, and advocate for patients' needs. Additionally, they oversee utilization review to ensure medical necessity and cost-effectiveness, maintain accurate documentation, and participate in quality improvement initiatives to enhance patient outcomes and hospital processes.

Delays caused due to case managers: Case managers work towards ensuring a seamless discharge process, so they do not cause any delays directly. If the necessary post-discharge resources (such as home healthcare, equipment, or rehabilitation services) are not readily available or take time to arrange, the discharge process can be delayed.

5. Recommendations

5.1 3-Step solution – Low effort high impact

- According to time study analysis, we found that the dominant delays occur when
- Doctors are unable to visit discharge patients early.
- After the doctor places an order, EPIC does not notify the nurse, and at the same time, nurses always have heavy workload and unable to check the doctor's orders in EPIC promptly.
- The outpatient pharmacy has only two staff members but hundreds of prescriptions to fill.
- Even when patients are ready for discharge, they may be delayed due to the unavailability of ambulances, a lack of beds in other facilities, or family members being unable to pick them up.
- We then determined that the first three delays are more controllable, so we developed a corresponding 3-step solution to address them, as shown in the figure.

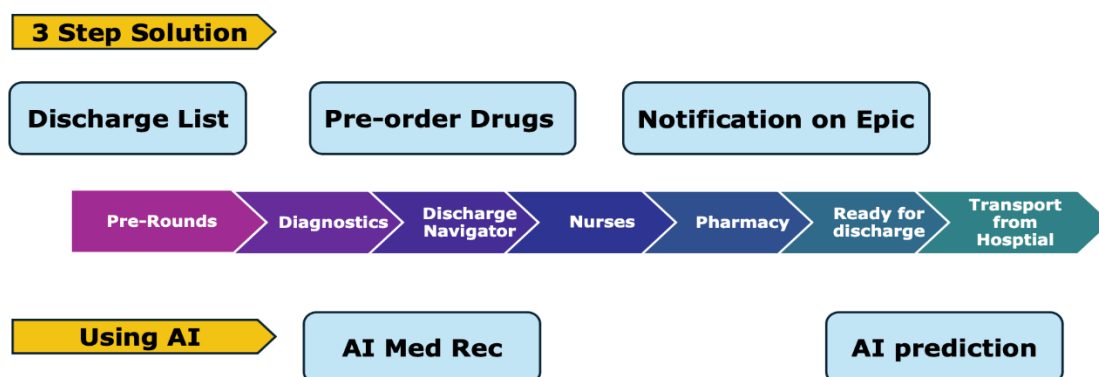


Fig. 3 Recommendations

Discharge List

After daily Multi-D meetings, we can develop a discharge list to streamline morning doctor visits [J].

As we can see in appendix 3, the first checklist is for case managers on the day of admission to monitor the patient's condition, overseeing their status from admission to discharge. The second and third check lists are for doctors: yellow one for one day before discharge and green one for the day on discharge. This helps the doctor assess the

patient's condition and accelerates the issuing of the discharge note. The last two checklists are for the nurses and are posted by the patient's bedside to ensure that all doctors and nurses responsible for the patient can see them.

With the discharge list, the decision regarding discharge patient could be made earlier, potentially reduce time in daily pre-round and coordination of discharge navigator, which can save up to **96 minutes**.

Pre-order Drugs

Instead of placing prescription orders to outpatient pharmacy on the day of discharge, they can be submitted one day in advance to ensure the medications are ready for pickup. If there are changes in the patient's medication needs on the day of discharge, only the necessary adjustments would be made to the existing prescriptions, which would still save time. Ordering and delivering drugs can take anywhere from 1 to 3 hours. In cases where the process takes 2.5 to 3 hours, we can reduce the time by **90 minutes**, ensuring it only takes the necessary 1 hour without avoidable delays. Implementing a pre-ordering system will help eliminate unnecessary waiting and streamline the process.

Notification On Epic

To reduce delays in patient discharge, we recommend enabling real-time, nurse-oriented notifications in the EPIC system. Currently, nurses check notifications periodically, which can lead to delays of up to 2 hours before a discharge note is viewed. By implementing real-time alerts when a doctor places an order for patient discharge, nurses will be promptly informed, potentially saving up to **90 minutes**, which is the maximum time it currently takes for a nurse to check the notification if missed. This will lead to a smoother discharge process, improved efficiency, and enhanced patient flow within the hospital.

5.2 Using AI

5.2.1 Using AI for med reconciliation process - High effort low impact

We propose integrating predictive analytics and AI-driven clinical decision support systems (CDSS) with Epic EHR to streamline medication reconciliation at discharge. This solution prioritizes high-risk medications and provides real-time alerts, reducing reconciliation time from 75 minutes to approximately **15-30 minutes**, enhancing efficiency and patient safety.

5.2.2 Using AI to predict length of stay - High effort high impact

Transportation for the patients from the hospital to either their homes or secondary facilities causes regular challenges. We are made aware that the hospital is working in AI models to predict the nature of treatment the patient might require. Using the same AI model as the base with the same data, we could infer what might be the predicted approximate length of patient stay. This could be used to notify a patient's family of the pickup date and schedule ambulance pickups from the hospital. This will ensure minimal hiccups when the patient is ready to depart.

5.3 Incentivizing- Low effort low impact

5.3.1 Recognition and Rewards

- Goody Bags for High-Performers: Continue recognizing high-performing nurses and interns with goody bags delivered by hospital medicine administrative staff. This personal touch has been well-received and motivates individuals to aim for timely discharges.
- Meal Vouchers: Maintain the practice of providing meal vouchers to nurses who place discharge orders before 10 am. This immediate reward encourages early action.

5.3.2 Public Recognition

- Star Awards: Extend the star award system to include all care teams, not just hospitalist physicians. Recognize individuals and teams publicly to foster a sense of accomplishment and healthy competition.

- **Weekly Emails:** Continue sending weekly feedback emails to APPs and physicians. Ensure that these emails highlight top performers and acknowledge their contributions publicly.

5.3.3 Leadership Acknowledgement

Have the physician leadership of our Hospitalist group continue to recognize top-performing individuals publicly through responses to the weekly emails. This leadership acknowledgment reinforces the value of their efforts and encourages continuous improvement.

5.3.4 Balanced Approach

- **Intrinsic Motivation:** Emphasize the importance of timely discharges for patient care and hospital efficiency in all communications. Help staff see the broader impact of their efforts.
- **Continuous Improvement:** Offer training sessions and resources to help all team members improve their discharge planning and coordination skills, promoting a culture of mastery and development.

By combining these intrinsic and extrinsic motivators, we can create a comprehensive incentive program that drives early discharges and enhances overall hospital efficiency and patient care.

6. Implementation Timeline

Sr No.	Recommendation	Timeline	Cost Factor
1.	3 Step Solution		
1.1	Discharge List	3-6 Months	Low
1.2	Pre-order Drugs	3-6 Months	Low
1.3	Notification on EPIC	1-3 Months	Medium
2.	Using AI		
2.1	AI For Med Reconciliation	6-12 Months	High
2.2	AI For Predicting length of stay	6-12 Months	High
3	Incentive Program		
3.1	Recognition and Rewards	1-2 Months	Medium
3.2	Public Recognition	1-2 Months	Low
3.3	Leadership Acknowledgment	1-2 Months	Low
3.4	Balanced Approach	1-2 Months	Low

Table. 2 Recommendation Implementation Timeline

7. Limitations

- Staff, including nurses and doctors, may resist new features due to familiarity with existing processes and concerns about increased workload. Ensuring proper training and understanding of new protocols is essential for successful adoption.
- Incomplete or inaccurate historical data used to train the AI model can lead to flawed predictions about patient discharge times. Missing patient histories or poorly recorded outcomes can result in unreliable forecasts.

8. Conclusion

The discharge process is a critical factor in hospital operations, reflecting how efficiently resources are used to transition patients out of the hospital. Currently, steps are being taken to streamline discharge workflow to maximize efficiency and reduce delays. However, most patients were still not discharged before the hospital's target time, even when individual tasks are managed well. The team identified 4 main factors affecting the discharge time: doctors cannot visit discharge patients early; nurses cannot check orders on EPIC promptly; pharmacy staff fill overflowing prescriptions and delays in transportation from hospital. To address these issues, recommendations have been proposed in using priority patient list, turning on notification for nurse on EPIC, pre-ordering drugs a day before discharge, using AI model during med reconciliation and transportation, and setting up incentive program.

By implementing these changes, we anticipate a 29% reduction in the overall discharge process, which greatly improves hospital workflow efficiency and results in greater patient satisfaction.

Respectfully Submitted by,

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10. References

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[B] Tak, S.B., Kulkarni, S.V., & More, R. (2013). A comparative time-motion study of all types of patient discharges in a hospital.

[C] Interview with Nurse Lee and Paul, Johns Hopkins Hospital, September 13, 2024

[D] Interview with medicine faculty Dr. Che Harris, Johns Hopkins Hospital, September 13, 2024

[E] Interview with CMIO (Chief Medical Information Officer) Dr. Amy Knight, Johns Hopkins Hospital, September 20, 2024.

[F] Interview with Charge Nurse April Zakes, Nurse Bonne and Grace, Johns Hopkins Hospital, September 20, 2024.

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[H] Medication Reconciliation for Hospitalists: <https://www.hospitalmedicine.org/clinical-topics/medication-reconciliation/#:~:text=Medication%2oreconciliation%2C%20or%20med%20rec,of%20medications%20they%20are%20prescribed>

[I] Interview with Nurse Bonne and Grace, Johns Hopkins Hospital, September 20, 2024

[J] Bailey R, Segon A, Garcia S, Kottewar S, Lu T, Tuazon N, Sanchez L, Gelfond JA, Bowling G. Increasing and sustaining discharges by noon - a multi-year process improvement project. BMC Health Serv Res. 2024 Apr 17;24(1):478. doi: 10.1186/s12913-024-10960-x. PMID: 38632568; PMCID: PMC11025149.

Appendix

1. Factors Affecting discharge process

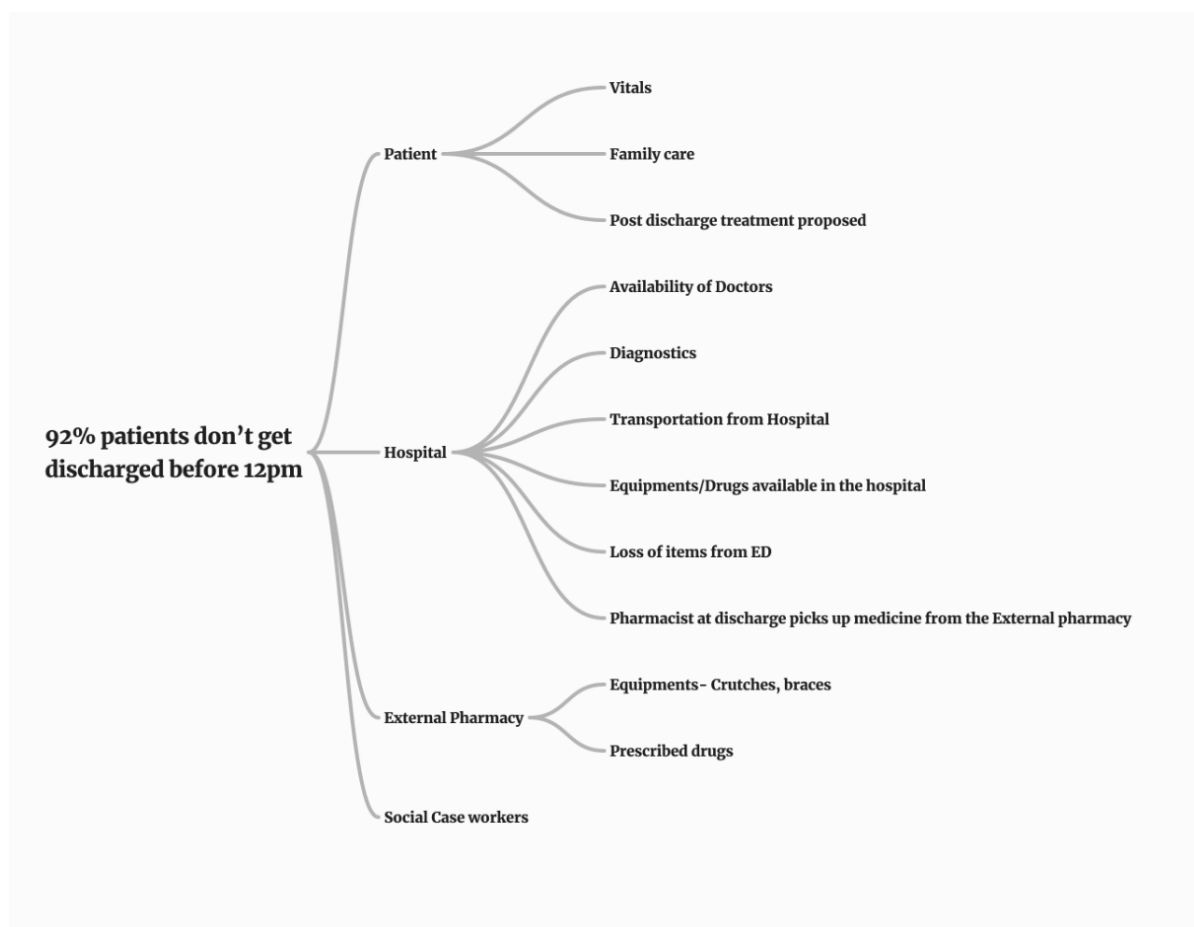


Fig. 4 Issue Tree

2. Impact Matrix for recommendations

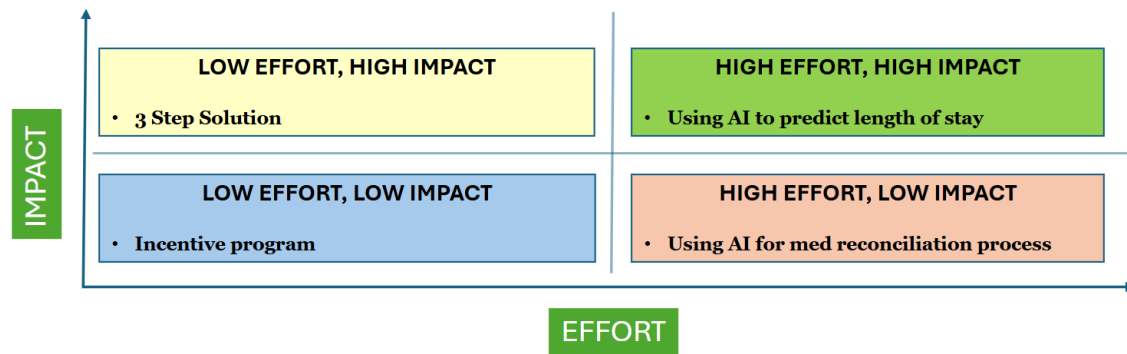


Fig. 5 Recommendation Impact Matrix

Sr No.	Recommendation	Implementation Approach
1.	3 Step Solution	
1.1	Discharge List	Operational Shift
1.2	Pre-order Drugs	Operational Shift
1.3	Notification on EPIC	Integration of a New Feature
2.	Using AI	
2.1	AI For Med Reconciliation	Adoption of New Technology
2.2	AI For Predicting length of stay	Adoption of New Technology
3	Incentive Program	
3.1	Recognition and Rewards	Introducing New Policy
3.2	Public Recognition	Introducing New Policy
3.3	Leadership Acknowledgment	Introducing New Policy
3.4	Balanced Approach	Training and Awareness

Table.3 Implementation Approach

3. Recommendation: Discharge list

CHECKLIST FOR SAFE AND TIMELY DISCHARGES

ADMISSION DAY

Assess during H&P:

- ☐ Mobility: “How do you get around at home? Do you need a cane or walker? Do you feel weaker?”
- ☐ Placement: “What’s your living situation like? Do you live with family or have support?”
- ☐ Medication Reconciliation and Adherence (affects discharge meds, especially safety and re-admissions): “Does anyone help you take your medications or do you manage them yourself?”

DURING HOSPITALIZATION

Interprofessional consults as soon as medically appropriate (anticipate DME, facility placement, or otherwise not at baseline):

- | | |
|---|--|
| <input type="checkbox"/> PT/OT | <input type="checkbox"/> Wound Care |
| <input type="checkbox"/> SLP | <input type="checkbox"/> Respiratory Therapy |
| <input type="checkbox"/> Dietician/Diabetes Education | |

Daily re-evaluation of any pertinent needs:

- | | |
|--|--|
| <input type="checkbox"/> <u>Outpatient follow-up appts</u> (e.g., PCP, specialty appts, funding needs) | <input type="checkbox"/> <u>Procedures</u> : discussed with patient and orders placed (NPO, hold dvt ppx, INR, plts) |
| <input type="checkbox"/> <u>BM/Urinary Retention/Foley</u> | <input type="checkbox"/> <u>VMT/Sitter/Restraints</u> (d/c if not needed) |
| <input type="checkbox"/> <u>IV meds</u> (d/c if not needed) | <input type="checkbox"/> <u>Outpatient IV ABX</u> : Place IV ABX order and PICC |
| <input type="checkbox"/> <u>Consult notes</u> : place orders based on recommendations (including medical specialties interprofessional services) | <input type="checkbox"/> <u>Home O₂</u> : Evaluation and place order if needed |

DAY OR TWO BEFORE DISCHARGE

Review medical needs:

- ☐ Acute medical conditions resolved/stabilized (this is what we’re exceptionally good at!)
- ☐ Specialty/Subspecialty medical recommendations (check-in and tell them plan to discharge as courtesy)
- ☐ Vital signs and lab abnormalities
- ☐ Pending procedures (e.g., dialysis, imaging): schedule earlier or in the morning

Coordinating with CM/SW and Patient

- ☐ Set patient expectations kindly: “You seem to be getting better and might be ready to discharge in the morning tomorrow if things keep getting better”
- ☐ Double-check interprofessional needs: DME, home health, other supplies
- ☐ Transportation (e.g., family to pick up, bus ticket, cab voucher, transport time to facility)
- ☐ OOH DNR/DNI (if going to facility or transporting by ambulance)

Medication reconciliation:

- ☐ Evaluate medication needs: PRN meds, triplicate meds, and chronic meds needing refills
- ☐ Send partial medication reconciliation to pharmacy (to avoid overwhelming pharmacy at peak times and prevent delays; also will find out if a certain medication is not covered by insurance and have time to prescribe alternative)

DISCHARGE DAY

- ☐ See patient and evaluate if medically clear for discharge (ask attending if they can see before rounds)
- ☐ Send remaining medications to complete reconciliation
- ☐ Place discharge orders and write discharge summary

Fig. 6 Checklist for Case managers [J]

PROVIDER'S CHECK LIST

Please check below when you are planning to discharge a patient

YELLOW DAY – 24 HOURS BEFORE DISCHARGE

Answer the following questions to guide when planning. Have you?

Ordered an anticipate discharge?	
Ordered vaccines?	
Started the medication reconciliation?	
Does your patient need DME? If so, have you ordered it? Check PT notes.	
Does your patient need prescription for narcotics? If so, did you obtain triplicates?	
Order Home antibiotics as applicable?	
Order all the out patient referrals as <u>OP Consults upon discharge?</u>	
Talk to patient and family about the discharge plan?	
Does your patient need lab before going home? If so, please order to have it done at 10 PM so this can be process early as appropriate. If patient needs labs in the morning before discharge- order it at 3 AM for early results. Order to notify you for results.	
Sign the work/school excuse for patient with restrictions and extended days off. Have the RN print this for you and just sign it.	

If one of these questions answer is no, please check with your care coordinator (Case manager, Social worker)

Fig. 7 Checklist for Doctors (day before discharge) [J]

GREEN – DAY OF DISCHARGE

Before discharging your patient, please answer the following questions. Have you?

Order for discharge by 0900?	
Complete medication reconciliation?	
Obtain triplicate for narcotics from your faculty?	
Completed discharge summary if patient going to another facility?	
Speak to the patient and family about discharge?	
Fax /e-scripts the prescriptions to patient preferred pharmacy?	
Check- if out patient referrals processed by Access Plus?	
Have you reviewed discharge meds with your faculty?	

Fig. 8 Checklist for Doctors (day on discharge) [J]

DATE: _____ RM NO. _____ PT INITIAL _____

PLACE THIS OUTSIDE THE PATIENT'S ROOM FOR COMMUNICATION

***RNs and Techs: Initiate this yellow form as you identified your patient as anticipate discharge in 24 hours. Please initial as you complete it and write NA for any information that is not applicable for your patient

** TECHs: Once the form has been completed by the RN, please turn in the completed form to the charge nurse. Then initiate the green form immediately.

YELLOW DAY POWER THROUGH

24Hrs prior to discharge- RN Role	RN Intials
Order for vaccine received from MD	
Home Health orders entered & DME delivered – O2, CPAP, etc.	
Lovenox, Insulin, Coumadin, stroke, CHF, DM, etc. teaching completed	
Wound Vac switched to portable	
Review/ completed POC/ Education in Epic- Care Measures teaching – Stroke, CHF, Pneumonia, VTE	
Tube feedings formula and supplies secured – teaching completed	
Work/ school excuse obtained or FMLA form	
Walk of life completed	
Transportation confirmed before 12: which Taxi, Bus, POV, Ambulance, WC van	
PT/OT/ ST recommendations followed and completed	
Ensure that labs are drawn by 2200 /0300– call for corrections if needed	
Notify charge nurse for pending procedures	
Notify charge nurse for barrier	

NIGHT BEFORE DISCHARGE

TRANSITIONING INTO GREEN (TECH ROLE)	TECH INITIAL
Check with UC if patient has valuables secured in the hospital	
All belongings packed and secured	
Bathing/ shower given	
Confirm that patient has breakfast ordered	
Notify charge nurse for barriers	

Fig. 9 Checklist for Nurses (day before discharge) [J]

DATE: _____ RM NO: _____ PT INITIAL _____

INSERT THIS INSIDE SIGN HOLDER ON FRONT OF PATIENTS DOOR

RNS and Techs: Initial this GREEN form as you complete it. Please write NA for any information that is not applicable for your patient TECHs: Once the form has been completed by the RN, please turn in the completed form to the charge nurse upon discharge to track the cause of delay.

GREEN DAY POWER THROUGH

	RN Initial
Discharge order is written and complete	
Confirm that discharge instructions are completed, documented and printed (AVS)	
Contact designated ambulance/ wheelchair van/ family service for transport for pick up schedule once order for discharge is receive. TIME CALLED _____ ETA _____	
Verify care measures education are completed and documented- Vaccines, CHF, DM, VTE, stroke, Lovenox teaching, insulin	
Discontinue lines – IV , central lines as applicable (except for patient going home with lines)	
Call Meds To Beds to verify medications are ready to be delivered	
Notify charge nurse for barriers: _____	
Call report to facility if applicable	

DAY OF DISCHARGE – GREEN- TECH ROLE	TECHS INITIALS
Confirm that belongings, clothing and shoes are obtained	
Confirm that patient has ordered early breakfast/ lunch. Notify dietary supervisor for to go	
Confirm that shower/ bath completed	
Place EPIC transport order for TCC – can call unit clerk for assistance	
Strip the room and empty suction canisters, chest tube drains and other drains place in biohazard room.	
Dirty equipment place in soiled utility room	
Patient's drawer empty	
TIME OF DISCHARGE _____	

Fig. 10 Checklist for Nurses (day on discharge) [J]

4. Time study analysis results

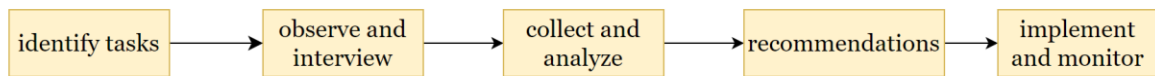


Fig. 11 Flow Chart for Time Study Analysis

We break the discharge process down into individual tasks: Multi-D meeting, doctors visit, diagnostics, discharge note issued, nurses check order, pharmacy fill description, patients are ready for discharge, and transportation from hospital.

We observed several units related to discharge like patient care rooms and Med A & B, interviewed doctors, nurses, staff in outpatient pharmacy, then attended Multi-D meeting and JBOSH meeting to understand the actual situation.

We inquired about their daily duty, the approximate time required to complete tasks, and the most frequent delays they encounter in the discharge process. To avoid bias, we interviewed 5 doctors and 6 nurses. Then we calculated the longest and shortest times for the entire discharge process to facilitate comparisons in the subsequent monitoring.

We identified the main factors that prolong discharge times and categorized them into controllable and uncontrollable factors. We focused on the controllable factors to develop solutions.

Based on our observations, we estimated the amount of time that could be saved in each relevant step and calculated the percentage reduction.

Below table depicts the minimum and maximum times for all the processes based on our observations

Factors	Minimum Time (minutes)	Maximum Time (minutes)	Time
Transportation	30	240	210
Patient Readiness	10	165	80
Pharmacy	60	180	120
Nurses	30	120	90
Discharge Navigator	60	90	30
Diagnostics	30	120	90
Doctors	10	20	10
Total	230	935	

Table. 4 Time Duration Difference for Influencing Factors

Our recommended solutions can save the following amount of time:

1. Discharge List - Our recommendation solves the delays caused due to Doctors, Diagnostics and Discharge Navigator. We calculated the delta time for each domain.

$$\Delta \text{Time}_1 = \Delta \text{Discharge Navigator} + \Delta \text{Diagnostics} + \Delta \text{Doctors}$$

$$\Delta \text{Time}_1 = 30 + 90 + 10 = 140 \text{ minutes}$$

Considering a 70% efficiency rate of the solution, approximately 96 minutes of discharge time were saved.

2. Pre-Order Drugs - Our recommendation solves the delays caused due to Pharmacy. We calculated the delta time for each domain.

$$\Delta \text{Time}_2 = \Delta \text{Pharmacy} = 120 \text{ minutes}$$

Considering a 70% efficiency rate of the solution, we saved approximately 90 minutes of discharge time.

3. Notification on EPIC - Our recommendation solves the delays caused due to nurses. We calculated the delta time for each domain.

$$\Delta \text{Time}_3 = \Delta \text{Nurses} = 90 \text{ minutes}$$

$$\begin{aligned} \text{Therefore, Total time saved} &= \Sigma \Delta \text{Time}_1, \Delta \text{Time}_2, \Delta \text{Time}_3 \\ &= 96 + 90 + 90 = 276 \text{ Mins} \end{aligned}$$

4. % Change = (Total time saved/Maximum Discharge time) * 100

$$= (276/935) * 100$$

$$= \sim 29\%$$

5. Current Average Discharge Time: 3:54 PM

Projected Average Discharge time: 11:18 AM