

Harnessing EHR to Improve Care of Patients with Cirrhosis

A. H. Hoque MD, MPH¹, T. Dube BS², F. Gordon MD²

¹ Department of Internal Medicine , Lahey Hospital and Medical Center, Burlington, MA

² Transplantation & Hepatobiliary Services, Lahey Hospital and Medical Center, Burlington, MA

Introduction

There is an increasing prevalence of patients with decompensated cirrhosis. These patients have a high rate of admission, with over one third readmitted within thirty days. Ultimately, the burden of this chronic illness impedes patients' quality of life and has an enormous economic impact on the healthcare system. Moreover, given their complexity of care it is challenging to coordinate transition of care between inpatient and outpatient world leading to additional and excessive testing. Or if they are being managed by a non-hepatology service, not all management and treatment guidelines are followed. Recent evidence suggests utilization of electronic health records (EHR) leads to improved guideline directed care and coordination.

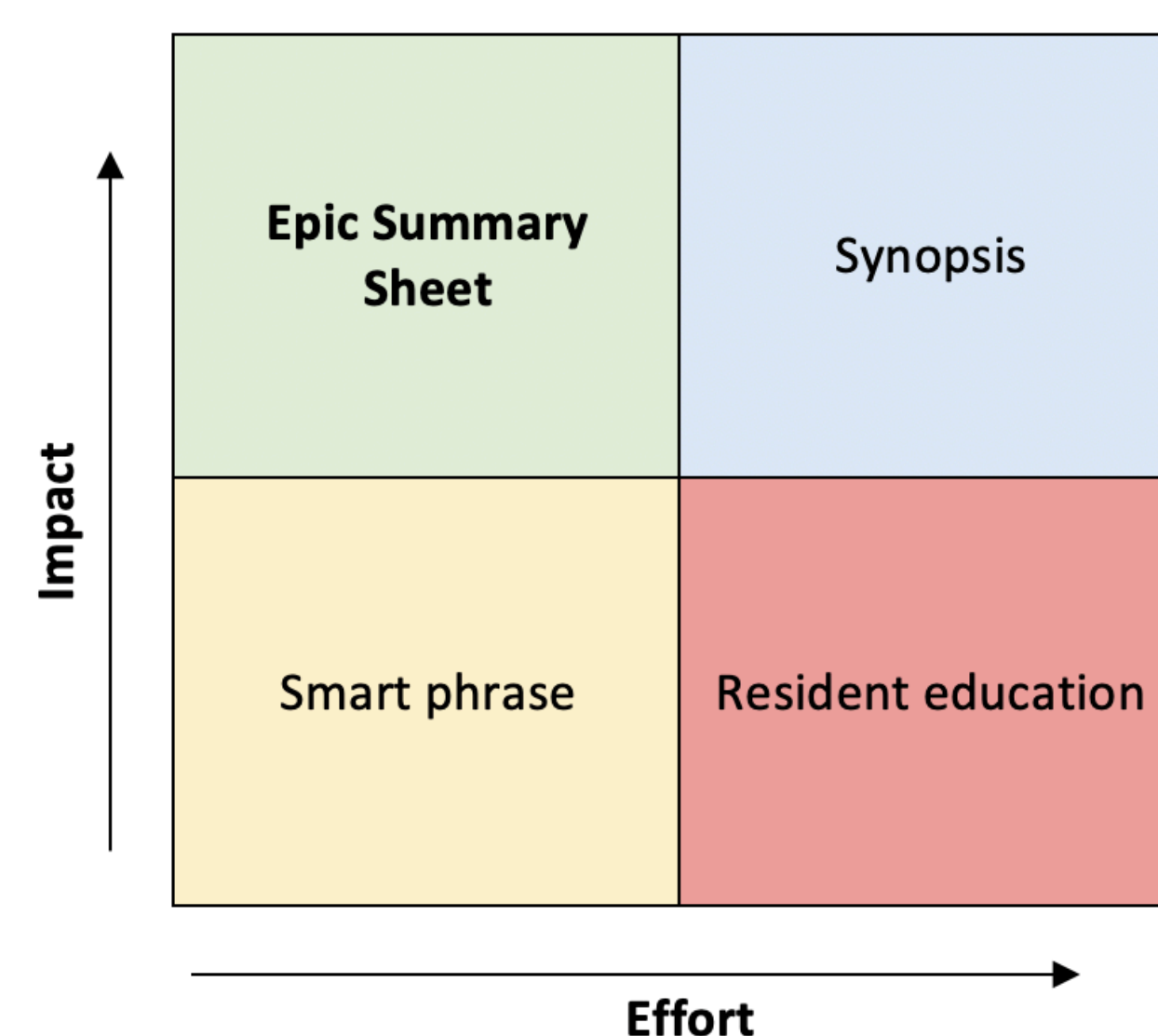
Aim The aim of this project was to utilize the electronic health record (EHR) to improve the coordination, efficiency, and quality of inpatient cirrhosis management.

Deciding our intervention

This project took place in a single tertiary liver transplantation center.

Stakeholders: internal medicine residents, the hepatology and transplant team, and informatics team.

Idea generation with impact & effort matrix as below.



Introducing The Liver Accordion

Liver Accordion of patient with Budd-Chiari cirrhosis admitted with hepatic encephalopathy, with hospital course complicated by spontaneous bacterial peritonitis (SBP) and an acute kidney injury

Category	09/12	09/13	09/14	09/15	09/16	09/17	09/18
Labs							
Sodium	150	145	150	146	144*	147	149
BUN	36	36	33	34	29	25	24
Creatinine, Blood	2.0	2.2	2.1	1.9	1.5	1.5	1.4
INR	2.6	2.5	2.0	1.5	1.4	1.4	1.3*
WBC	8.35	9.18	6.81*	5.77	6.62	6.37	7.20
Absolute Neutrophil Count	8.93			4.32			8.30
Platelet Count	237	241	181*	148	136	117	120
AST (SGOT)	103	68	64			37	
ALT (SGPT)	55	37	32			20	
Encephalopathy							
Lactulose	20	20	220*	200	20	20	20
Stool Occurrence	1	1	1	1	1	1	1
Fluid Status/Kidney							
P.O.	100mL	300mL	120mL	275mL	240mL	400mL	250mL
Urine							
Glucose, UA			Negat...				
Protein, UA			30 mg...				
Ketones, UA			Negat...				
albumin human IV (g)		25	50*	25	25	25	50*
GI Bleed							
metoprolol tartrate CRAL (mg)		25					
Infection							
CefTRIAxone (mg)		2,000					
Ciprofloxacin CRAL (mg)			500		500	500	500

We developed and implemented an EHR tool to allow clinicians to quickly formulate the patient's clinical picture and thereby manage patient's disease

This project offers a novel EHR tool that can be easily adopted and implemented to change clinical practice

Results

Previously, to review all of the information on your patients; you would have to go to labs, ins/ outs, manage orders, ,imaging, and medication administration history and etc. Now this one temporal view will simplify it into one place.

- Titrate lactulose to the number of bowel movements
- Monitor ins and outs, and easily access patient's urine sediment and studies, albumin given etc.
- Determine if mediations such as beta blockers or diuretics are given or held in setting of SBP
- Duration of antibiotic therapy for any infection or for example SBP prophylaxis
- Manage immunosuppressive therapy by tracking trough levels , administration time, and doses
- Patient's evaluated for transplant will have link to outpatient notes, official transplant listing, pending transplant evaluation studies
- Transplanted patient similarly will link to the outpatient transplant synopsis including viral studies etc.

Next Steps

After implementation of this tool, we received iterative feedback from users including the hepatology attendings, fellows, and the resident team. We are currently in the process of adding:

- Fibrinogen, Direct Bilirubin, MELD-Na to the labs
- Imaging studies for current admission
- Changing "GI Bleeding" to "Coagulopathy"
- Adding vitamin K repletion

Acknowledgements

Thank you to all our staff and faculty, and to our team for all their effort!