

# Impact of an automated screening management platform on completion of imaged based screening

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# Hepatocellular Carcinoma

Over 4 million Americans at risk

FOURTH leading cause of cancer-related deaths

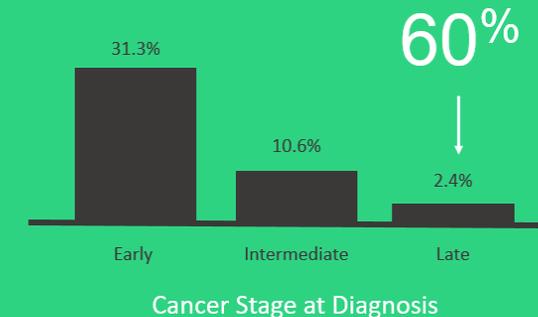
SECOND most lethal cancer: 5 year survival 18%

< 30% receive screening nationally

Wide range of screening compliance:  
15-20% among PCPs in our practice to 60% among hepatologist

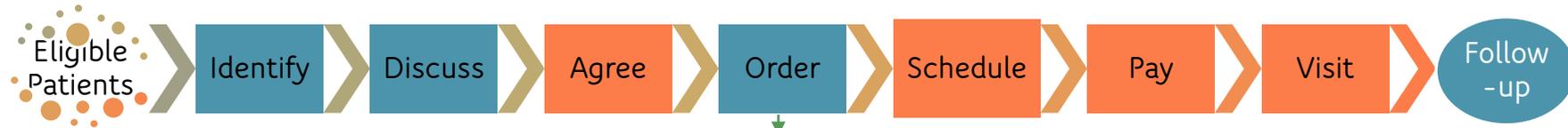
Despite available screening, more than 60% are diagnosed in late-stage disease

## 5-year relative survival



1. Singal AG, Yopp A, S Skinner C, Packer M, Lee WM, Tiro JA. Utilization of hepatocellular carcinoma surveillance among American patients: a systematic review. *J Gen Intern Med.* 2012;27(7):861-867. doi:10.1007/s11606-011-1952-x
2. <https://www.cdc.gov/nchs/fastats/liver-disease.htm>
3. Jemal A, Ward EM, Johnson CJ, et al. Annual Report to the Nation on the Status of Cancer, 1975-2014, Featuring Survival. *J Natl Cancer Inst* 2017; 109.

# FROM PROBLEM TO SOLUTION



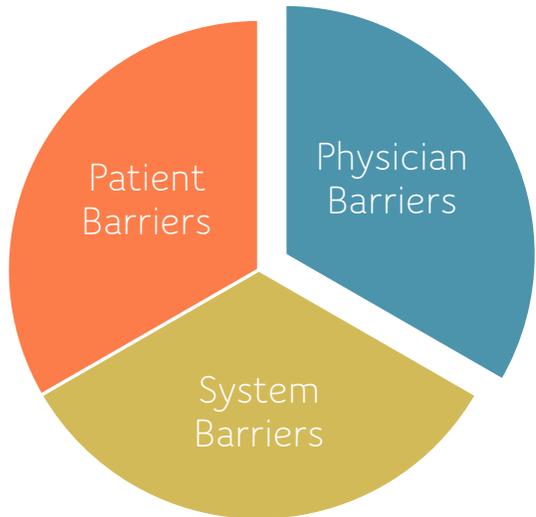
Several successful steps must be taken to get a patient successfully screened and there are several barriers along the way



For PCPs, already burden, identifying the patients at risk from a large cohort and ordering screening is a challenge with only 60% of eligible patients (in our practice) getting appropriate screening order



There is a further challenge of getting patients to complete their screening with only 50% of patients with orders successfully completing screening



Our goal was to design a system to help eliminate the burden of identifying eligible patients, makes it easy to order appropriate screening and easier to follow through



IDENTIFY



PRIME



ENGAGE

# LiveAware

*An automated platform to improve imaging-based screening rates and remove the cognitive burden on ordering clinicians*

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## OUR AIMS:

01

Develop and validate a novel algorithm to automatically identify patients due for imaging-based cancer screening

02

Decrease the cognitive burden on clinicians to order image-based screening

03

Understand and decrease the barriers for patients to complete their screening

# LiveAware: HOW IT WORKS

Natural language processing

Patients at Risk

Patients due for screening

Track imaging status

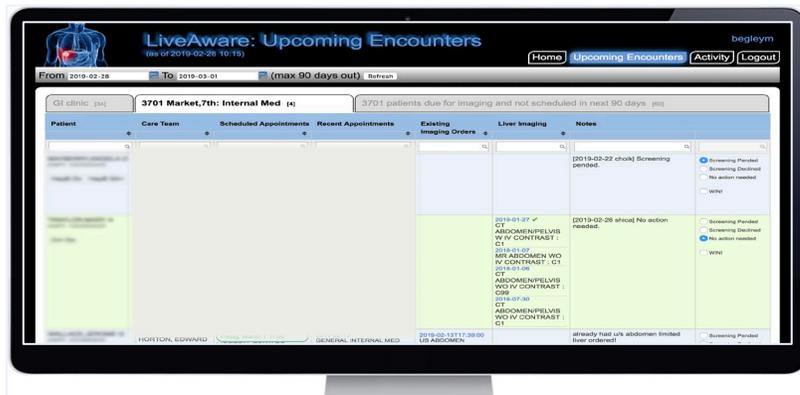
Identify Upcoming PCP Appointment

Create screening order

Engage Patient

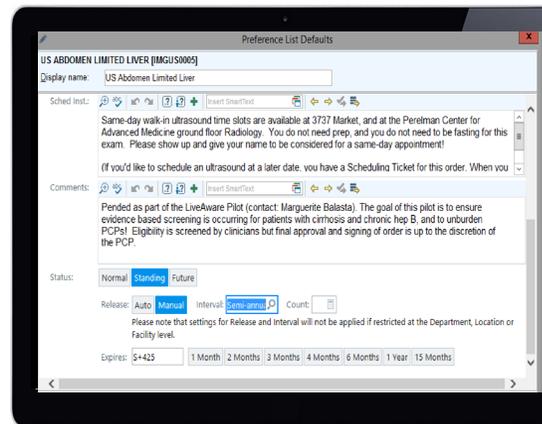
Monitor completion

A live dashboard to IDENTIFY patients at risk for HCC using natural language processing and complex queries of the EMR, eliminating the burden on clinicians



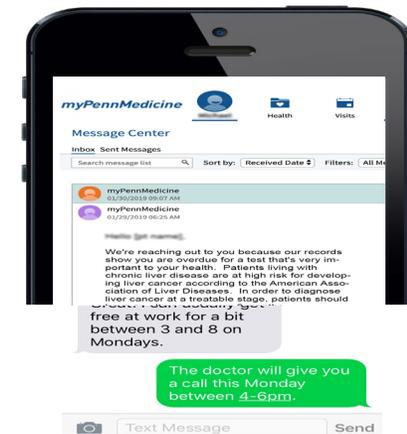
IDENTIFY

Next, we sought to improve the number of orders placed for screening by identifying upcoming appointments and pending standing screening orders in patient's medical record only for the clinician to sign



PRIME

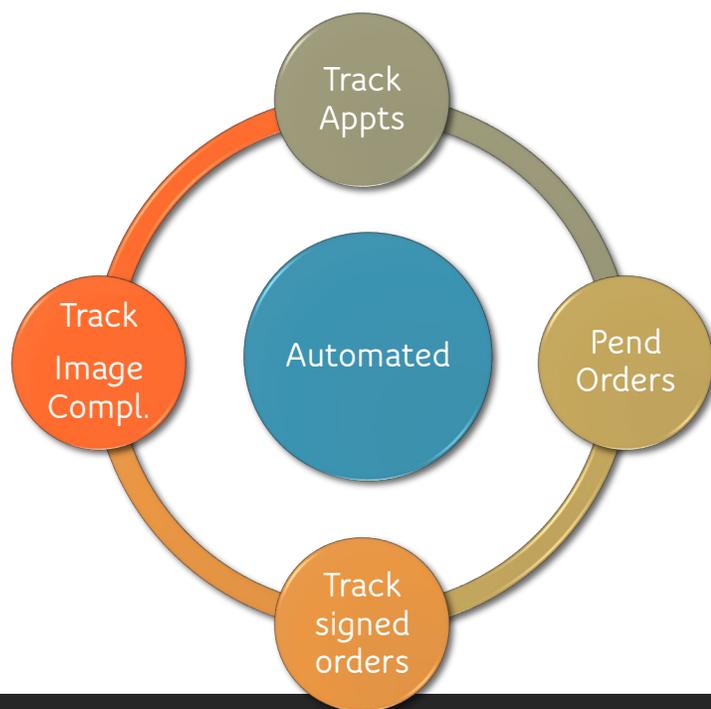
To further increase the chance for screening completion, we communicated with patients to encourage scan completion



ENGAGE

# LiveAware

LiveAware, after several iterations, was developed to allow an essentially fully-automated process to identify and track patients



Pending Of USABLLVx80	Appointment	Patient Signed
2021-10-08 OrderPender	2021-10-08 GEN...	Order pending (ROWEMAR)
2021-10-06 OrderPender	2021-10-06 GEN...	Order pending (PALEGEKE)
2021-10-02 OrderPender	2021-10-02 GEN...	Order pending (HUM)
2021-09-30 OrderPender	2021-09-30 PEN...	Order cancelled (CANDOG)
2021-09-29 OrderPender	2021-09-29 GEN...	Order pending (MARTNICH)
2021-09-29 OrderPender	2021-09-29 GEN...	Order cancelled (CHAPMANN)
2021-09-28 OrderPender	2021-09-28 APP...	[order not found]
2021-09-25 OrderPender	2021-09-25 GEN...	Order pending (ENDEJ)
2021-09-24 OrderPender	2021-09-24 GEN...	Order signed (WYNNEC)
2021-09-24 OrderPender	2021-09-24 DEL...	Order cancelled (KARYPWSR)
2021-09-18 OrderPender	2021-09-18 GEN...	Order cancelled (SIDDISA)
2021-09-18 OrderPender	2021-09-18 GEN...	Order cancelled (AMANKWAN)
2021-09-15 OrderPender	2021-09-15 PENN FAMILY CARE PMUC	Order signed (CHIAS)

Patient	Compliance before Appointment (5 months)	Imaging Order in 6 months before Appointment	Appointment Participants	Current Order Status	Screening Scheduled	Screening Completed
	Screening Due	NO ORDER	PENN FAMILY MEDICINE PRINCETONVILLE	NEEDS ORDER	NO RAD APPT	Non-compliant
	Compliant	Ordered	GI MEDICINE	N/A	N/A	Compliant
	Compliant	Ordered	GI MEDICINE	N/A	N/A	Compliant
	Screening Due	NO ORDER	GI MEDICINE	NEEDS ORDER	NO RAD APPT	Non-compliant
	Screening Due	Ordered	GI MEDICINE	Signed	NO RAD APPT	Non-compliant
	Screening Due	NO ORDER	PENN...	NEEDS ORDER	NO RAD APPT	Non-compliant
	Compliant	Ordered	GI MEDICINE	N/A	N/A	Compliant
	Screening Due	Ordered	GENERAL INTERNAL MEDICINE	PENDING	NO RAD APPT	Non-compliant
	Compliant	Ordered	GENERAL INTERNAL MEDICINE	N/A	N/A	Compliant
	Screening Due	NO ORDER	GENERAL INTERNAL MEDICINE	NEEDS ORDER	NO RAD APPT	Non-compliant
	Compliant	Ordered	GENERAL INTERNAL MEDICINE	N/A	N/A	Compliant
	Compliant	Ordered	CC...	N/A	N/A	Compliant
	Screening Due	Ordered	GENERAL INTERNAL MEDICINE	PENDING	NO RAD APPT	Non-compliant
	Compliant	Ordered	GI MEDICINE	N/A	N/A	Compliant
	Compliant	Ordered	DELAWARE...	N/A	N/A	Compliant
	Screening Due	Ordered	GENERAL INTERNAL MEDICINE	Signed	NO RAD APPT	Non-compliant
	Screening Due	NO ORDER	GENERAL INTERNAL MEDICINE	NEEDS ORDER	NO RAD APPT	Non-compliant
	Screening Due	Ordered	GENERAL INTERNAL MEDICINE	Signed	NO RAD APPT	Non-compliant

# METHODS: THE PILOT

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## INTERVENTION GROUP

- Phase 1: August 2019: 1 office, 11 physicians
- Phase 2: November 2019: 7 primary care offices
- 1084 At-Risk Patients

## CONTROL GROUP

- January 2019-Current: 1 PCP office
- 35 at-risk patients

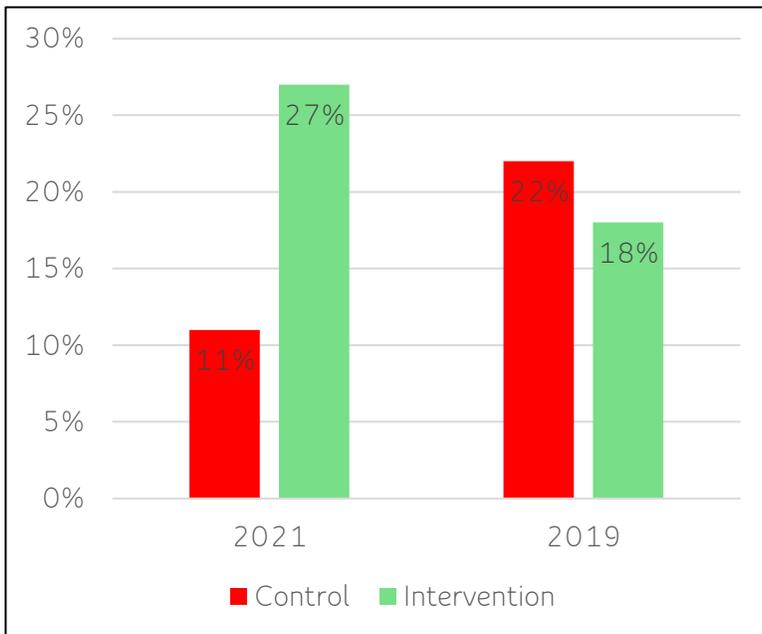
## OUTCOMES

- Signed orders in control verses intervention group
- Completed orders in the control verses intervention group

- At Risk Patients:
  - *Patients with cirrhosis, chronic Hepatitis B or Hep C*
- Compliance:
  - *Any liver imaging (Abdominal US, MRI, liver CT) within 7 months (recommended interval + 1 month)*
- Baseline:
  - *January 2019*

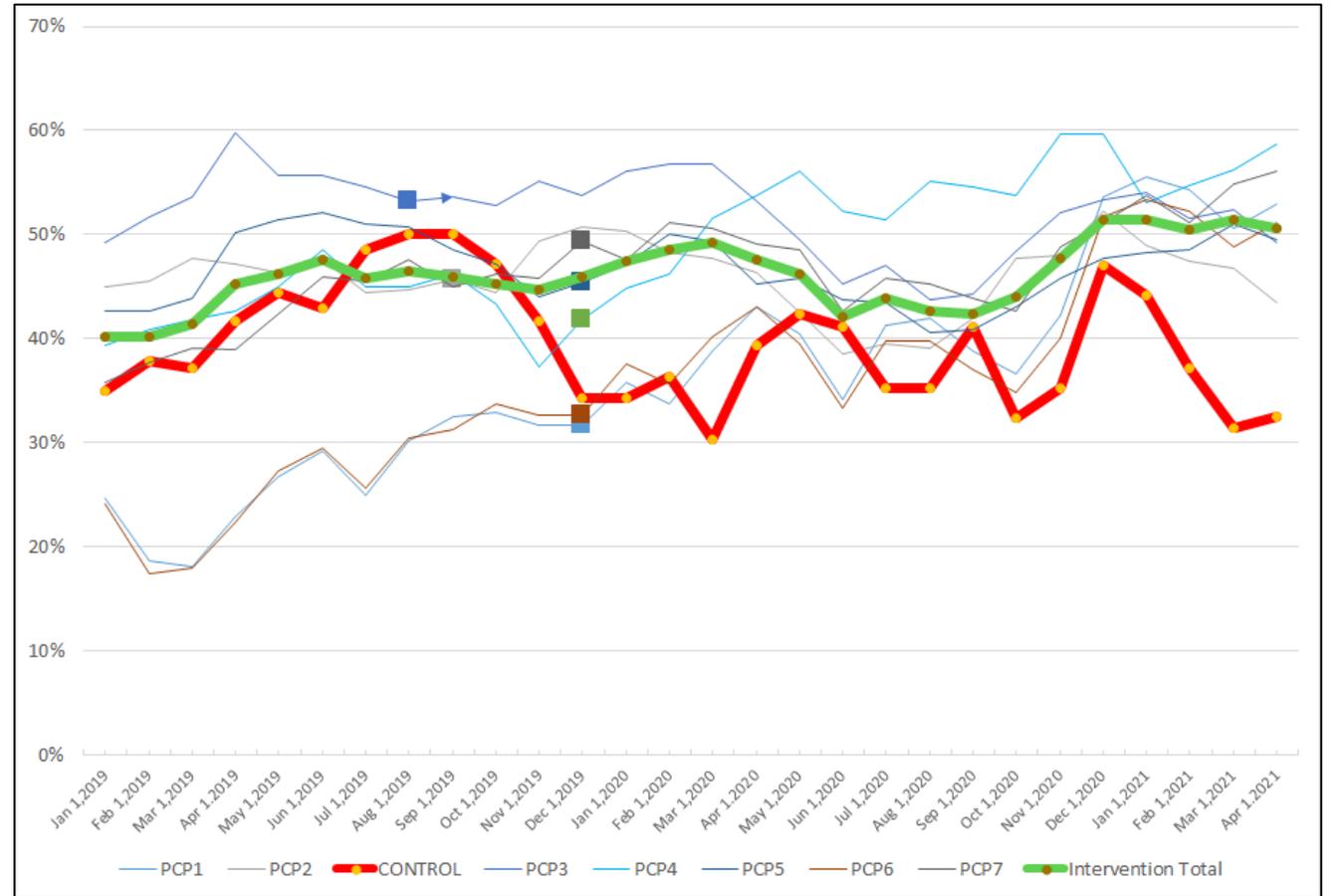
# Preliminary Results

Percent Completed Orders



While we see improvements in screening orders placed, the number of completed orders continue to fluctuate.

Percent Signed Orders



\*\* The COVID Pandemic may have impacted the trends, especially between April and June 2020, when many elective imaging appointments and PCP visits were canceled or rescheduled.

# DISCUSSION

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## CONCLUSIONS

An automated screening dashboard is viable

May be impactful in screening and follow-up management

May help to off cognitive burden on primary care providers

## LIMITATIONS

- Signed order does not translate to completed screening
- Small size of control practice
- Covid Pandemic

## FUTURE DIRECTIONS

- Identify physician barriers to signing orders
- Identify and address patient barriers between order and screening completion
- Explore other ways to utilize follow-up platform
- Identify and expand into clinics that might benefit.

# THANK YOU

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