Impact of Information Technology Enhancement for Human Papillomavirus Vaccination: Time and Cost Savings

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Background

- **Human Papillomavirus (HPV) vaccination** plays a critical role in preventing six types of cancers.[1]
- **Problem scope:**
  1. Health systems face challenges in optimizing the clinical workflow for administering and monitoring HPV vaccines.[2]
  2. Electronic Health Records (EHR) transform patient care by centralizing information and streamlining documentation, but they also introduce time-related challenges.[3-6]
- UT Physicians implemented various information technology (IT) enhancements to the EHR system (EPIC) during 03/2022-03/2023.

Objective

- To evaluate the **impact of EHR enhancements** on time and cost savings related to HPV vaccination clinical workflows.

Program Description

- EHR enhancements aimed to improve clinical efficiency and reduce the time burden on healthcare providers.

Electronic ImmTrac2
- ✓Texas Immunization Information System (IIS)
- ✓Real-time, two-way exchange with the Texas state registry for submitting and accessing immunization records.

External Data Validation
- ✓Cross-checks immunization data with state and federal registries to reduce errors and inconsistencies.

Immunization Forecaster
- ✓Recommends vaccination timing and adjustments based on medication and patient history.

Digital Personalized Patient Reminders
- ✓Sends timely alerts for upcoming or overdue vaccinations.

Methods

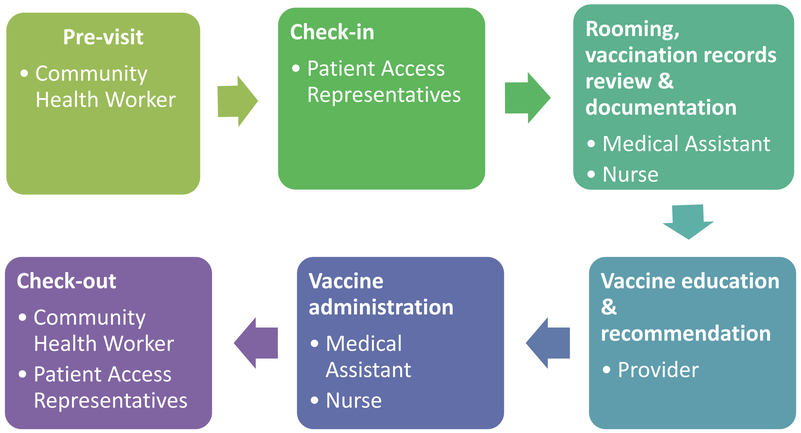
- **Study design:** Pre- and post-comparison study to estimate the clinical staff time and related cost changes.
- Costs were estimated using **time-driven activity-based costing**, with adjusted per-minute salaries calculated based on salary, fringe benefits, and productivity rate. Direct costs were collected from the provider's perspective and estimated in 2024 dollars.
- **Time:** March 2022 - May 2023.

Methods (Cont'd)

- **Process maps of routine clinical activities,** including HPV vaccination, were developed from five outpatient clinics: community-based, pediatric, and obstetrics and gynecology clinics.
- **Scenario-based sensitivity analysis (SA)** was conducted to compare with the average time and cost results in each clinical step.

Scan the QR code to view a process map example

Figure 1. Key Vaccine-Related Activities by Role and Phase of Visit



Results

- Immunization workflows vary by clinic, and each step is covered by a different role (e.g., MA, front desk, provider). (*Figure 1*)
- **Most time** spent during the rooming, immunizations review and documentation. (*Table 1*)
- **Least time** spent during check-in. (*Table 1*)
- Pre vs. Post-Enhancements per patient (*Table 1*):

	Pre		Post
⏱	56 min	→	37 min ↓
$	$51.40	→	$31.00 ↓

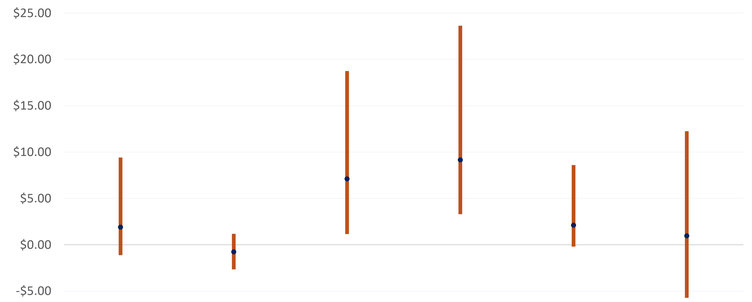
- Time-savings (per patient): 0.7-59 min across clinics
- SA showed time savings from EHR enhancements varied **–11 to +18 minutes**, with cost impacts from **–$4.04 to $72.62** per patient *(Figure 2)*.

Results (Cont'd)

Table 1. Time spent and associated costs on HPV vaccination per patient

Clinical Activity	Average Time Spent (Minute)		Average Cost (2024 US dollars)	
	Baseline	Follow-up	Baseline	Follow-up
Pre-Visit	10.8	8.2	$7.56	$5.67
Check-In	3.1	4.5	$2.01	$2.78
Rooming, vaccination records review and documentation	18.6	8.1	$12.86	$5.75
Vaccine education and recommendation	5.5	2.5	$16.52	$7.37
Vaccine administration	9.5	6.2	$6.46	$4.35
Check-Out	8.6	7.6	$5.98	$5.02
TOTAL	**56.1**	**37.1**	**$51.39**	**$30.94**

Figure 2. Sensitivity analysis of cost saving in six clinical step



	Pre-Visit	Check-In	Rooming, vaccination records review and documentation	Vaccine education and recommendation	Vaccine administration	Check-Out
Best Scenario	$9.21	$0.98	$18.54	$23.43	$8.40	$12.05
Worst Scenario	-$0.92	-$2.45	$1.36	$3.50	$0.00	-$5.52
• Base-Case	$1.89	-$0.77	$7.11	$9.15	$2.11	$0.96

Conclusion

- EHR enhancements improved clinical workflows and saved clinical staff time and cost during clinical vaccination activities.
- Impact of EHR enhancements varied by clinic due to differences in the clinical workflow.

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