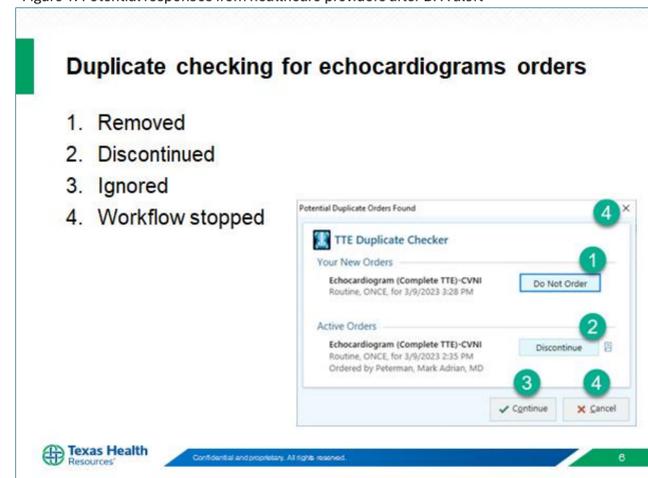


**Background:** The judicious use of diagnostic testing remains an important point of focus among clinicians and the healthcare industry. We investigated whether implementing a change to the look back time for a Best Practice Advisory (BPA) alert reduced repeat transthoracic echocardiograms and healthcare costs and overall patient mortality.

Figure 1: Potential responses from healthcare providers after BPA alert



**Methodology:** We conducted a single center pre and post intervention quality improvement analysis comparing transthoracic echocardiogram (TTE) ordering patterns for patients who received an alert for a duplicate ECHO between the dates of July 15, 2022 and July 12, 2023. Inclusion criteria included persons 18 years or older and patients where a duplicate ECHO was alerted. The BPA changed from a look back of 30 days to 6 months. Healthcare provider responses are noted in Figure 1. Key metrics analyzed included changes in echocardiogram order rates, compliance with BPA recommendations, cost analysis (including echocardiogram and total hospital costs), patient outcomes (mortality rates and length of hospital stay).

# Reducing Transthoracic Echocardiogram Redundancy Through Implementation of an Electronic Medical Record Alert: A Pre- and Post-Intervention Analysis

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## Definitions

**Ignored** – an ECHO was performed for this patient within the look-back period and the provider makes a clinical decision to order a second ECHO.  
**Discontinued** – if there is an existing active order for the patient and the second provider discontinues placing the order for the ECHO.  
**Removed** – an ECHO was performed for this patient within the look-back period and the provider is made aware of this previous ECHO and decides to remove (not order) the ECHO.  
**Workflow Stopped** -This action occurs if at any point during the process of ordering an ECHO, when a previous ECHO had been performed within the look-back period, the provider cancels the order for an ECHO.

Mean costs by pre/post timeframe

|      | ECHO cost | Total Hospital cost |
|------|-----------|---------------------|
| Pre  | 1495.64   | 35100.07            |
| Post | 1326.54   | 47744.93            |

ECHO value \$1000

Mortality rate by timeframe

|      | Alive | Dead | Rate per 1000 |
|------|-------|------|---------------|
| Pre  | 2115  | 142  | 62.92         |
| Post | 5024  | 274  | 46.86         |

Pre time 0/03

Pre timeframe 7/15/2022- 1/10/2023 and Post timeframe 1/11/2023 - 7/15/2023

**Results:** After the change to the BPA alert for previous TTE completed, there was a significant reduction in Length of Stay, ECHO cost and mortality. Although mortality and length of stay can not be solely attributed to the change in alerts. The rate of alert response also saw a significant increase in duplicate echocardiogram orders removed.

Rate of alert response by timeframe

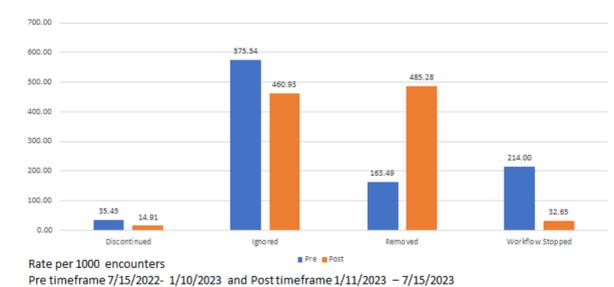
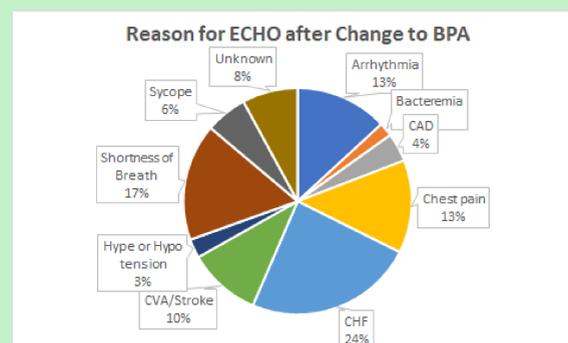
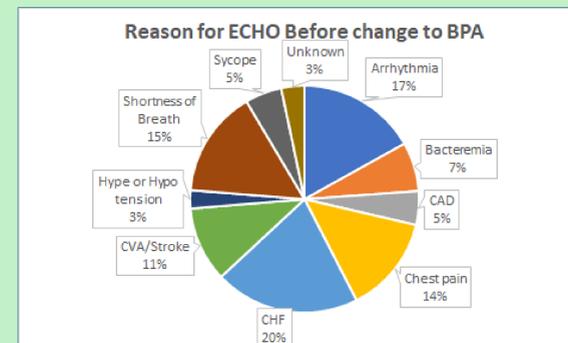


Table 1: Demographic distribution by Pre or Post change in BPA for ECHO

|                            | Pre (n=2468) | Post (n=5087) | p-value |
|----------------------------|--------------|---------------|---------|
| Age (mean)                 | 66.5         | 68.4          | .000    |
| Length of stay (mean)      | 7.61         | 6.71          | .000    |
| Total Hospital Cost (mean) | \$34146.76   | \$51384.00    | .203    |
| Total ECHO costs (mean)    | \$1494.68    | \$1330.27     | .000    |
| <b>Race</b>                |              |               | .609    |
| White                      | 1980         | 4038          |         |
| Black                      | 385          | 798           |         |
| Asian                      | 64           | 148           |         |
| Native American            | 5            | 21            |         |
| Two or More Races          | 24           | 51            |         |
| <b>Ethnicity</b>           |              |               | .966    |
| Hispanic                   | 251          | 517           |         |
| Non-Hispanic               | 2201         | 4533          |         |
| <b>Insurance</b>           |              |               | .000    |
| Private                    | 1047         | 1047          |         |
| Medicare/Medicaid          | 3750         | 3750          |         |
| Self-pay                   | 284          | 284           |         |
| Mortality rate per 1000    | 64.25183     | 55.39419      | .088    |
| <b>ICU</b>                 |              |               | .623    |
| No                         | 2141         | 4392          |         |
| Yes                        | 327          | 695           |         |



**Conclusion:** This study strengthens the current body of literature surrounding appropriate use criteria for echocardiography by offering an effective and simple intervention to reduce duplicative echocardiograms. Increased implementation of BPAs within similar hospital systems may enhance clinical practice and optimize echocardiogram usage, leading to more efficient and effective healthcare delivery. Future research should evaluate patient satisfaction and determine the effectiveness of similar interventions within the outpatient setting.