



Texas Children's Hospital Forecast Tester: How It Can Improve Your Forecaster

Rachel M. Cunningham, MPH

Nathan Bunker

Immunization Project

Texas Children's Hospital



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Objectives

- Understand the current reality and future vision of Immunization Forecasters and testing systems.
- Learn TCH Forecast Tester terminology.
- Observe the TCH Forecast Tester.
- Appreciate how the TCH Forecast Tester can be used to improve forecasting results.

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Current Reality and Future Vision



**Texas Children's
Hospital[®]**

Current Reality

- Lack of national standard for Forecasters
- Forecaster Testing
 - Forecasters may not directly support testing
 - Lack of organizational capacity for testing
- Non-standard Integration
 - Forecaster built directly into IIS or EHR
 - Separate system with custom or proprietary access method

Vision for Future

- **Standardization**
 - Forecaster results are consistent across different systems
- **Accurate**
 - Based on most recent ACIP/CDC recommendations
- **Universally and easily accessible**
 - Standard part of continuity of care

TCH Forecast Tester Terminology

- **Expert** – a forecast tester user who can give opinions on correct forecast results
- **Task Group** – a set of experts that work together to create sets of tests
- **Test Panel** – a collection of test cases
- **Test Case** – a single scenario with expected answers
- **Software** – a forecaster that can evaluate a test case and give an answer
- **Expected Results** – exactly what an expert indicates the results for a specific test case should be
- **Actual Results** – exactly what a Forecast returns for a specific test case

Proposed Solution

- One central system for testing Forecasters
- System with ability to maintain database of:
 - Test cases and expected results from the experts
 - Opinions and notes from experts
 - Actual results from any connected Forecaster
- System with technical ability to:
 - Connect multiple Immunization Forecasters
 - Compare immunization expert guidance/opinions and Actual vs. Expected results within and across different Immunization Forecasters

How Solution Would Realize Vision

- **Standardization**

- Verify if actual results match across Immunization Forecasters from different organizations
- Differences found can point to specific areas that need further clarification

- **Accurate**

- General consensus from all Forecaster Experts Expected Results
- Immunization Forecasters can be both tested and utilized as reference Forecasters

- **Universally accessible**

- Provides opportunity for the development and promotion of a national web service standard for Forecast integration

Current Collaborators

- Texas Children's Hospital
- Indian Health Services (IHS)
- Virginia Department of Health (VDH)
- Massachusetts Immunization Information System (MIIS)
- Scientific Technologies Corporation (STC)
- HLN Consulting, LLC who support the Immunization Calculation Engine (ICE)
- Contra Costa County



TCH Forecast Tester



Registration and Login

Login

Register

Request Password



Texas Children's Hospital
Immunization System

Welcome to the TCH Immunization Forecast System Testing Application. The system has been designed for national cooperation and sharing of immunization forecast test cases and for supporting verification of forecast systems.

- Click Register to request an account.
- You will be emailed your password for access.
- A current TCH Forecast Tester user must add you as an expert to at least one Task Group.
- Once registration is complete, you can login, add and view test cases.
- Option to reset password.

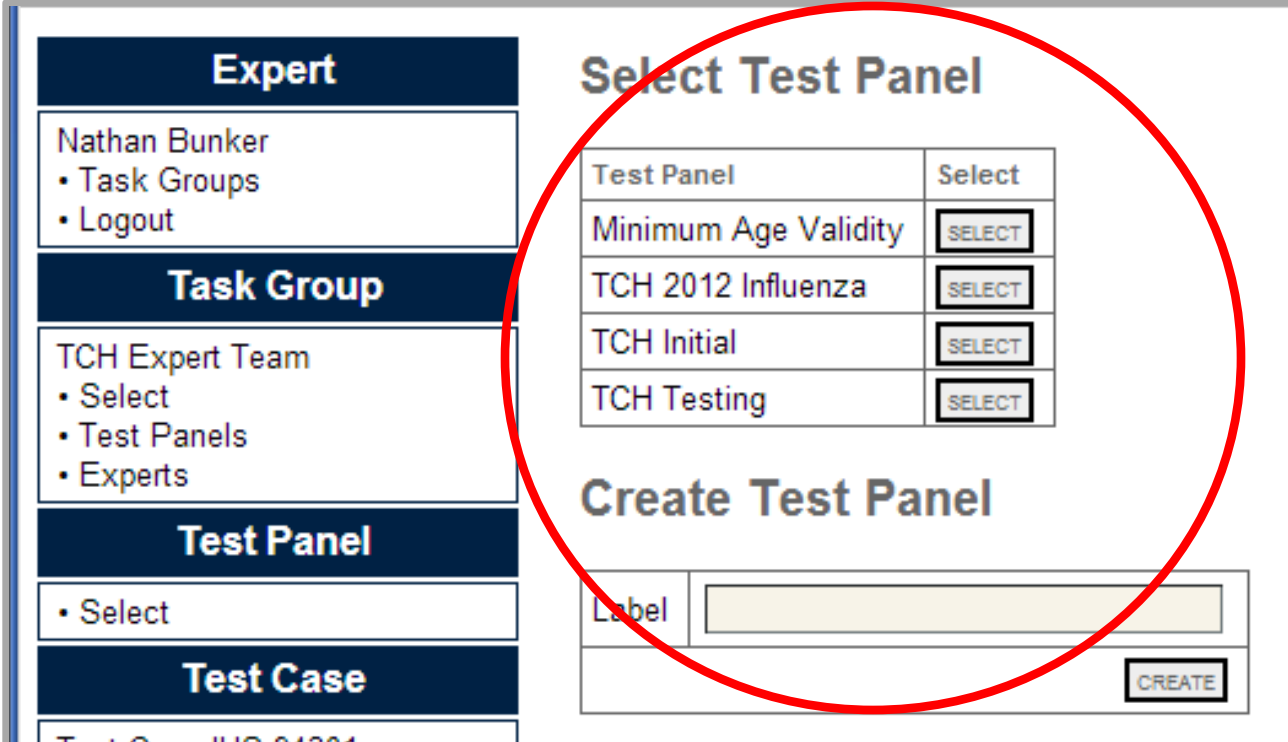
Task Groups

Expert	
Nathan Bunker • Task Groups • Logout	
Task Group	
TCH Expert Team • Select • Test Panels • Experts	
Test Panel	
TCH Initial • Select • Add Test Case • Upload Test Cases	
Test Case	
Test Case IHS-94301	

Task Group	Software	Role	Select
			<input type="button" value="SELECT"/>
Contra Costa Co	TCH Forecaster Validator		<input type="button" value="SELECT"/>
Dev Test	TCH Forecaster Validator	Expert	<input type="button" value="SELECT"/>
ICE User Group	ICE Forecaster	Expert	<input type="button" value="SELECT"/>
IHS Expert Team	TCH Forecast for IHS	Expert	<input type="button" value="SELECT"/>
	TCH Forecaster Validator		<input type="button" value="SELECT"/>
MIIS Expert Team	MIIS Forecaster		<input type="button" value="SELECT"/>
	TCH Forecaster Validator		<input type="button" value="SELECT"/>
STC Expert Team	STC Forecaster	Expert	<input type="button" value="SELECT"/>
STC User Group	STC Forecaster	Expert	<input type="button" value="SELECT"/>
TCH Expert Team	TCH Forecaster Validator	Expert	<input type="button" value="SELECT"/>
VHD Expert Team	TCH Forecaster Validator		<input type="button" value="SELECT"/>

- All task groups are visible to all users.
- Any task group can be selected by any user.
- All test cases within a task groups are visible to all users.
- Only users assigned to a task group can add test cases.

Test Panel



The screenshot shows a web application interface with a sidebar on the left and a main content area on the right. The sidebar has four main sections: 'Expert', 'Task Group', 'Test Panel', and 'Test Case'. The 'Expert' section lists 'Nathan Bunker' with sub-items 'Task Groups' and 'Logout'. The 'Task Group' section lists 'TCH Expert Team' with sub-items 'Select', 'Test Panels', and 'Experts'. The 'Test Panel' section has a sub-item 'Select'. The 'Test Case' section is partially visible at the bottom. The main content area has two sections: 'Select Test Panel' and 'Create Test Panel'. The 'Select Test Panel' section is circled in red and contains a table with four rows: 'Minimum Age Validity', 'TCH 2012 Influenza', 'TCH Initial', and 'TCH Testing'. Each row has a 'Select' button. The 'Create Test Panel' section has a 'Label' input field and a 'CREATE' button.

Expert
Nathan Bunker <ul style="list-style-type: none">Task GroupsLogout
Task Group
TCH Expert Team <ul style="list-style-type: none">SelectTest PanelsExperts
Test Panel
<ul style="list-style-type: none">Select
Test Case

Select Test Panel

Test Panel	Select
Minimum Age Validity	<input type="button" value="SELECT"/>
TCH 2012 Influenza	<input type="button" value="SELECT"/>
TCH Initial	<input type="button" value="SELECT"/>
TCH Testing	<input type="button" value="SELECT"/>

Create Test Panel

Label	<input type="text"/>
<input type="button" value="CREATE"/>	

- Test Cases are organized under Test Panels.
- Users assigned to Task Group can create new Test Panels.

Test Panel

- Test Cases are organized under the Test Panel.
- Test Cases are sorted under a section heading.
- The section heading is defined by the Task Group.

TCH Initial						
3Hib						
Num	Test Case	Description	Patient	Include	Status	Select
62	3 Dose HIB Test 1	The earliest age for administr...	Mallory Ritter	Included	Pass	<input type="button" value="SELECT"/>
64	3 Dose HIB Test 2	HIB administered at 6 weeks an...	Kyra Murphy	Included	Pass	<input type="button" value="SELECT"/>
67	3 Dose HIB Test 3	HIB (Comvax) at 2,4,12 months ...	Drew Riddle	Included	Pass	<input type="button" value="SELECT"/>
70	3 Dose HIB Test 4	Dose 3 of Comvax must be admin...	Fatima Beatty	Included	Pass	<input type="button" value="SELECT"/>
73	3 Dose HIB Test 5	3 Comvax required for series c...	Charlie Drain	Included	Pass	<input type="button" value="SELECT"/>
76	3 Dose HIB Test 6	Less than 4 weeks between dose...	Kameron Summit	Included	Pass	<input type="button" value="SELECT"/>
78	3 Dose HIB Test 7	2 doses of HIB required if fir...	Dakota Timber	Included	Pass	<input type="button" value="SELECT"/>
79	3 Dose HIB Test 8	If first HIB is given at 12-14...	Devon Gardiner	Included	Pass	<input type="button" value="SELECT"/>
81	3 Dose HIB Test 9	If first HIB is administered a...	Eliza Chemult	Included	Pass	<input type="button" value="SELECT"/>
83	3 Dose HIB Test 10	1 dose of any HIB product admi...	Veronica Marcola	Included	Pass	<input type="button" value="SELECT"/>
84	3 Dose HIB Test 11	Hib administered before 6 week...	Amir Warren	Included	Pass	<input type="button" value="SELECT"/>
85	3 Dose HIB Test 12	HIB administered at 6 weeks an...	Ruben Seneca	Included	Pass	<input type="button" value="SELECT"/>

Test Panels Currently Available

- Texas Children's Hospital Test Cases
- Massachusetts Immunization Information System Test Cases
- Clinical Decision Support for Immunizations (CDSi) Test Cases
- Production data replicas

Test Case

- Label and description set by experts
- Name is auto generated
- Birth date and evaluation date are critical
- Events include all immunizations administered

Test Case

Label	3 Dose HIB Test 1
Description	The earliest age for administration of HIB is 6 weeks old. Before that is invalid.
Patient	Mallory Ritter (F)
Birth Date	01/01/2008
Evaluation Date	07/12/2011

Events

Type	Item	CVX	MVX	Date	Age
Vaccination	Hep B, adolescent or pediatric	08		01/01/2008	0 Months
Vaccination	Hib-Hep B	51		02/07/2008	1 Month




EDIT TEST CASE

Test Case

Hib Test Results

Entity	Dose	Valid	Due	Overdue
Expected by TCH Expert Team	1	02/12/2008	03/01/2008	04/01/2008
Actual from TCH Forecaster Validator	1	02/12/2008	03/01/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	1	02/12/2008	03/01/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	COMP	-	-	-

Set Expected Values for Task Group

Dose	<input type="text" value="1"/>
Valid	<input type="text" value="2/12/08"/> 
Due	<input type="text" value="3/1/08"/> 
Overdue	<input type="text" value="4/1/08"/> 
<input type="button" value="SAVE"/>	




- Expected results shown on top
- Actual results shown below
- Any expert can add expected values
- Only Task Group members can set expected results for the Task Group

Test Case Expectations

Hib Test Results

Entity	Dose	Valid	Due	Overdue
Expected by TCH Expert Team	1	02/12/2008	03/01/2008	04/01/2008
Actual from TCH Forecaster Validator	1	02/12/2008	03/01/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	1	02/12/2008	03/01/2008	04/01/2008
Actual from <input type="text"/>	1	03/06/2008	03/06/2008	04/01/2008
Actual from <input type="text"/>	COMP	-	-	-

Set Expected Values for Task Group

Dose	<input type="text" value="1"/>
Valid	<input type="text" value="2/12/08"/> 
Due	<input type="text" value="3/1/08"/> 
Overdue	<input type="text" value="4/1/08"/> 
<input type="button" value="SAVE"/>	

- Expectations for Recommendation:
 - Dose Number
 - Valid Date
 - Due Date
 - Overdue Date
- Expectations for Evaluation:
 - Indirectly tested
 - Future improvement

Expert Comments

Software	Laura King	TCH	11/11/2010	Changed test status to ACC
TCH Forecaster Validator <ul style="list-style-type: none"> • Select • Test Results • Run Tests • Compare Report 	Laura King	TCH	11/11/2010	Changed test status to RES
Software Compare	Laura King	TCH	11/11/2010	Changed test status to FAIL
<ul style="list-style-type: none"> • Select • Original Compare Report 	Laura King	TCH	11/11/2010	Changed test status to FIX
Texas Children's Hospital Immunization Forecast Test System © 2013 Version 2.9	Laura King	TCH	11/11/2010	Changed test status to PASS
	Leila Sahni	TCH	11/19/2010	Valid on Day 42 with no grace period per published MU criteria = 2/12/2008 as is listed for DPT/Polio/PCV/Rotawhy is tetanus not in table? since connected to Diphtheria till higher ages?

Add Comment

Comment	
<input type="button" value="ADD"/>	

- Any Expert can leave a comment
- Comments are universally visible

Software

- Any forecast software application can be selected
- Selecting a different software application changes the Test Case display page to compare expected results against the new target forecaster
- Currently supporting:
 - Texas Children's Hospital Forecaster
 - Massachusetts Immunization Information System Forecaster
 - Scientific Technologies Corporation (STC) Forecaster
 - Immunization Calculation Engine (ICE) Forecaster

Comparing Forecasters

- To run the comparison report the user must select:
 - Test Panel
 - Target forecast software
 - Set of forecast software for comparison
- The results show the Test Cases grouped into these categories:
 1. Same as all others
 2. Same as at least one other
 3. Different than all the others and others don't agree
 4. Different than all others and others have mixed agreement
 5. Different than all others and others agree



Next Steps



Increase Number of Test Cases

- Tester currently supports importing test cases in several formats including the CDSi spreadsheet format
- Number of users is increasing and the number of test cases imported are also increasing
- Planning to add support for importing test cases in HL7's VMR XML format
- Willing to consider adding support for importing test cases in other formats, as needed

Increase Number of Systems

- Currently integrated with 4 forecast systems
- Currently testing and verifying 2 of the integrated forecast systems before allowing them to be publicly visible
- In discussions to integrate an additional 4 forecasters
- Anticipate supporting 6-8 forecasters in the next year
- Planning to add support for comparing vaccination evaluations

Improve Forecaster Integration

- Harmonized standard for requesting a forecast
 - Simple HTTP standard for retrieving a forecast result from any forecaster
 - Semantically compatible with all forecasters integrated with tester
 - Could be adopted as community standard
- Interim universal adaptor for Forecasters
 - Currently in development
 - Open source code for providing a common interface for any Forecaster connected to TCH Forecast Tester
 - Core logic shared with TCH Forecast Tester

Create a National Minimum Standard

TCH Forecast Tester can support the creation of a national minimum standard by:

- Facilitating collaboration between experts with the Forecaster community
- Facilitating and assisting in selection of standard CDSi Test Cases and Test Panels as determined by Forecaster community
- Providing resource to run test cases against Forecasters currently in use
- Possibly include certification process that would require agreement with Basic Test Panel



Thank You!

- Dr. Julie Boom and Laura King, RN, MSN
- CDC Immunization Information Systems Support Branch
- Contra Costa County
- HLN Consulting
- Immunization Calculation Engine
- Indian Health Services
- Massachusetts Immunization Information System
- Scientific Technologies Corporation
- Virginia Department of Health

Nathan Bunker

Nathan.bunker@gmail.com

Rachel Cunningham

rmcunnin@texaschildrens.org

BCM[®]
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Baylor
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Medicine



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Hospital**[®]