ASCEND
HEALTH INFORMATION TECHNOLOGY

Device Interface Overview

Welch Allyn Q-Stress Stress ECG

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Device interface version	7.0
Document version	1

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Introduction

The device interface supports import from the Q-Exchange version 3.6 (Welch Allyn Q-Stress software versions 3.51, 4.0.1, 4.5, 6.1.0, and 6.2.1). It supports Nuclear, Adult Echo and Pediatric Echo knowledge bases version 7.0.

Import scope

- Patient demographics
  - Date of birth (disabled by default)
  - Gender (disabled by default)
  - Age (disabled by default)
  - Height
  - Weight
- Study date and time
- BP at rest, HR at rest
- Indications
- Study protocol (exercise and pharmacological)
- Procedure narrative – Exercise
  - Study protocol
  - Maximal work rate
  - Duration
  - Final stage
- Procedure narrative – Pharmacologic
  - Study protocol
  - Stress agent
- Stress table – Exercise
  Per stage:
  - Stage name
  - Treadmill speed (disabled by default)
  - Treadmill grade (disabled by default)
  - Metabolic rate (disabled by default)
  - Time into phase
  - Heart rate
  - Systolic and diastolic BP
  - Comments
- Stress table – Pharmacologic
  Per stage:
  - Stage name
  - Dose units or infusion rate units*
  - Time into phase (disabled by default)
  - Heart rate
  - Systolic and diastolic BP
  - Comments (changes or symptoms)***
- Stress data heart rate response
  - Max HR achieved
  - Max predicted HR
  - Maximal rate pressure product
- Stress ECG conclusions – Exercise**
  - Exercise time
  - Max ST deviation
  - Duke treadmill angina scale
  - Duke score
  - Duke risk category
- Risk factors (disabled by default)
  - Smoker: yes/no
  - Diabetes: yes/no

* For pharmacological stress studies, import populates the stress table with drug names, units, and stage information. Missing are the rates/doses for each stage. ASCEND implemented a solution to automate the recording of rates/doses instead of prompting users to fill in the rates/doses manually via a configuration in the knowledge base. See the pharmacological stress section below for more details.

** The stress ECG conclusions import from Welch Allyn Q-Stress only for the Bruce exercise

protocol.

*** Comments from multiple trend plots (observations) within a stage are aggregated in the stage and displayed by timestamp. Aggregation excludes the recovery stages because the user can un-filter to display all the recovery stages in the report, if comment aggregation is desired.

Configurable items

ASCEND uses global configuration states to include/exclude specific sections within the device interface.

Pharmacological stress

The Welch Allyn Q-Stress device is not capable of providing meaningful stage labels for pharmacological stress test protocol. There is a limitation in Welch Allyn that results in the system always recording the stress exercise stages in the stress table. The only capability that Welch Allyn allows for pharmacological stress is to let the user record the name of the pharmacological stress test.
The fundamental issue is that Welch Allyn does not allow a Tech to record pharma protocol steps. The Tech can label a study as being pharmacological but cannot document drug dose per stage. Instead, Welch Allyn sends stage data containing exercise protocol data -- including speed and incline grade information -- for pharmacological studies.

Automated workaround

The device interface does not import the speed, incline grade, metabolic rate, and the stress ECG conclusions (Duke scoring information) even if those are exported from the device during a pharmacological stress. These data elements import only in the exercise stress protocol, where they are appropriate. Furthermore, the stress ECG conclusions (Duke scoring information) only imports for the Bruce exercise stress protocol.

Welch Allyn generates the stage names in the stress table as stages 1 though n. ***The device interface replaces them with the drug name generated from the pharmacological stress protocol name, and it populates the stage information and rate/dose units but not the rate/dose value*** for Adenosine, Dipyridamole, Dobutamine, and Regadenoson, respectively. The scope of stage label replacement does not include the rest and recovery stages.

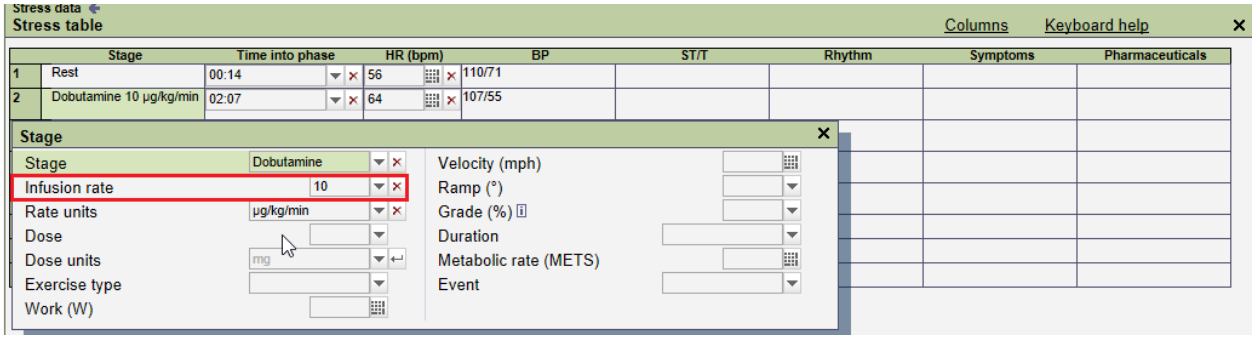
Because Welch Allyn does not support the export of rates/doses for separate stages of a pharmacological stress table, one solution is to prompt users to fill in the rates/doses manually. ASCEND has implemented a mechanism to automate the recording of rates/doses by creating scripts (that get added to the knowledge base via configuration of the latter), to facilitate populating doses into the stress table. E.g., a script would be able to inject the rates/doses 10, 20, 30, and 40 mcg/kg/min to the first four Dobutamine stages in the stress table.

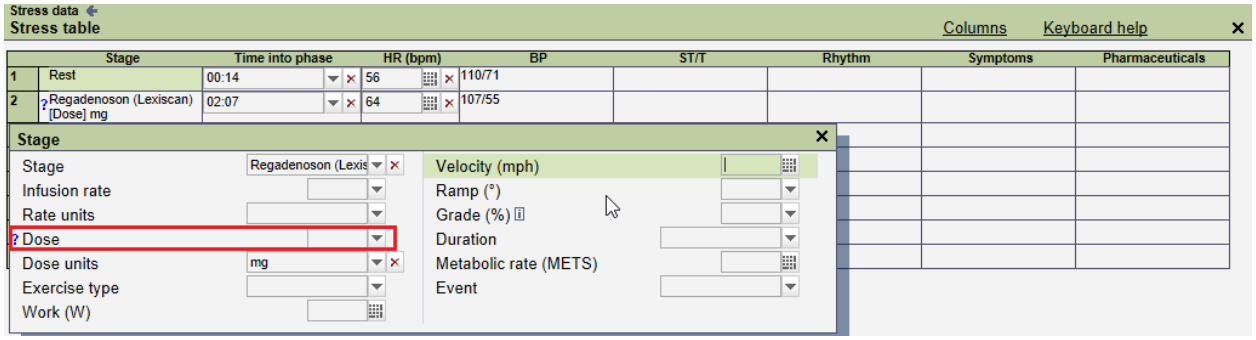
Scripts will not be added to knowledge base, because this is a workaround for a particular device deficiency and general applicability is not in evidence. Scripts will be maintained in configuration documents along with instructions on how to install them:

//Informatics/7.0/trunk/documents/Knowledge base documentation/Nuclear/Nuclear configuration guide.docx

Manual workaround

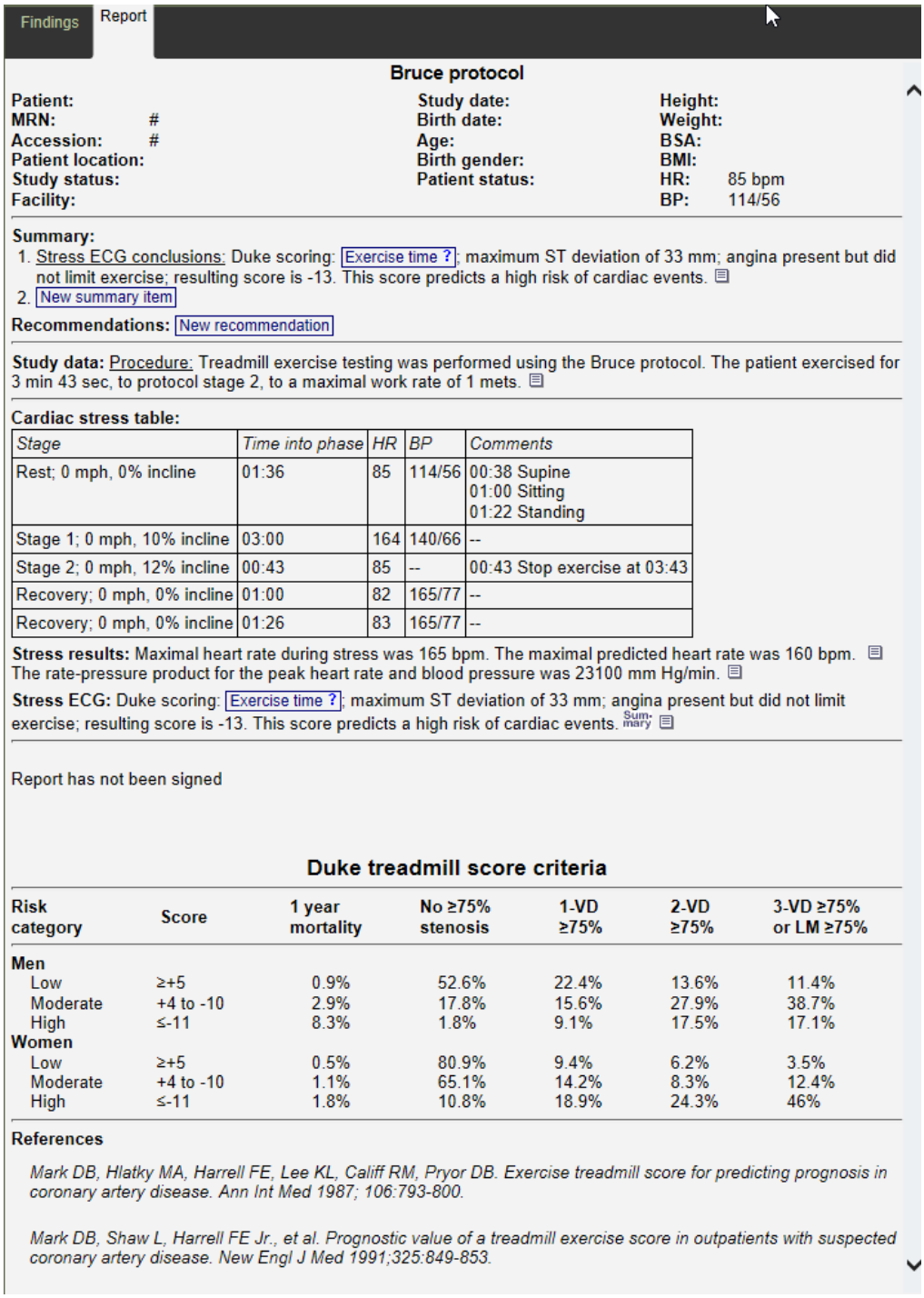
In the absence of scripts that automatically inject the rates/doses to the stress table, the technician can manually record the rate/dose in the ASCEND report, as shown in the examples below for rates or doses.





Representative stress report

A representative stress report, after import into the knowledge base and assuming that nothing is disabled, is provided below.



Findings | Report

Bruce protocol

Patient:
MRN: #
Accession: #
Patient location:
Study status:
Facility:

Study date:
Birth date:
Age:
Birth gender:
Patient status:

Height:
Weight:
BSA:
BMI:
HR: 85 bpm
BP: 114/56

Summary:
1. Stress ECG conclusions: Duke scoring: Exercise time ?; maximum ST deviation of 33 mm; angina present but did not limit exercise; resulting score is -13. This score predicts a high risk of cardiac events.
2. New summary item

Recommendations: New recommendation

Study data: Procedure: Treadmill exercise testing was performed using the Bruce protocol. The patient exercised for 3 min 43 sec, to protocol stage 2, to a maximal work rate of 1 mets.

Cardiac stress table:

Stage	*Time into phase*	*HR*	*BP*	*Comments*
Rest; 0 mph, 0% incline	01:36	85	114/56	00:38 Supine 01:00 Sitting 01:22 Standing
Stage 1; 0 mph, 10% incline	03:00	164	140/66	--
Stage 2; 0 mph, 12% incline	00:43	85	--	00:43 Stop exercise at 03:43
Recovery; 0 mph, 0% incline	01:00	82	165/77	--
Recovery; 0 mph, 0% incline	01:26	83	165/77	--

Stress results: Maximal heart rate during stress was 165 bpm. The maximal predicted heart rate was 160 bpm. The rate-pressure product for the peak heart rate and blood pressure was 23100 mm Hg/min.

Stress ECG: Duke scoring: Exercise time ?; maximum ST deviation of 33 mm; angina present but did not limit exercise; resulting score is -13. This score predicts a high risk of cardiac events. Summary

Report has not been signed

Duke treadmill score criteria

Risk category	Score	1 year mortality	No ≥75% stenosis	1-VD ≥75%	2-VD ≥75%	3-VD ≥75% or LM ≥75%
Men						
Low	≥+5	0.9%	52.6%	22.4%	13.6%	11.4%
Moderate	+4 to -10	2.9%	17.8%	15.6%	27.9%	38.7%
High	≤-11	8.3%	1.8%	9.1%	17.5%	17.1%
Women						
Low	≥+5	0.5%	80.9%	9.4%	6.2%	3.5%
Moderate	+4 to -10	1.1%	65.1%	14.2%	8.3%	12.4%
High	≤-11	1.8%	10.8%	18.9%	24.3%	46%

References

Mark DB, Hlatky MA, Harrell FE, Lee KL, Califf RM, Pryor DB. Exercise treadmill score for predicting prognosis in coronary artery disease. Ann Int Med 1987; 106:793-800.

Mark DB, Shaw L, Harrell FE Jr., et al. Prognostic value of a treadmill exercise score in outpatients with suspected coronary artery disease. New Engl J Med 1991;325:849-853.

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