

# NHSN Hospital Respiratory Data (HRD) Data Processing and Quality Assurance Reference Guide

Version 1

Updated: May 30, 2025

This guide provides detailed information regarding the processing, deduplication, data quality assurance, and aggregation steps applied to data submitted to NHSN's Hospital Respiratory Data (HRD) Module prior to inclusion in downstream internal and external products, including publication to CDC's public-facing webpages and dashboards.

## **HRD Data Submission Pathways**

As of November 1, 2024, all U.S. acute care and critical access hospitals are required to electronically report weekly information about COVID-19, influenza, respiratory syncytial virus (RSV), and hospital bed capacity to CDC's National Healthcare Safety Network (NHSN) in a standardized format and frequency specified by the HHS Secretary under the Centers for Medicare & Medicaid (CMS) Conditions of Participation (CoP). These data are submitted to CDC via NHSN Hospital Respiratory Data (HRD) module, located in the Patient Safety Component (PSC), through either the HRD Daily or the HRD Weekly Pathway. Users may choose which pathway they would like to use to submit their facility's data. Additionally, users may choose to report their facility's data using either the web form entry, CSV upload, or API direct upload.

# Front-End Specifications & Business Rules

Each reporting pathway and submission method requires certain NHSN front-end specifications be met when submitting and saving data, including specified data element formats, valid value ranges and response options, and business rules. Business rules are specified checks applied upon submission that flag and/or reject illogical data (e.g., reporting a greater number of adult inpatient beds than total inpatient beds) from being saved. The table below provides the list of data elements for which business rules are applied.

#### **Business Rules**

Data Element	ID	Business Rule(s)	
Column Name			
numInPtBeds	2a	Must be >= 2b. numInPtBedsAdult + 2c. numInPtBedsPed	
Hullillirtbeus	Zd	Must be >= 3a. numInPtBedsOcc	
numInPtBedsAdult	2b	Must be <= 2a. numInPtBeds	
HullilletbeusAuult	20	Must be >= 3b. numInPtBedsOccAdult	
numInPtBedsPed	2c	Must be >= 5a. numlCUBedsOcc (where 5a. numlCUBedsOcc does not equal 9999) AND	
Hullilletbeusreu	20	Must be >= (3b. numInPtBedsOccAdult + 3c. numInPtBedsOccPed)	
numInPtBedsOcc 3a		Must be >= 5a. numlCUBedsOcc (where 5a. numlCUBedsOcc does not equal 9999) AND	
		Must be >= (3b. numInPtBedsOccAdult + 3c. numInPtBedsOccPed)	





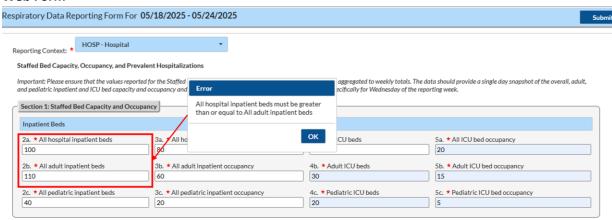
numInPtBedsOccAdult	3b	Must be <= 3a. numInPtBedsOcc AND
		Must be >= 5b. numICUBedsOccAdult (where 5b. numICUBedsOccAdult does not equal
		9999)
numInPtBedsOccPed	3c	Must be <= 3a. numInPtBedsOcc AND
		Must be >= 5c. numlCUBedsOccPed (where 5c. numlCUBedsOccPed does not equal
		9999)
numICUBeds	4a	If not equal to 9999:
		Must be <= 2a. numInPtBeds AND
		Must be >= 4b. numICUBedsAdult (where 4b. numICUBedsAdult does NOT equal 9999) +
		4c. numICUBedsPed (where 4c. numICUBedsPed does NOT equal 9999)]) AND
		Must be >= 5a. numICUBedsOcc
numICUBedsAdult	4b	Must be 9999 if 4a. numICUBeds equals 9999
		If not equal to 9999:
		Must be <= 4a. numICUBeds AND
		Must be >= 5b. numICUBedsOccAdult
numICUBedsPed	4c	Must be 9999 if 4a. numICUBeds equals 9999
		If not equal to 9999:
		Must be <= 4a. numICUBeds AND
		Must be >= 5c. numICUBedsOccPed
numlCUBedsOcc 5a Must be 9999 if 4a. numlCUBeds equals 9999		·
		If not equal to 9999:
		Must be <= 3a. numInPtBedsOcc AND
		Must be >= 5b. numICUBedsOccAdult (where 5b. numICUBedsOccAdult does NOT equal
		9999) + 5c. numlCUBedsOccPed (where 5c. numlCUBedsOccPed does NOT equal 9999)
numICUBedsOccAdult	5b	Must be 9999 if 4a. numICUBeds equals 9999 OR if 4b. numICUBedsAdult equals 9999
		If not equal to 9999:
		Must be <= 5a. numICUBedsOcc
numICUBedsOccPed	5c	Must be 9999 if 4a. numICUBeds equals 9999 OR if 4c. numICUBedsPed equals 9999
		If not equal to 9999:
		Must be <= 5a. numICUBedsOcc
numConfC19ICUPatsAdult	9a	Must be <= 6a. numConfC19HospPatsAdult
numConfC19ICUPatsPed	9b	Must be <= 6b. numConfC19HospPatsPed
numConfFluICUPatsAdult	10a	Must be <= 7a. numConfFluHospPatsAdult
numConfFluICUPatsPed	10b	Must be <= 7b. numConfFluHospPatsPed
num ConfRSVICUP ats Adult	11a	Must be <= 8a. numConfRSVHospPatsAdult
numConfRSVICUPatsPed	11b	Must be <= 8b. numConfRSVHospPatsPed

When a user attempts to submit a record that fails one or more of these business rules, the submission will be rejected, and the user will receive a notification of the error. When submitting data via the web form, this notification will appear as a pop-up message with errors listed. When submitting data via CSV upload, this notification will appear as both a pop-up message and notification of errors will be sent to the email address associated with the submitting user's NHSN account. When submitting data via API upload, notification of errors will be sent to the email address associated with the System Account in SAMS. All errors must be fixed before the record can be successfully submitted and saved. Examples of these error notifications are provided below.

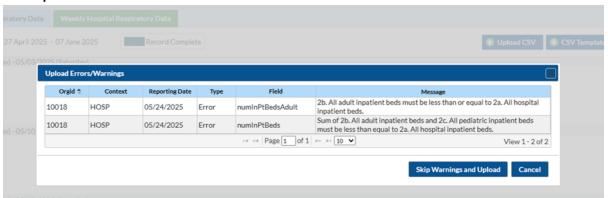




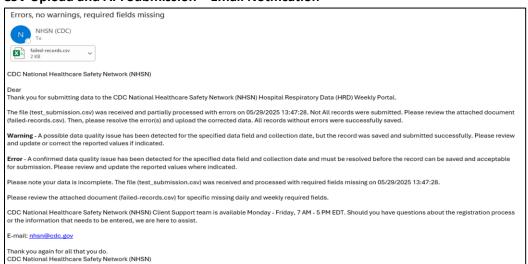
#### **Web Form**



#### **CSV Upload**



#### **CSV Upload and API Submission – Email Notification**







For a full list of data upload and reporting specifications, please review the HRD Daily and Weekly Reporting Tables of Instructions and Import File Specifications documentation found here, under *Data Collection Forms and Instructions*: <a href="https://www.cdc.gov/nhsn/psc/hospital-respiratory-reporting.html">https://www.cdc.gov/nhsn/psc/hospital-respiratory-reporting.html</a>, along with the full HRD Protocol.

As such, the sections that follow in this reference guide outline additional data processing steps that are performed and applied after data are successfully submitted to the HRD Daily or Weekly Pathways, meaning all reporting specifications and business rules have been met.

## **Deduplication of Records**

While NHSN users can upload more than one record for a single facility for a specific date (HRD Daily Pathway) or reporting week (HRD Weekly Pathway), our downstream timeseries datasets used for reporting and analytics only include one record per facility per reporting week (or date).

Therefore, our data processing includes a de-deduplication step within each reporting pathway where a single record is chosen based on the completeness of the record for CMS enforcement purposes. If more than one record is considered equal based on these criteria, then the record submitted most recently will be retained.

# Logic Checks

Suppression is applied to the deduplicated data in both the Daily and Weekly data pipelines for values that fail specified logic checks for priority data elements. While many of these checks are addressed at submission through the applied business rules described above, this step ensures any logically implausible data are removed from final aggregate metrics used for reporting, analytics, and public dissemination. The tables below provide the list of logic checks applied to both the Daily and Weekly data pipelines:

#### **Daily Pathway Logic Checks**

Logic Check Type	Impacted Fields (The fields listed will be converted to null if ANY of the logic check conditions in the column on the right are met)	Data Quality Checks
Inpatient	numInPtBeds	(numInPtBedsAdult + numInPtBedsPed) > numInPtBeds
Beds	numInPtBedsAdult	(numInPtBedsOccAdult + numInPtBedsOccPed) > numInPtBedsOcc
	numInPtBedsPed	(numConfC19HospPatsAdult + numConfC19HospPatsPed) > numInPtBedsOcc
	numInPtBedsOcc	(numConfFluHospPatsAdult + numConfFluHospPatsPed) > numInPtBedsOcc
	numInPtBedsOccAdult	(numConfRSVHospPatsAdult + numConfRSVHospPatsPed) > numInPtBedsOcc
	numInPtBedsOccPed	numInPtBeds is > 20 AND
	numConfFluHospPatsAdult	(numInPtBedsOcc/numInPtBeds) > 1.1
	numConfFluHospPatsPed	numInPtBeds <= 20 AND





Logic	Impacted Fields	
Check	(The fields listed will be converted to null if	
	ANY of the logic check conditions in the	
Туре	column on the right are met)	Data Quality Checks
	numConfC19HospPatsAdult	numInPtBedsOcc – numInPtBeds > 2
	numConfC19HospPatsPed	(numConfC19HospPatsAdult is null AND numConfC19HospPatsPed is null) OR
	numConfRSVHospPatsAdult	(numConfFluHospPatsAdult is null AND numConfFluHospPatsPed is null) OR
	numConfRSVHospPatsPed	(numConfRSVHospPatsAdult is null AND numConfRSVHospPatsPed is null) OR
		numInPtBeds is null OR
		numInPtBedsOcc is null
ICU Beds	numICUBeds	(numICUBedsAdult + numICUBedsPed) > numICUBeds
	numICUBedsAdult	(numICUBedsOccAdult + numICUBedsOccPed) > numICUBedsOcc
	numICUBedsPed	(numConfC19ICUPatsAdult + numConfC19ICUPatsPed) > numICUBedsOcc
	numICUBedsOcc	(numConfFluICUPatsAdult + numConfFluICUPatsPed) > numICUBedsOcc
	numICUBedsOccAdult	(numConfRSVICUPatsAdult + numConfRSVICUPatsPed) > numICUBedsOcc
	numICUBedsOccPed	numlCUBeds is > 20 AND
	numConfC19ICUPatsAdult	(numlCUBedsOcc/numlCUBeds) > 1.1
	numConfC19ICUPatsPed	numlCUBeds <= 20 AND
	numConfFluICUPatsAdult	numlCUBedsOcc – numlCUBeds > 2
	numConfFluICUPatsPed	(numConfC19ICUPatsAdult is null AND numConfC19ICUPatsPed is null) OR
	numConfRSVICUPatsAdult	(numConfFluICUPatsAdult is null AND numConfFluICUPatsPed is null) OR
	numConfRSVICUPatsPed	(numConfRSVICUPatsAdult is null AND numConfRSVICUPatsPed is null) OR
		numlCUBeds is null OR
		numlCUBedsOcc is null
COVID-19	numConfC19HospPatsPed	(If numConfC19NewAdmPed0to4 OR
Pediatric	numConfC19NewAdmPed0to4	numConfC19NewAdmPed5to17 is not null) AND
Admissions	numConfC19NewAdmPed5to17	(numConfC19HospPatsPed is not null)
and		AND
Hospitalized		(numConfC19HospPatsPed > 20 AND
Patients		(numConfC19NewAdmPed0to4 + numConfC19NewAdmPed5to17)
		/numConfC19HospPatsPed >1.1)
		(If numConfC19NewAdmPed0to4 OR numConfC19NewAdmPed5to17 is not
		null) AND (numConfC19HospPatsPed is not null)
		AND
		(numConfC19HospPatsPed <= 20 AND
		(numConfC19NewAdmPed0to4 + numConfC19NewAdmPed5to17) -
		numConfC19HospPatsPed > 2)
COVID-19	numConfC19HospPatsAdult	(IF numConfC19NewAdmAdult18to49 OR
Adult	numConfC19NewAdmAdult18to49	numConfC19NewAdmAdult50to64 OR
Admissions	numConfC19NewAdmAdult50to64	numConfC19NewAdmAdult65to74 OR
and	numConfC19NewAdmAdult65to74	numConfC19NewAdmAdult75plus is not null) AND
Hospitalized	numConfC19NewAdmAdult75plus	(numConfC19HospPatsAdult is not null)
Patients		AND
		(numConfC19HospPatsAdult > 20 AND
		(numConfC19NewAdmAdult18to49 +numConfC19NewAdmAdult50to64 +
		numConfC19NewAdmAdult65to74 + numConfC19NewAdmAdult75plus)
		/numConfC19HospPatsAdult >1.1)
		(IF numConfC19NewAdmAdult18to49 is not null OR
		numConfC19NewAdmAdult50to64 is not null OR
		numConfC19NewAdmAdult65to74 is not null OR





Logic	Impacted Fields	
Check	(The fields listed will be converted to null if	
	ANY of the logic check conditions in the	Data Quality Chacks
Туре	column on the right are met)	Data Quality Checks
		numConfC19NewAdmAdult75plus is not null) AND
		numConfC19HospPatsAdult is not null) AND
		(numConfC19HospPatsAdult <= 20 AND
		(numConfC19NewAdmAdult18to49 +numConfC19NewAdmAdult50to64 +
		numConfC19NewAdmAdult65to74 +numConfC19NewAdmAdult75plus) -
		numConfC19HospPatsAdult > 2)
Flu Pediatric	numConfFluHospPatsPed	(IF numConfFluNewAdmPed0to4 is not null OR
Admissions	numConfFluNewAdmPed0to4	numConfFluNewAdmPed5to17 is not null) AND
and	numConfFluNewAdmPed5to17	(numConfFluHospPatsPed is not null)
Hospitalized		AND
Patients		(numConfFluHospPatsPed > 20 and
		(numConfFluNewAdmPed0to4 + numConfFluNewAdmPed5to17)
		/numConfFluHospPatsPed >1.1)
		(IF numConfFluNewAdmPed0to4 is not null OR
		numConfFluNewAdmPed5to17 is not null) AND
		(numConfFluHospPatsPed is not null)
		AND
		(numConfFluHospPatsPed <= 20 AND
		(numConfFluNewAdmPed0to4 + numConfFluNewAdmPed5to17) -
		numConfFluHospPatsPed > 2)
Flu Adult	numConfFluHospPatsAdult	(IF numConfFluNewAdmAdult18to49 is not null OR
Admissions	numConfFluNewAdmAdult18to49	numConfFluNewAdmAdult50to64 is not null OR
and	numConfFluNewAdmAdult50to64	numConfFluNewAdmAdult65to74 is not null OR
Hospitalized	numConfFluNewAdmAdult65to74	numConfFluNewAdmAdult75plus is not null) AND
Patients	numConfFluNewAdmAdult75plus	(numConfFluHospPatsAdult is not null)
		AND
		/numConfflulloonDateAdult > 20 AND
		(numConfFluHospPatsAdult > 20 AND (numConfFluNewAdmAdult18to49 + numConfFluNewAdmAdult50to64 +
		numConfFluNewAdmAdult65to74 + numConfFluNewAdmAdult75plus)
		/numConfFluHospPatsAdult >1.1)
		(IF numConfFluNewAdmAdult18to49 is not null OR
		numConfFluNewAdmAdult50to64 is not null OR
		numConfFluNewAdmAdult65to74 is not null OR
		numConfFluNewAdmAdult75plus is not null) AND
		(numConfFluHospPatsAdult is not null)
		AND
		(numConfFluHospPatsAdult <= 20 AND
		(numConfFluNewAdmAdult18to49 + numConfFluNewAdmAdult50to64 +
		numConfFluNewAdmAdult65to74 + numConfFluNewAdmAdult75plus) -
		numConfFluHospPatsAdult > 2)
RSV Pediatric	numConfRSVHospPatsPed	(IF numConfRSVNewAdmPed0to4 is not null OR
Admissions	numConfRSVNewAdmPed0to4	numConfRSVNewAdmPed5to17 is not null) AND
		1





Logic	Impacted Fields	
Check	(The fields listed will be converted to null if	
	ANY of the logic check conditions in the	Rote Quality Charles
Туре	column on the right are met)	Data Quality Checks
Hospitalized		AND
Patients		(numConfRSVHospPatsPed > 20 AND
		(numConfRSVNewAdmPed0to4 + numConfRSVNewAdmPed5to17)
		/numConfRSVHospPatsPed >1.1)
		(IF numConfRSVNewAdmPed0to4 is not null OR
		numConfRSVNewAdmPed5to17 is not null) AND
		(numConfRSVHospPatsPed is not null)
		AND
		(numConfRSVHospPatsPed <= 20 AND
		(numConfRSVNewAdmPed0to4 + numConfRSVNewAdmPed5to17) -
		numConfRSVHospPatsPed > 2)
RSV Adult	numConfRSVHospPatsAdult	(IF numConfRSVNewAdmAdult18to49 is not null OR
Admissions	numConfRSVNewAdmAdult18to49	numConfRSVNewAdmAdult50to64 is not null OR
and	numConfRSVNewAdmAdult50to64	numConfRSVNewAdmAdult65to74 is not null OR
Hospitalized	numConfRSVNewAdmAdult65to74	numConfRSVNewAdmAdult75plus is not null) AND
Patients	numConfRSVNewAdmAdult75plus	(numConfRSVHospPatsAdult is not null)
		AND
		(numConfRSVHospPatsAdult > 20 and
		(numConfRSVNewAdmAdult18to49 + numConfRSVNewAdmAdult50to64 +
		numConfRSVNewAdmAdult65to74 + numConfRSVNewAdmAdult75plus)
		/numConfRSVHospPatsAdult >1.1)
		(IF numConfRSVNewAdmAdult18to49 is not null OR
		numConfRSVNewAdmAdult50to64 is not null OR
		numConfRSVNewAdmAdult65to74 is not null OR
		numConfRSVNewAdmAdult75plus is not null) AND
		(numConfRSVHospPatsAdult is not null)
		AND
		(numConfRSVHospPatsAdult <= 20 AND
		(numConfRSVNewAdmAdult18to49 +numConfRSVNewAdmAdult50to64 +
		numConfRSVNewAdmAdult65to74 +numConfRSVNewAdmAdult75plus) -
		numConfRSVHospPatsAdult > 2)

#### **Weekly Pathway Logic Checks**

Logic Check Type	Impacted Fields (The fields listed will be converted to null if ANY of the logic check conditions in the column on the right are met)	Data Quality Checks
Inpatient	numInPtBeds	(numInPtBedsAdult + numInPtBedsPed) > numInPtBeds
Beds	numInPtBedsAdult	(numInPtBedsOccAdult + numInPtBedsOccPed) > numInPtBedsOcc
	numInPtBedsPed	(numConfC19HospPatsAdult + numConfC19HospPatsPed) > numInPtBedsOcc
	numInPtBedsOcc	(numConfFluHospPatsAdult + numConfFluHospPatsPed) > numInPtBedsOcc
	numInPtBedsOccAdult	(numConfRSVHospPatsAdult + numConfRSVHospPatsPed) > numInPtBedsOcc
	numInPtBedsOccPed	numInPtBeds is > 20 AND
	numConfFluHospPatsAdult numConfFluHospPatsPed	(numInPtBedsOcc/numInPtBeds) > 1.1
		numInPtBeds <= 20 AND





Logic Check Type	Impacted Fields (The fields listed will be converted to null if ANY of the logic check conditions in the column on the right are met)	Data Quality Checks
	numConfC19HospPatsAdult numConfC19HospPatsPed numConfRSVHospPatsAdult numConfRSVHospPatsPed	numInPtBedsOcc – numInPtBeds > 2  (numConfC19HospPatsAdult is null AND numConfC19HospPatsPed is null) OR (numConfFluHospPatsAdult is null AND numConfFluHospPatsPed is null) OR (numConfRSVHospPatsAdult is null AND numConfRSVHospPatsPed is null) OR numInPtBeds is null OR numInPtBedsOcc is null
ICU Beds	numICUBeds numICUBedsAdult numICUBedsPed numICUBedsOcc numICUBedsOccAdult numICUBedsOccPed numConfC19ICUPatsAdult numConfC19ICUPatsPed numConfFluICUPatsAdult numConfFlvICUPatsAdult numConfFlvICUPatsPed numConfRSVICUPatsPed	(numlCUBedsAdult + numlCUBedsPed) > numlCUBeds (numlCUBedsOccAdult + numlCUBedsOccPed) > numlCUBedsOcc (numConfC19lCUPatsAdult + numConfC19lCUPatsPed) > numlCUBedsOcc (numConfFlulCUPatsAdult + numConfFlulCUPatsPed) > numlCUBedsOcc (numConfRSVICUPatsAdult + numConfRSVICUPatsPed) > numlCUBedsOcc numlCUBeds is > 20 AND (numlCUBedsOcc/numlCUBeds) > 1.1 numlCUBeds <= 20 AND numlCUBedsOcc - numlCUBeds > 2 (numConfC19lCUPatsAdult is null AND numConfC19lCUPatsPed is null) OR (numConfFlulCUPatsAdult is null AND numConfFlulCUPatsPed is null) OR (numConfRSVICUPatsAdult is null AND numConfRSVICUPatsPed is null) OR numlCUBeds is null OR numlCUBedsOcc is null





## Reconciliation of Valid/Complete Data to Weekly Pathway

NHSN users may choose to submit data via **either** a weekly reporting pathway OR a daily reporting pathway to satisfy requirements for submission of Hospital Respiratory Data for CMS CoP. Data submitted to the weekly pathway represent two types of information:

- 1. **Single-day snapshot data elements:** the 24 data elements within the reporting form sections for *Bed Capacity and Occupancy and Prevalent Hospitalizations* are required to be reported as **single day snapshots** (specifically, Wednesday) of the reporting week.
- 2. **Weekly total data elements:** the 21 data elements within the reporting form sections for *New Admissions* are required to be reported to account for aggregated data for the entire reporting week (specifically, Sunday-Saturday).

<u>Complete</u> daily data (meaning non-null values reported for all 45 required data elements) submitted for a given reporting week (Sunday – Saturday) to the Daily HRD pathway will be reconciled with data submitted via the Weekly HRD pathway. Values reported for the Wednesday during the reporting period will be retained for the 24 *Bed Capacity and Occupancy and Prevalent Hospitalizations* data elements, while weekly aggregate totals will be calculated for the 21 *New Admissions* data elements by summing the values reported each day of the reporting week.

Data reported to the Daily HRD pathway will only be carried over to the Weekly HRD pathway if **complete** data were reported for all required fields each day in the reporting period (for *New Admissions*) and on Wednesday (for *Bed Capacity and Occupancy and Prevalent Hospitalizations*).

<u>Note:</u> This data reconciliation step occurs AFTER deduplication of the Daily HRD data and application of the logic checks outlined above to the Daily HRD data. Therefore, invalid daily data that fail the data quality logic checks will be treated as missing in this step and, thus, will not be carried over to the Weekly HRD pathway.

## Aggregate Data Pipeline

Reconciled, de-duplicated weekly hospital respiratory data with logic checks applied are ingested into the 1 CDC Data Platform (1CDP), a Palantir Foundry platform, for further transformation and aggregation prior to analytics, reporting, and public release.

Weekly hospital level data are first aggregated to the NHSN Facility ID level, aggregating data reported across multiple contexts for a single hospital. Exclusion criteria are then applied to remove hospitals that do not meet the following criteria:

- facType (NHSN Facility Type) = {HOSP-GEN, HOSP-CAH, HOSP-LTAC, HOSP-SURG, HOSP-CHLD, HOSP-ORTHO, HOSP-ONC, HOSP-WOM, HOSP-WOMCHILD, HOSP-VA, HOSP-MIL}
  - Note: These facility types represent hospitals that are required to report weekly hospital respiratory under the CMS CoP as well as federal hospitals
- facStatus (NHSN Facility Status) = 'A'





 Note: A facility status of 'A' indicates that the hospital currently has an Active registration with NHSN

## **Additional Resources**

- CDC'S NHSN Hospital Respiratory Data
- Hospital Respiratory Data Weekly Reporting Form
- Hospital Respiratory Data Table of Instructions
- Hospital Respiratory Data Daily Reporting Form
- Hospital Respiratory Data Table of Instructions

