Introduction to the OHDSI DataQualityDashboard

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What is data quality?

The state of completeness, validity, consistency, timeliness and accuracy that makes data appropriate for a specific use.

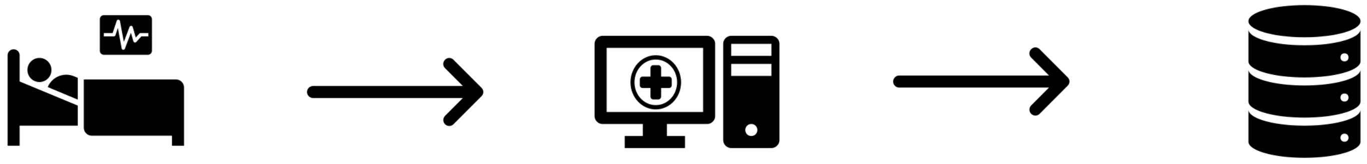
- *The Book of OHDSI*

Roebuck, Kevin. 2012. *Data Quality: High-Impact Strategies-What You Need to Know: Definitions, Adoptions, Impact, Benefits, Maturity, Vendors*. Emereo Publishing.

What is data quality?

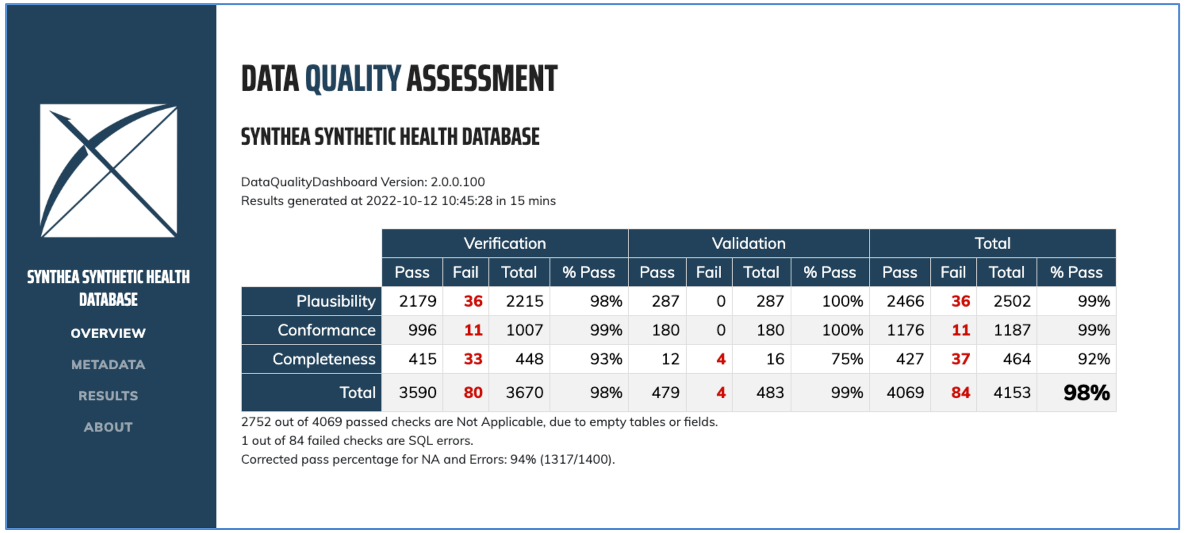
Inherent quality of the **original source data**

Quality of the **OMOP CDM**



DataQualityDashboard

- R package
- Part of the HADES suite
- 26 data quality check types --> over 4,000 individual data quality checks
- Results exported to json, csv, or database table, and can be explored in an R Shiny application



DATA QUALITY ASSESSMENT

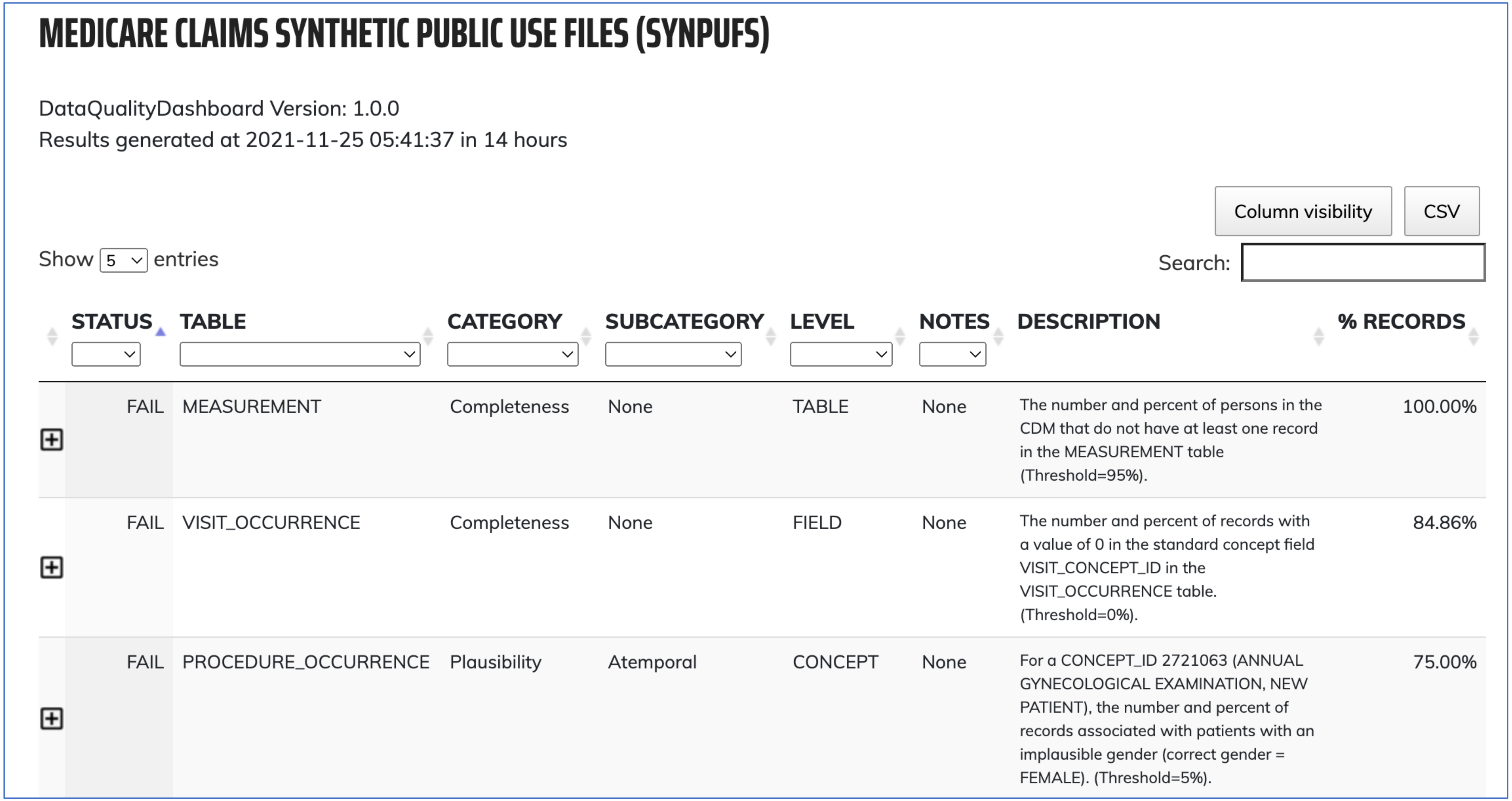
SYNTHEA SYNTHETIC HEALTH DATABASE

DataQualityDashboard Version: 2.0.0.100
Results generated at 2022-10-12 10:45:28 in 15 mins

	Verification				Validation				Total			
	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass	Pass	Fail	Total	% Pass
Plausibility	2179	**36**	2215	98%	287	0	287	100%	2466	**36**	2502	99%
Conformance	996	**11**	1007	99%	180	0	180	100%	1176	**11**	1187	99%
Completeness	415	**33**	448	93%	12	**4**	16	75%	427	**37**	464	92%
Total	3590	**80**	3670	98%	479	**4**	483	99%	4069	**84**	4153	**98%**

2752 out of 4069 passed checks are Not Applicable, due to empty tables or fields.
1 out of 84 failed checks are SQL errors.
Corrected pass percentage for NA and Errors: 94% (1317/1400).

DataQualityDashboard



MEDICARE CLAIMS SYNTHETIC PUBLIC USE FILES (SYNPUFS)

DataQualityDashboard Version: 1.0.0
Results generated at 2021-11-25 05:41:37 in 14 hours

Show 5 entries

	STATUS	TABLE	CATEGORY	SUBCATEGORY	LEVEL	NOTES	DESCRIPTION	% RECORDS
⊞	FAIL	MEASUREMENT	Completeness	None	TABLE	None	The number and percent of persons in the CDM that do not have at least one record in the MEASUREMENT table (Threshold=95%).	100.00%
⊞	FAIL	VISIT_OCCURRENCE	Completeness	None	FIELD	None	The number and percent of records with a value of 0 in the standard concept field VISIT_CONCEPT_ID in the VISIT_OCCURRENCE table. (Threshold=0%).	84.86%
⊞	FAIL	PROCEDURE_OCCURRENCE	Plausibility	Atemporal	CONCEPT	None	For a CONCEPT_ID 2721063 (ANNUAL GYNECOLOGICAL EXAMINATION, NEW PATIENT), the number and percent of records associated with patients with an implausible gender (correct gender = FEMALE). (Threshold=5%).	75.00%

Data quality check definition

An aggregated summary statistic that can be computed against a dataset and to which a decision threshold can be applied to determine if the statistic meets expectations.

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

Data quality check example

The number and percent of records with a value in the DAYS_SUPPLY field of the DRUG_EXPOSURE table less than 0.

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

Data quality check example

The number and percent of records with a value in the CDM field of the CDM table less than a low value.

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

Data quality check example

The number and percent of records which are not mapped into a standard concept in the CONDITION_CONCEPT_ID field of the CONDITION_OCCURRENCE table.

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

Data quality check example

The number and percent of records which are not mapped into a standard concept in the CDM field of the CDM table.

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

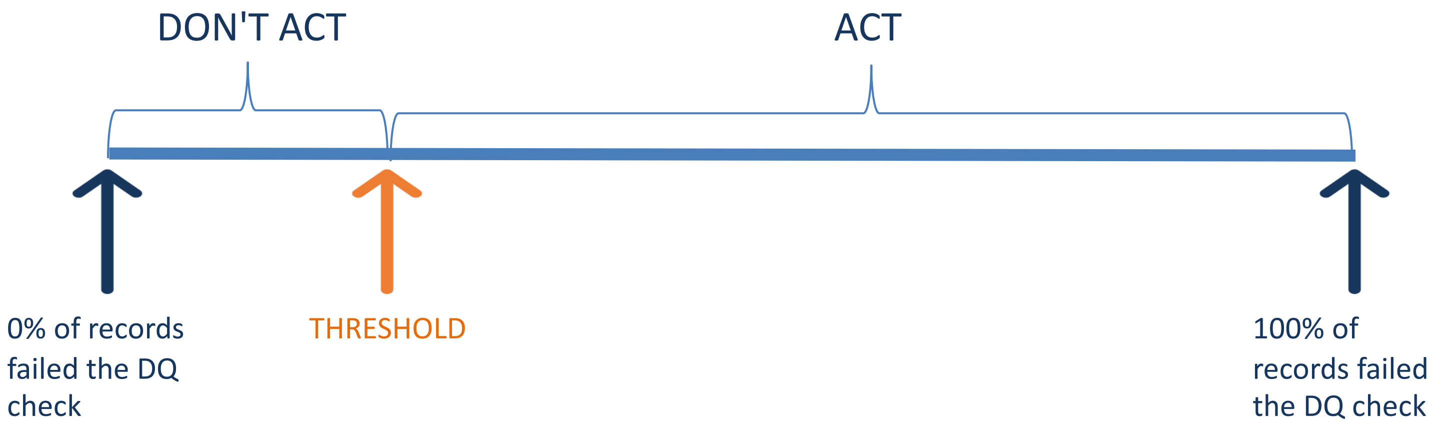
Data quality check types

Check Type	Check Description
Person Completeness	The number and percent of persons in a database that do not have a least one record in the *CDM table.*
Is Required	The number and percent of records with a NULL value in a *CDM field* of a *CDM table* that is considered not nullable.
Is Foreign Key	The number and percent of records that have a value in a foreign key *CDM field* of a *CDM table* that does not exist in the *foreign key table.*
Is Standard Valid Concept	The number and percent of records that do not have a standard, valid concept in the *CDM field* of a *CDM table.*
Plausible Temporal After	The number and percent of records with a value in a *CDM field* of a *CDM table* that occurs prior to a *plausible date.*
	…
Plausible Value Low	For a given *CONCEPT_ID* and *UNIT_CONCEPT_ID* pair, the number and percent of records with a value lower than the *plausible low value.*
Plausible Gender	For a given *CONCEPT_ID*, the number and percent of records associated with persons with an *implausible gender.*

Blacketer, Clair and Williams, Andrew. 2019. *Data Quality*. https://www.ohdsi.org/wp-content/uploads/2019/09/2-Plenary-1-OMOP-DQ-Clair-Andrew.pdf

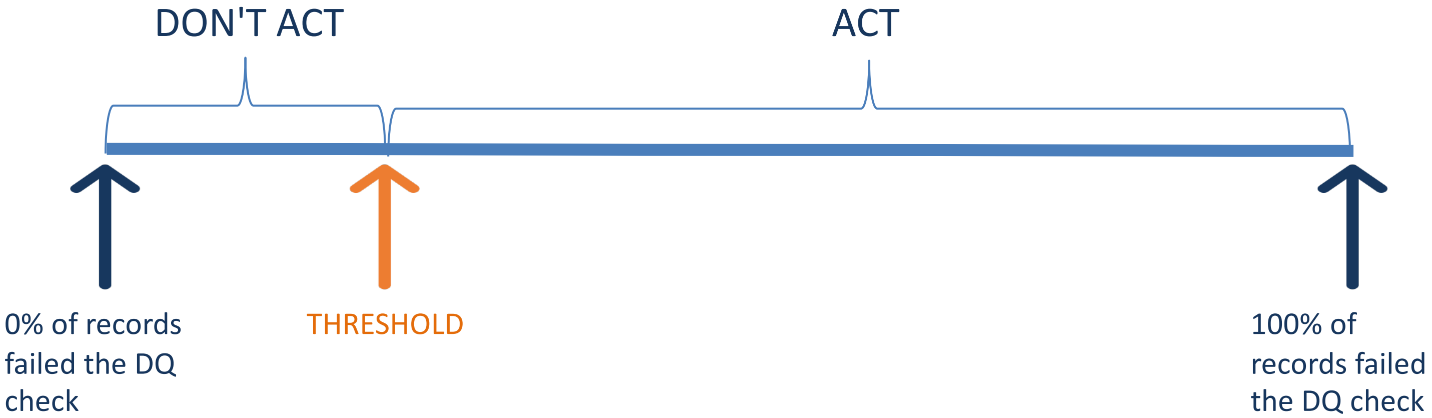
Data quality check thresholds

An aggregated summary statistic that can be computed against a dataset and to which a **decision threshold** can be applied to **determine if the statistic meets expectations**.


DON'T ACT
ACT
0% of records failed the DQ check
THRESHOLD
100% of records failed the DQ check

Data quality check thresholds

- Fatal checks: Threshold is always 0 💀
- CDM convention checks: Threshold should be 0 in theory, but may need to be adjusted in practice
- Characterization checks: Threshold depends on expectations of the data source*



DON'T ACT

ACT

0% of records failed the DQ check

THRESHOLD

100% of records failed the DQ check

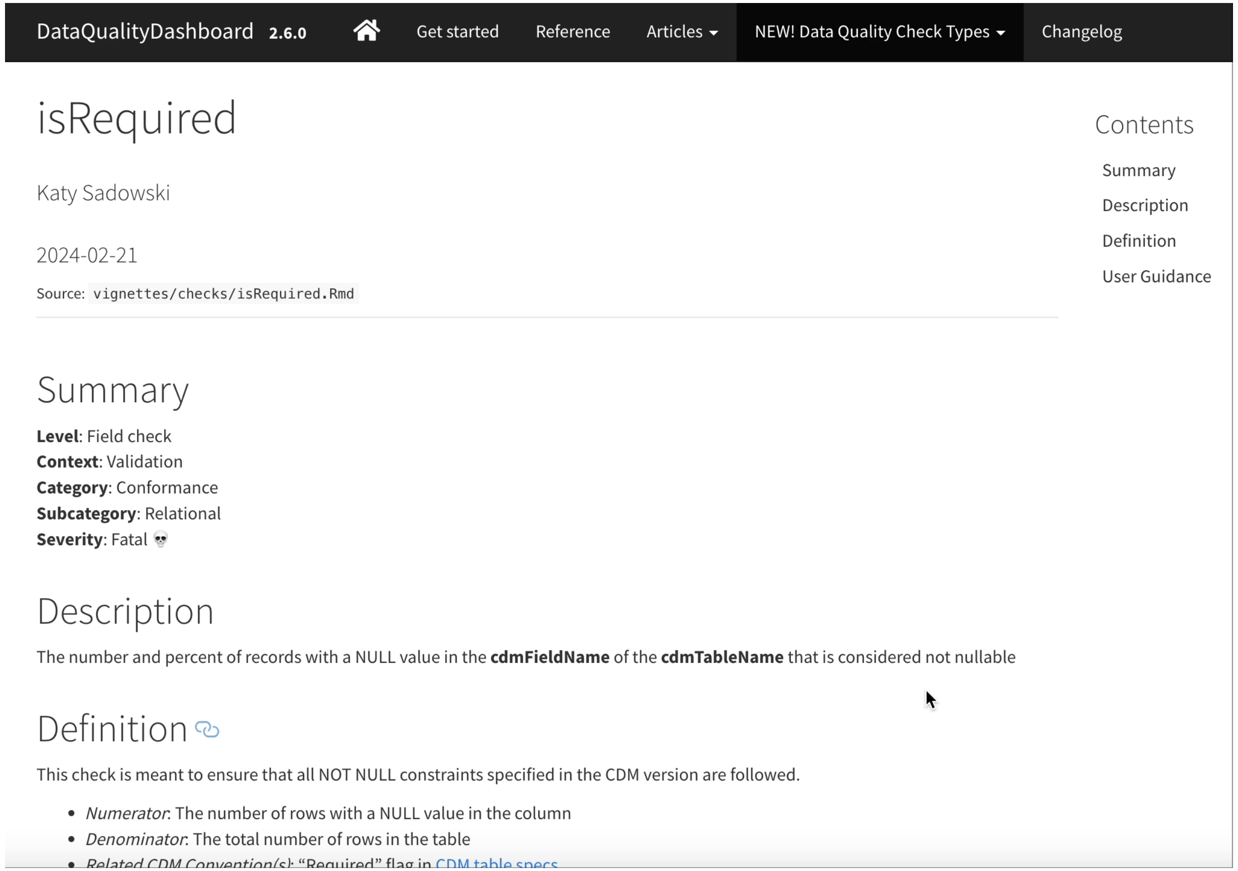
*and the analytic use case

Getting Started

1. Prerequisites
   - An OMOP CDM
   - An R environment set up following HADES instructions: https://ohdsi.github.io/Hades/rSetup.html
2. Install and execute DataQualityDashboard following DQD instructions: https://ohdsi.github.io/DataQualityDashboard/articles/DataQualityDashboard.html
   - By default, DQD will apply preset data quality check thresholds which may or may not be relevant for your OMOP CDM
3. Configure data quality check thresholds: https://ohdsi.github.io/DataQualityDashboard/articles/Thresholds.html

What's New

Check-level documentation



isRequired

Katy Sadowski

2024-02-21

Source: `vignettes/checks/isRequired.Rmd`

Summary

Level: Field check
Context: Validation
Category: Conformance
Subcategory: Relational
Severity: Fatal 💀

Description

The number and percent of records with a NULL value in the **cdmFieldName** of the **cdmTableName** that is considered not nullable

Definition

This check is meant to ensure that all NOT NULL constraints specified in the CDM version are followed.

- *Numerator*: The number of rows with a NULL value in the column
- *Denominator*: The total number of rows in the table
- *Related CDM Convention(s)*: “Required” flag in CDM table specs

New & improved checks

- Temporal plausibility
- Unit concept checks
- Gender plausibility

Coming soon...

- Check severity parameter
- New user interface 🤩

Thank You – 2024 Contributors

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