Query Development
Community and Technical Resources

The NSSP Community of Practice (CoP) uses collaborative methods to create, modify, and validate queries. This collection of resources is well tested and reflects best practices that syndromic surveillance experts use and share across public health jurisdictions.

Expand Your Circle of Syndromic Surveillance Experts

- Join the NSSP CoP
- Join Slack®: Use this collaboration platform to share queries and get expert opinions quickly.
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What is a syndrome definition (or, query)?

A syndrome definition is a method of classifying data so that patient visits are logically grouped for querying and analysis. In syndromic surveillance, the terms *queries*, *definitions*, *syndromes*, *subsyndromes*, *groupings*, and *classifications* are often used interchangeably.

A syndrome definition[*] comprises one or all of the following components:

1. **Discharge diagnosis codes.** These standardized codes provide a method to search the clinically assigned diagnoses to capture records of interest. There are two coding systems commonly found in syndromic data: International Classification of Diseases, Clinical Modification (ICD CM) and Systematized Nomenclature of Medicine, Clinical Terms (SNOMED CT).

2. **Keywords**. Terms related to the topic of interest can be used to search free-text fields, such as patient symptom and chief complaint, admission reason, and triage notes to capture records.

3. **Negations.** A query may define discharge diagnosis codes or keywords that should not be identified. These are used to exclude records from the query results.

[*] This definition has been adapted from *Developing, Evaluating, and Disseminating Definitions for Syndromic Surveillance in Public Health Practice: A Guidance Document*. International Society of Disease Surveillance, Syndrome Definition Committee. January 2019 Version 1.

Create an ESSENCE Syndrome Definition

1. List alternative names, causes, and symptoms for disease or condition.
2. See what work has been already done to avoid duplicating work.
3. Search for topics in the NSSP CoP's SLACK platform and Knowledge Repository (KR). In the KR, use the drop-down menu to search Key Topic Areas for available syndromes, including Chief Complaint-based Syndromes and Subsyndromes, Chief Complaint (CC) and Discharge Diagnosis (DD) Categories, and Chief Complaint Explanation.
4. Search ICD-10-CM Codes. (There are many ICD-10-CM references available. When selecting one, note that ICD-10-**CM** is the version used in our syndromic surveillance data.) This link includes the 2023 release of ICD-10-CM.
5. List symptoms and other free-text criteria related to your condition. Also list any appropriate negations.
6. Put code and terms into ESSENCE syntax.
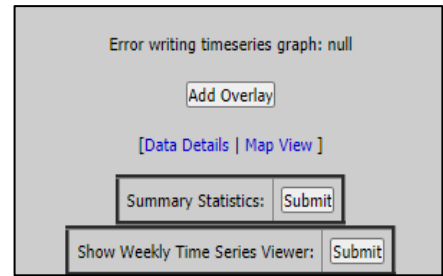7. Review syntax.

Create ESSENCE Syntax Queries: Resources for Free-text Coding

- In the ESSENCE free-text coding box, you have a couple options:
  - Click **Help** for an overview of ESSENCE syntax options.
  - Click **Query Builder** to generate simple queries.

- These articles on free-text coding contain pieces of code that will save you time when developing queries:
  - Part 1. Wildcards
  - Part 2. Underscores and Brackets
  - Part 3. Inclusionary Terms
  - Part 4. Exclusion Terms and Parentheses
  - Part 5. A "Starter" Fall-related Injury Query and Examples of Complex Queries
  - Part 6. Wrapping Things Up
  - Part 7. Additional Tips: ISBLANK and ISNULL
  - Part 8. Additional Tips: !TERM! Syntax

- SNOMED and ICD-10-CM and ICD-9-CM codes:
  - ICD-9-CM: http://www.icd9data.com/
  - SNOMED Search:
    https://www.cdc.gov/nchs/icd/icd-10-cm/files.html
  - 2022 ICD-10-CM: https://www.icd10data.com/ICD10CM/Codes
  - 2023 ICD-10-CM: https://www.cdc.gov/nchs/icd/icd-10-cm/files.html

- Best practices for discharge diagnosis coding:
  - Use the DDparsed field. This field contains NO text, and all decimals are removed from ICD codes. Queries are simpler when you don't need to include both decimal and non-decimal variations of a code in the syndrome/category definition. Short, non-decimal ICD-9-CM coding can also be the start of a SNOMED code. Always end your ICD-9-CM codes with the "[;/]" syntax. Sometimes you'll need to iterate all possible ICD-9 codes applicable to your condition.
  - 'V' and 'E' codes exist in both ICD-9-CM and ICD-10-CM. If diagnosis codes start with these letters, check to make sure there isn't an overlap that would cause unexpected results.
  - Some DD codes look a lot like highway names, ZIP codes, phone numbers, etc., and you'll need to work around these issues. You'll usually encounter this when running code in a field containing chief complaints.

- Miscellaneous resources:
  - The Syndrome Definition Committee's 2019 guidance document explains the process and recommended practices for developing syndrome definitions.
  - Using drowning as an example, an article on the NSSP website, Technical Tips and Training, Queries, explains how to use the guidance document to develop a query.

- When developing a chief complaint query, ask yourself:
  - Does the query contain name(s) of disease(s) and condition(s)?
  - Does the query look for symptoms?
  - Have you looked for CCs associated with DD codes previously identified?
  - Can the query use a collection of ESSENCE syndromes?
  - How specific can you make this CC query?

Common Free-text ESSENCE Errors

▪ **Problem:** Error with syntax, often commas or parentheses.

Solution: Review syntax. A program like Notepad ++ can help you find unclosed parentheses.

Shown above: This message indicates a syntax error in a time series query.

▪ **Problem:** ESSENCE cannot query a character used in a specified field.

Solution: Remove character, change fields, or submit a service desk ticket to add allowances for that character and field when necessary for use cases. (Note: There's no way to recover the errored query. Users may click **BACK** to recover previous versions.)

> **Warning!**
>
> The HTML parameter "teHistory" contains suspicious SQL Injection characters/words.
>
> If you feel that this determination is incorrect, contact your site administrator. Inform the admin of the parameter name in question and the flagged characters/words that should be considered valid.
>
> We apologize for any inconvenience. The SQL Injection detection is being implemented as a security measure.

▪ **Problem:** Zero returns or excessive returns. Either your query is too restrictive or permissive, or one of your terms is not functioning as intended. Common problems include extra syntax like a stand-alone "^" or extra spaces in your query.

Here are some examples:

- ^Fever^,or,^Febrile^,AND,^Cough^
  - o Likely you want to have your "AND" term encompass both of the first terms since they are so similar. The statement in the example will apply the "AND" only to the term ^Febrile^ and not both.
  - o Correct syntax is: (,^Fever^,or,^Febrile^,),AND,^Cough^.
- ^ [;/]B08.02^
  - o Extra space in the first specified character will significantly limit returns.
  - o When writing queries in Microsoft Word and similar programs, the program can add spaces where it thinks they should go, even if you don't want one there.
- ^,^[;/]B08.02^
  - o Extra caret will open your query up to nearly all visits.
- ^Bite^,ANDNOT,^Cat^
  - o Be careful using short segments in your query. You may exclude/include much more than you intend. ^Cat^ will exclude terms like mediCATion, disloCATed, CATheter, compliCATion, CATaract, etc.
- ^[;/]B08.02^,or,^[;/]B0802^,AND,^ORF^
  - o Likely you want "AND" to encompass both of the first terms. As it is written, only the second B code will have the "AND" requirement.
  - o Correct syntax is: (,^[;/]B08.02^,or,^[;/]B0802^,),AND,^ORF^

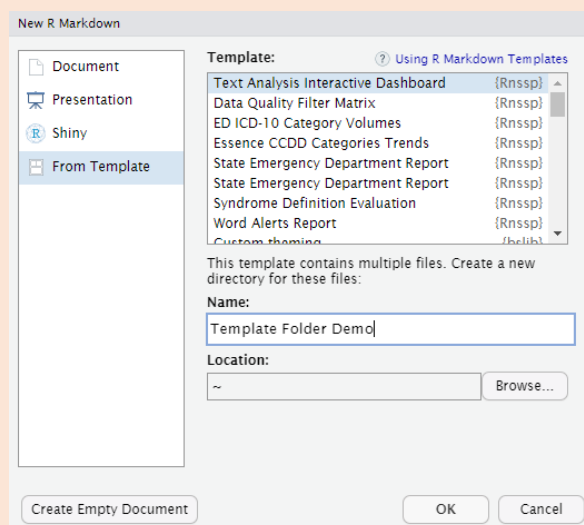## Review and Revise ESSENCE Queries

1. Conduct a line-level review:

   ▪ Review results of query.

   ▪ Break query into chunks and test different segments.

   ▪ Use negation to isolate returns exclusive to a single term or segment:

      • Example to see what just the CC term adds: ^ORF^,andnot,(,^[;/]B08.02^,or,^[;/]B0802^,)

      • Example across multiple fields:
         o CC query: ^ORF^
         o DD query: ISNULL,or,^,ANDNOT,(,^[;/]B08.02^,or,^[;/]B0802^,)

2. Use ESSENCE's tagging feature to tag visits for inclusion/exclusion (Note: Tagging is not available in the Chief Complaint Query Validation).

3. Conduct a text analysis either by (a) going to the ESSENCE Query Portal and selecting "Text Analysis" **OR** by (b) using one of two Rnssp templates available in RStudio Workbench:

   ▪ Text Analysis Dashboard Template: https://cdcgov.github.io/Rnssp-rmd-templates/templates/textmining/

   ▪ Syndrome Definition Evaluation Template: https://cdcgov.github.io/Rnssp-rmd-templates/templates/syndromeeval/

Steps for generating a report from an Rnssp template:

1. Start a new session in RStudio Workbench.
2. Select "R Markdown" from the "New File" drop-down list under the "File" menu.
3. Select "From Template" option. A list of up-to-date Rnssp analytic templates should appear at the top of the Template selection list. Select "Text Analysis Interactive Dashboard" or "Syndrome Definition Evaluation."
4. Specify the directory/folder in which you would like the HTML output to be saved by populating the Name field above Location.
5. A new R Markdown file should automatically open in your session. Select the "Knit with Parameters…" option under the "Knit" drop-down menu.
6. Populate the parameter fields in the graphical user interface that appears. Select "Knit" after making these selections. The template will start to render.

More guidance can be found on the Rnssp R Markdown Templates webpage: https://cdcgov.github.io/Rnssp-rmd-templates/usage

Questions? Contact… **NSSP's Service Desk**.

Once you set up an account, you can request technical and administrative assistance by submitting a service ticket. NSSP's support teams can provide one-on-one consultation on data quality, onboarding (including SFTP and Master Facility Table), ESSENCE, and other topics.

An NSSP support team member can reset passwords, explain how to use data access rules, demonstrate the use of data quality dashboards, point you toward resources, and connect you with subject experts.