

NEMSIS V3 Performance Measure Service Technical Guide

Date

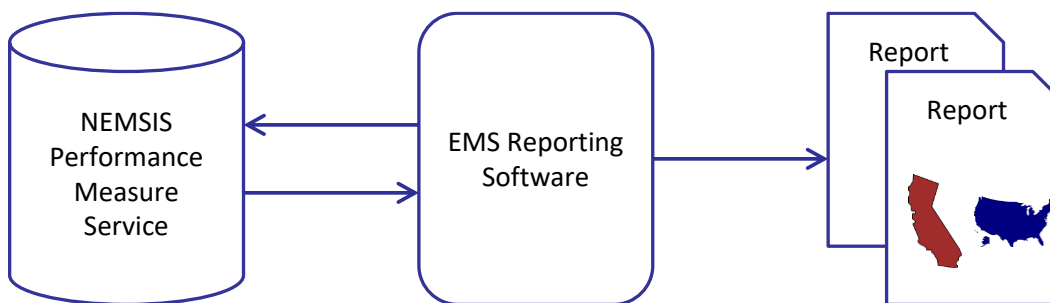
June 28, 2024 (Updated for NEMSQA)
June 11, 2019

Authors

Joshua Legler – NEMSIS Consultant
N. Clay Mann – NEMSIS P.I.

Overview

This technical guide describes how software developers can use the NEMSIS V3 performance measure service. The NEMSIS TAC-hosted web service provides a set of predefined, parameterized EMS performance measures that can be queried by software applications. The software applications can then incorporate the data in user reports for benchmarking and comparison. By utilizing the service, software applications can compare national data with customer-specific data.



The NEMSIS V3 performance measure web service implements EMS performance measures defined by the National EMS Quality Alliance (NEMSQA) at nemsqa.org.

Architecture

The NEMSIS V3 performance measure service is a SOAP web service. The WSDL is available here:

<https://perfmeasures.nemsis.org/perfMeasureWs.wsdl>

The web service includes three operations:

- **ListBenchmarks:** Lists the performance measures currently supported by the service.
- **ListParameters:** Lists the parameters currently supported by the service, which can be used to filter or segment the data returned by the service.
- **RetrieveBenchmark:** Provides national-level benchmark data for a requested performance measure and combination of parameters.

Accessibility

The NEMESIS V3 performance measure service is publicly available. No authentication is required.

Performance Measures

The goal of the NEMESIS V3 performance measure service is to support all NEMISQA performance measures that can be calculated using NEMESIS V3 national elements. See [Performance Measure Definitions](#) for documentation of the currently supported measures.

To retrieve a list of measures supported by the service, use the ListBenchmarks request:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemsis.org/">
  <env:Header/>
  <env:Body>
    <ListBenchmarksRequest/>
  </env:Body>
</env:Envelope>
```

The service will return a message listing the available performance measures:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <ListBenchmarksResponse status="71" xmlns="http://ws.nemsis.org/"
      xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <benchmark denominatorType="xs:nonNegativeInteger" id="Trauma-01"
        numeratorType="xs:nonNegativeInteger">Pain Assessment of Injured
        Patients</benchmark>
      <benchmark denominatorType="xs:nonNegativeInteger" id="Seizure-01"
        numeratorType="xs:nonNegativeInteger">Blood Glucose Evaluation</benchmark>
      ...
    </ListBenchmarksResponse>
  </env:Body>
</env:Envelope>
```

The numeratorType and denominatorType attributes describe the XML Schema data types that are used for the numerator and denominator in the result data for a benchmark. Most benchmarks use “nonNegativeInteger” as the data type for both numerator and denominator. However, some benchmarks may use other XML Schema data types such as duration, float, or decimal. See [XML Schema Part 2: Datatypes Second Edition](#) for an enumeration of possible data types.

Parameters

The NEMSIS V3 performance measure service supports parameters to enable a client to filter or segment the benchmark data. See [Performance Measure Parameters](#) for documentation of the supported parameters.

To retrieve a list of parameters supported by the service, including the potential values supported for each parameter, use the ListParameters request:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemsis.org/">
  <env:Header/>
  <env:Body>
    <ListParametersRequest/>
  </env:Body>
</env:Envelope>
```

The service will return a message listing the available parameters:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <ListParametersResponse status="81" xmlns="http://ws.nemsis.org/">
      <parameter code="OrgStatus" name="Organization Status">
        <value code="P02001">Mixed</value>
        <value code="P02002">Non-Volunteer</value>
        <value code="P02003">Volunteer</value>
      </parameter>
      <parameter code="EMSPatientContactPerYear" name="EMS Patient Contact Per Year">
        <value code="P05001">1-100</value>
        <value code="P05002">101-1000</value>
        <value code="P05003">1001-10000</value>
        <value code="P05004">10001-50000</value>
        <value code="P05005">Over 50000</value>
        <value code="P05006">Not Recorded</value>
      </parameter>
      ...
    </ListParametersResponse>
  </env:Body>
</env:Envelope>
```

Performance Measure Data

Performance measure data are calculated from NEMSIS V3 data in the national EMS database, using the definitions provided by NEMSQA.

To retrieve benchmark data for a particular performance measure, use the RetrieveBenchmark request:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemesis.org/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkRequest>
      <benchmark id="Trauma-01">
      </benchmark>
    </RetrieveBenchmarkRequest>
  </env:Body>
</env:Envelope>
```

The service will return a message that contains the benchmark data in numerator/denominator form as defined by NEMSQA, along with some metadata:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkResponse status="91" xmlns="http://ws.nemesis.org/"
      xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <database>
        <databaseUpdateDateTime>2024-06-10T14:21:43.400Z</databaseUpdateDateTime>
        <databaseRecords>266385276</databaseRecords>
      </database>
      <benchmark id="Trauma-01"/>
      <data denominatorType="xs:nonNegativeInteger" numeratorType="xs:nonNegativeInteger"
        records="10153981" states="53">
        <result records="10153981">
          <numerator>7086425</numerator>
          <denominator>10153981</denominator>
        </result>
      </data>
    </RetrieveBenchmarkResponse>
  </env:Body>
</env:Envelope>
```

Using Parameters

To filter the data to a subset of records matching certain criteria, use the RetrieveBenchmark request with any combination of <filter> elements. The following example demonstrates a request for benchmark data for the Trauma-01 measure limited to urban responses in December 2023:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemesis.org/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkRequest>
      <benchmark id="Trauma-01">
        <filter parameter="Urbanicity">P01001</filter>
        <filter parameter="CalendarMonth">202312</filter>
      </benchmark>
    </RetrieveBenchmarkRequest>
  </env:Body>
</env:Envelope>
```

The service will return a message that contains filtered benchmark data:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkResponse status="91" xmlns="http://ws.nemsis.org/"
      xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <database>
        <databaseUpdateDateTime>2024-06-10T14:21:43.400Z</databaseUpdateDateTime>
        <databaseRecords>266385276</databaseRecords>
      </database>
      <benchmark id="Trauma-01">
        <filter parameter="Urbanicity">P01001</filter>
        <filter parameter="CalendarMonth">202312</filter>
      </benchmark>
      <data denominatorType="xs:nonNegativeInteger" numeratorType="xs:nonNegativeInteger"
        records="278292" states="51">
        <result records="278292">
          <numerator>190014</numerator>
          <denominator>278292</denominator>
        </result>
      </data>
    </RetrieveBenchmarkResponse>
  </env:Body>
</env:Envelope>
```

The service also supports segmentation of performance measure data (analogous to the “group by” clause in an SQL query). To request the benchmark results to be segmented by a parameter, use the RetrieveBenchmark request with one <segment> element. The following example demonstrates a request for benchmark data for the Trauma-01 measure segmented (or grouped) by Urbanicity:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemsis.org/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkRequest>
      <benchmark id="Trauma-01">
        <segment>Urbanicity</segment>
      </benchmark>
    </RetrieveBenchmarkRequest>
  </env:Body>
</env:Envelope>
```

The service will return a message that contains segmented benchmark data providing a result for each member of the Urbanicity parameter:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkResponse status="91" xmlns="http://ws.nemsis.org/"
      xmlns:xs="http://www.w3.org/2001/XMLSchema"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
      <database>
        <databaseUpdateDateTime>2024-06-10T14:21:43.400Z</databaseUpdateDateTime>
        <databaseRecords>266385276</databaseRecords>
```

```

</database>
<benchmark id="Trauma-01">
  <segment>Urbanicity</segment>
</benchmark>
<data denominatorType="xs:nonNegativeInteger" numeratorType="xs:nonNegativeInteger"
  records="10153981" states="53">
  <result records="8241576" segmentMember="P01001">
    <numerator>5724906</numerator>
    <denominator>8241576</denominator>
  </result>
  <result records="563882" segmentMember="P01002">
    <numerator>403184</numerator>
    <denominator>563882</denominator>
  </result>
  <result records="642987" segmentMember="P01003">
    <numerator>465994</numerator>
    <denominator>642987</denominator>
  </result>
  <result records="159436" segmentMember="P01004">
    <numerator>119433</numerator>
    <denominator>159436</denominator>
  </result>
  <result records="546100" segmentMember="P01005">
    <numerator>372908</numerator>
    <denominator>546100</denominator>
  </result>
</data>
</RetrieveBenchmarkResponse>
</env:Body>
</env:Envelope>

```

A request may include zero or more <filter> elements and zero or one <segment> element.

Metadata

In addition to numerator and denominator, the service returns the following metadata:

- **databaseUpdateDateTime:** Timestamp of the last refresh of the data in the database supporting the benchmarking service.
- **databaseRecords:** Count of the patient care report records in the database supporting the benchmarking service.
- **benchmark:** Client-provided benchmark and filtering criteria (echo back).
- **states:** Count of the states/territories whose records contributed to the result.
- **records:** Count of the records that contributed to the result. For many performance measures, this value is the same as the denominator because the denominator for the performance measure is defined as the count of records. However, it is possible that there will be performance measures where the denominator is defined as something other than a count of records.

Privacy and Null Data

The service uses small-cell suppression. If a result would be calculated based on fewer than six records, it is not returned.

If a result contains no data (or the data have been suppressed due to small cell size), the <result> element will be empty and have no <numerator> or <denominator>.

Errors

The web service validates requests per the WSDL and returns a SOAP fault message if a request is invalid.

The web service validates benchmark and parameter codes. The service will return an error message if non-existent codes are requested:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkResponse status="-91" xmlns="http://ws.nemsis.org/">
      <error>The requested benchmark ID "Trauma-99" does not exist.</error>
    </RetrieveBenchmarkResponse>
  </env:Body>
</env:Envelope>
```

Performance

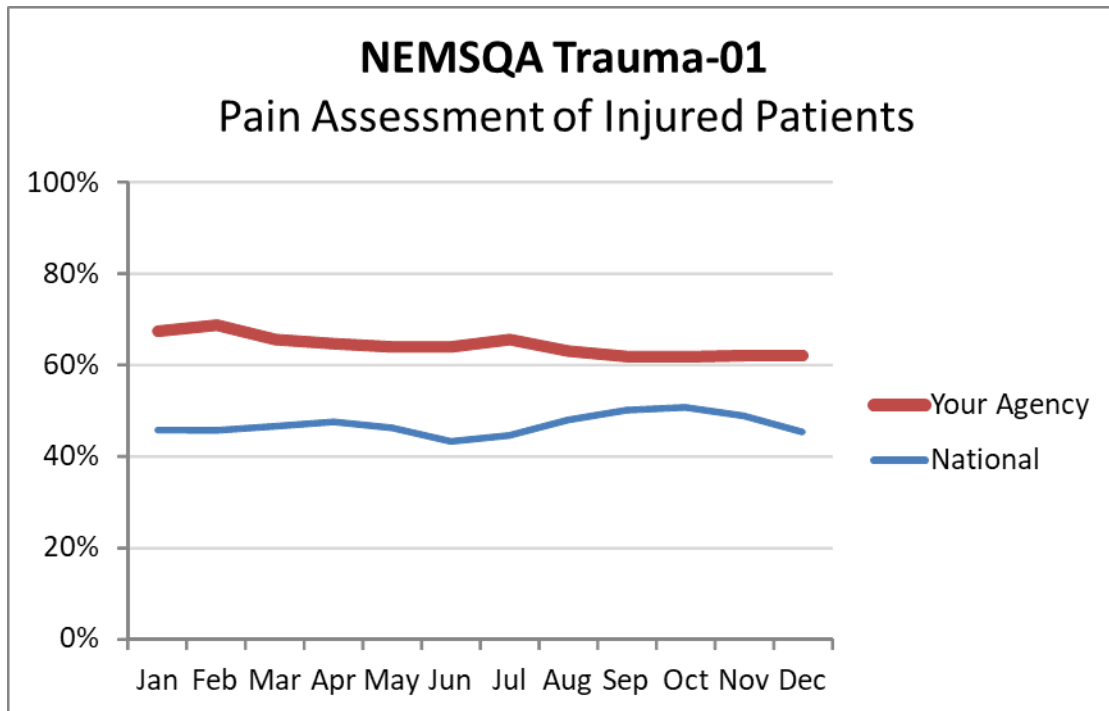
The service returns results for most queries within two seconds, but responses to queries for performance measures involving a large number of records may take up to 30 seconds.

Availability

The service is available full-time, except during scheduled maintenance windows. The maintenance schedule is the NEMESIS production system maintenance schedule described at <https://nemsis.org/nemsis-faqs/>.

Example Application

The chart below demonstrates an example application using data from the NEMESIS V3 performance measure service to display a customer's data alongside national data for comparison. For trend analysis, the CalendarYear and CalendarMonth parameters will be useful.



In the above chart, the “National” data comes from the NEMSIS V3 Performance Measure Service, and the data for “Your Agency” comes from data stored by the software product generating the report.

To acquire the data for the “National” line in the above chart, the software would query the performance measure web service with a request like this:

```
<env:Envelope xmlns:env="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns="http://ws.nemsis.org/">
  <env:Header/>
  <env:Body>
    <RetrieveBenchmarkRequest>
      <benchmark id="Trauma-01">
        <filter parameter="CalendarYear">2023</filter>
        <segment>CalendarMonth</segment>
      </benchmark>
    </RetrieveBenchmarkRequest>
  </env:Body>
</env:Envelope>
```

By requesting `<segment>CalendarMonth</segment>`, the software would cause the performance measure web service to return a response message that contains a result pair (numerator and denominator) for each month (January–December) in the year 2023. Each point on the “National” line in the example chart represents the numerator divided by the denominator for that month.

Data Use Statement

The NEMSIS Technical Assistance Center makes no representations regarding the suitability, reliability, availability, timeliness, or accuracy of the report. To the maximum extent permitted by applicable law, this report is provided “as is” without warranty or condition of any kind. To the maximum extent

permitted by applicable law, in no event shall the NEMSIS TAC nor its agents be liable for any direct, indirect, punitive, incidental, special, consequential damages or any damages whatsoever arising out of the use of this report.

Conclusions

It is the hope of the NEMSIS Technical Assistance Center that the NEMSIS V3 performance measure service can become a key data source supporting efforts to implement performance measurement in EMS using the NEMSQA performance measures.