Canadian **VIGOUR** Centre
Bridging Hearts and Minds

%FastCase

A case definition macro for administrative health data

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Administrative Health Data

- Some examples….
  - Hospital Discharge Abstract
  - Emergency Department visits
  - Physical Claims
  - Pharmacy Dispense events
  - Laboratory tests

Case Definitions

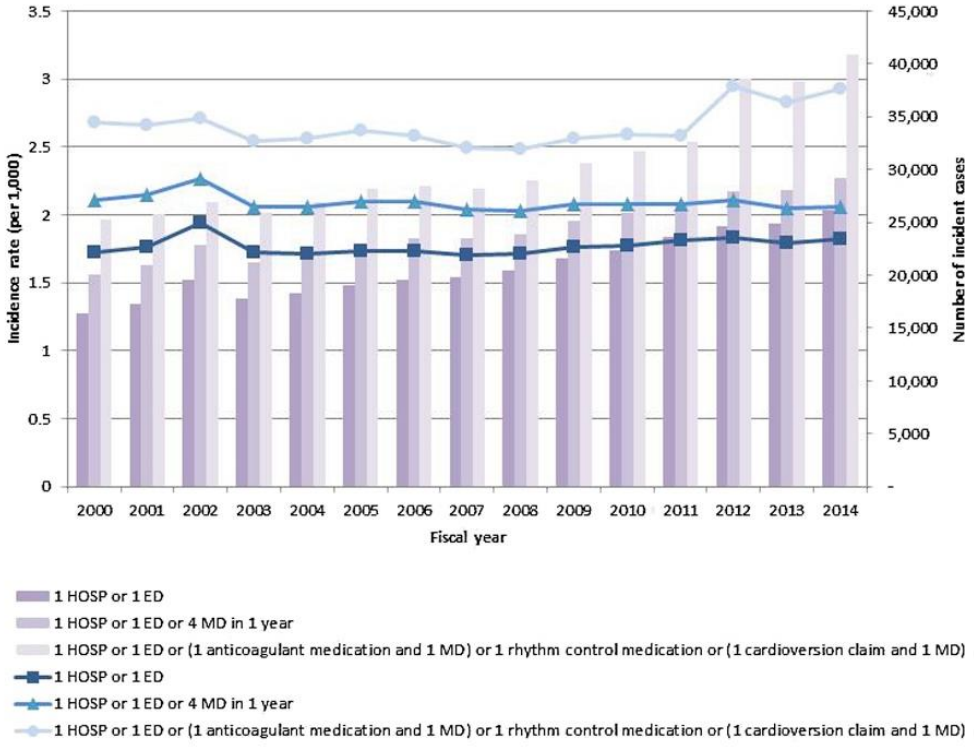
- Code *meaning* varies between the databases
  - Hospitalization records follow national standards, multiple levels of expertise and QA
  - Physician claims are not diagnoses

Case Definitions

- Case definition: algorithm using admin data that is used to identify a health state
  - usually identify the number of records, within a time frame, with certain qualities (codes), from a certain database

Atrial Fibrillation

- Tu K, Nieuwlaat R, Cheng SY, Wing L, Ivers N, Atzema CL, Healey JS, Dorian P. Identifying patients with atrial fibrillation in administrative data. Canadian Journal of Cardiology. 2016 Dec 1;32(12):1561-5.



HOSP=hospital claim, ED=emergency room visit, MD=physician billing claim

Atrial Fibrillation

- Three case definitions
  1) 1 Hosp or 1 ED

Atrial Fibrillation

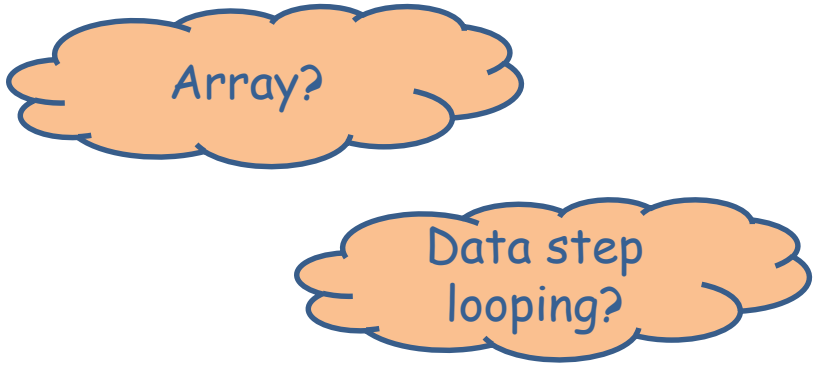
- Three case definitions
  1) 1 Hosp or 1 ED
  2) 1 Hosp or 1 ED or 4 MD in 1 year

Atrial Fibrillation

- Three case definitions
  1) 1 Hosp or 1 ED
  2) 1 Hosp or 1 ED or 4 MD in 1 year
  3) 1 Hosp or 1 ED or (1 MD and 1 anticoagulant) or 1 rhythm control drug or (1 MD and 1 cardioversion procedure)

How to implement this??

- 4 Claims in 1 year, at least 30 days apart



FastCase macro

- Structure:
  - X events with T time, at least Y apart
  - Codes exactly matching or starting with
  - Any number of code variables

FastCase macro

- Data:
  - Required: event level data
  - Optional: cohort dataset

FastCase macro

- Time:
  - cohort start date and relative time block
    - [-1825, -1]
    - [-365, -7]
    - [0, 30]

FastCase macro

- Time:
  - Custom specified date range

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

FastCase

```
%macro fast
IDvar=,
cohortdata=
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Unique person identifier

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Cohort Data (optional)

FastCase

```
%macro fastcase(
IDvar=,
cohortda
data=,
nvisits=
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Event Data

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=,
nvisits=, apart=0,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Event Date

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=9999
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Variables containing codes

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforwa
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

&nvisits within &within days at least &apart days apart

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
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                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Cohort start date with time period

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookfo
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Custom event date range

FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dt    t=%str(date9.),
out=_temp_,
mergeto=,
                    indicator1=,
                    ICDstartswith1=, ICDequals1=,
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Output dataset options

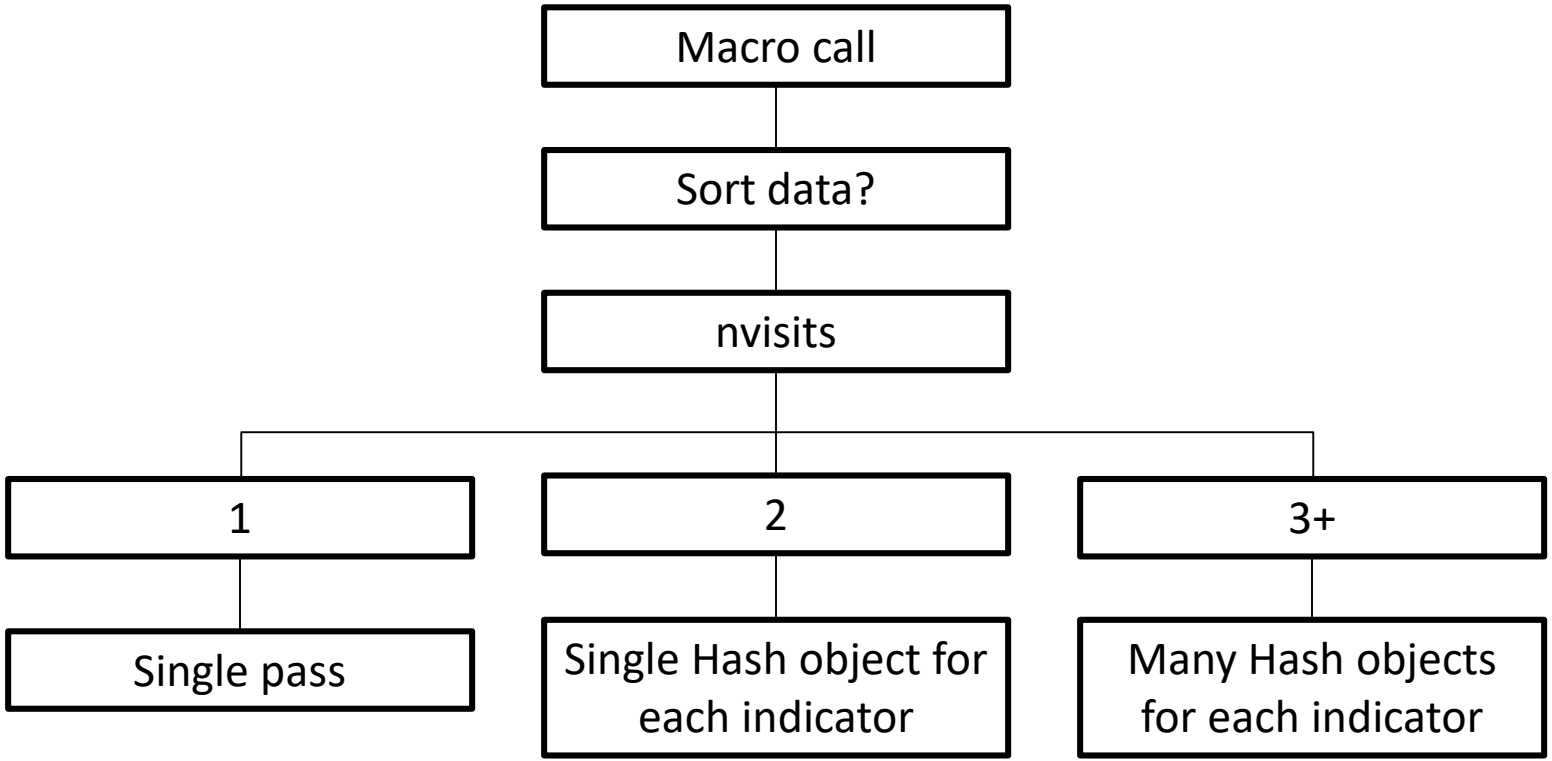
FastCase

```
%macro fastcase(
IDvar=,
cohortdata=,
data=, dxdate=, ICDvarlist=,
nvisits=, apart=0, within=99999,
cohortdxdate=, lookback=, lookforward=,
lookstartdate=, lookenddate=,
presorted=YES, dtfmt=%str(date9.),
out=_temp_,
mergeto=,
                    anyrecord=,
                    indicator1=,
                    ICDstartswith1=
                    indicator2=,
                    ICDstartswith2=, ICDequals2=,
                    indicator3=,
                    ICDstartswith3=, ICDequals3=,
                    indicator4=,
                    ICDstartswith4=, ICDequals4=,
```

Indicator name

Codes to look for

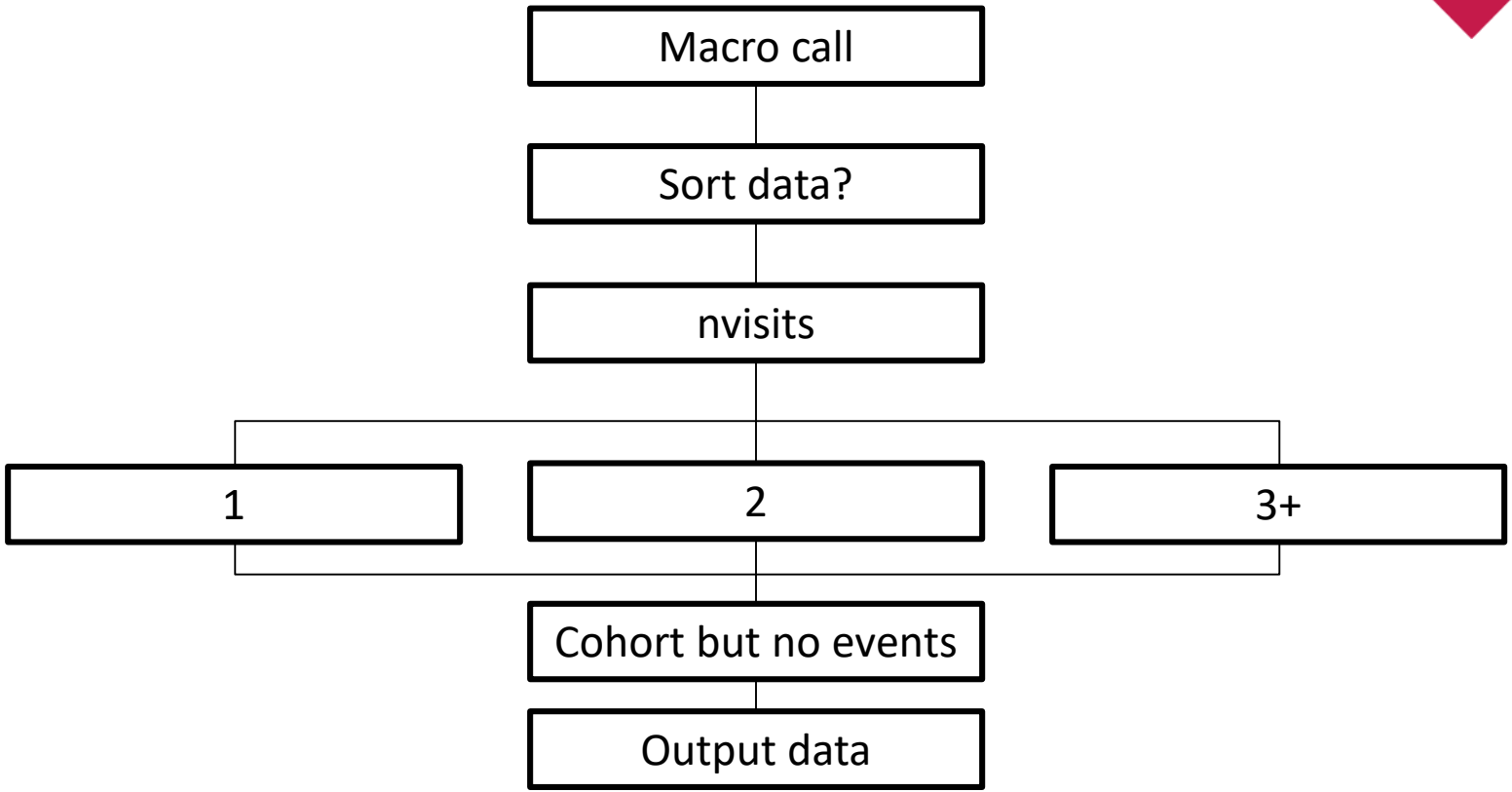
How does it work?



Hash object

- Like a dynamic mini dataset within your data step
- So what?
  - Easy to iterate over
  - Only one person's data at a time
  - Can be any length
  - Can dynamically shrink as we go

How does it work?



How does it work?

- Early stopping everywhere
  - only process records if
    - in the cohort
    - in the date range
    - not already met the case definition

Examples

```
%fastcase(
IDvar=PHN,
data=Hospital, dxdate=Episode_Start_Date, ICDvarlist=DxCode1-DxCode25,
nvisits=1,
out=AtrialFib,
                    indicator1=AFhosp,
                    ICDstartswith1=I48
);
```

Examples

PHN	AFhosp	AFhosp_date
12345	1	20-Oct-2020
45678	0	.
78990	1	9-Feb-2005

Examples

```
%macro(
IDvar=PHN,
data=Claims, dxdate=BillingDate, ICDvarlist=DxCode1-DxCode3,
nvisits=2, apart=30, within=365,
mergeto=AtrialFib,
                        indicator1=AFclaims,
                        ICDstartswith1=I48
);
```

Examples

PHN	AFhosp	AFhosp_date	AFclaims	AFclaims_date
12345	1	20-Oct-2020	1	19-Oct-2020
45678	0	.	1	12-Aug-2011
78990	1	9-Feb-2005	0	.

Examples

```
*create my AF cohort*;
Data AtrialFib;
    Set AtrialFib;
    AF = max(AFhosp, AFclaims);
    if AF then AF_date = min(AFhosp_date, AFclaims_date);
    if AF;
run;
```

Examples

```
*comorbidities*;

%fastcase(
IDvar=PHN,
cohortdata=AtrialFib,
data=Ambulatory(where=(ED=1)), dxdate=Episode_Start_Date, ICDvarlist=DxCode1-DxCode10,
nvisits=1,
cohortdxdate=AF_date, lookback=-1825, lookforward=0,
out=comorbid,
                    indicator1=HeartFailure,
                    ICDstartswith1=I50,

                    indicator2=Diabetes,
                    ICDstartswith2=E11 E12 E13 E14,

                    indicator3=MIunknown,
                    ICDequals3=I21.9,

                    indicator4=Bleeding,
                    ICDstartswith4=R58, ICDequals4=R04.0
);

**you can have up to 30 indicators**;
```

Examples

```
*outcomes*;

%fastcase(
IDvar=PHN,
cohortdata=AtrialFib,
data=PIN, dxdate=Dispense_Date, ICDvarlist=ATCcode,
nvisits=1,
cohortdxdate=AF_date, lookback=1, lookforward=90,
out=drugs,
                        indicator1=Edoxaban,
                        ICDequals1=B01AF03
);
```

Thank you.

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