atmolytics

Cohort Discovery

User Guide v2.63

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1 Introduction

Welcome to Atmolytics Cohort Discovery! Cohort Discovery is one of the most powerful parts of the Atmolytics system and allows you to create cohorts of different groups of patients. Any cohort that you create becomes instantly available for exploration using our **Cohort Insights** feature, or for reporting using any of the reporting **Apps** available to you.

It's important to remember at all times that when you're using Cohort Discovery, you are using filters to **identify patients** and add them to a cohort. You may or may not subsequently create reports and explore data relating to this group of patients.

> The critical point is for you to be clear in yourself about the difference between:
>
> - The **patients** who need to be included in the **cohort**, and
> - The **data about those patients** that needs to be included in any **report**.

This guide takes you through the different screens and functions, and provides some introductory exercises. It's important to start with the basics and build up your confidence and understanding.

1.1 A note about terminology

Because Atmolytics is fully configurable, different organisations may use different terms to describe the individuals and events they are working with, and these will be reflected in the Atmolytics screens. For example, one organisation's **patients**, **admissions** and **reports** may be another organisation's **service users**, **involvements** and **explorations**. Your organisation may use different terminology in their implementation of Atmolytics.

In this user guide, we've used the terminology **patients**, **admissions** (occasionally **visits**) and **reports** throughout.

We refer to the main area of Atmolytics (found by clicking on the icon) as the **Home** area. You may also see this referred to as **My Hub** in other user guides.

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2 What is a Cohort?

Cohorts are the bedrock of Atmolytics. They are groups of patients which are created by filtering the full list of patients available to you, using criteria specified by you, the user. You can then create **reports** about these cohorts using the Atmolytics **Apps**.

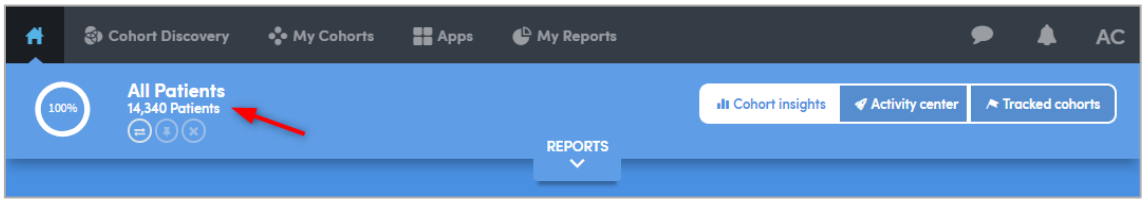
Every cohort you create is a subset of your **base cohort**.

2.1 What is a Base Cohort?

Your **base cohort** is a group which contains all the patients (and their data) made available to you as an Atmolytics user.

For example, if you work in Oak Ward of Hospital A, you may only be allowed to access data belonging to certain patients. Your base cohort might consist of just the patients in your organisation's Atmolytics system who have ever been admitted to Oak Ward.

The number of patients in your base cohort is visible at the top of your **Home** area.



Your system administrator will have created your base cohort by selecting the patients whose data you are permitted to access. This base cohort will be assigned to you as part of your **role**. Any cohorts you create yourself will only include patients who are also included in your base cohort. If you share any information with other users, they will only be able to see the information you share which relates to the patients who are also in their own base cohort (they must also have permission to access the type of patient data you are sharing).

Nobody can view, report on, or share any data belonging to any patient who is not included in their own base cohort of patients. This is one of the ways in which Atmolytics protects sensitive data.

2.2 What is a Role?

Your system administrator will have assigned you a **role** as a user of the Atmolytics system. This is a kind of profile which sets the type of access permissions you have, and the patient data you are allowed to view or report on.

Your user permissions may allow you and fellow users to share **cohorts** and **reports** with each other, but you will not be able see other users' data, and they won't be able to see yours, unless you explicitly choose to share it and have the necessary user permissions to do so.

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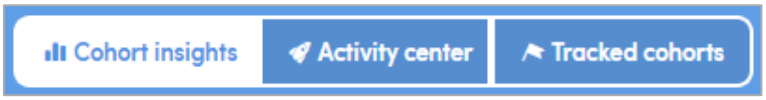
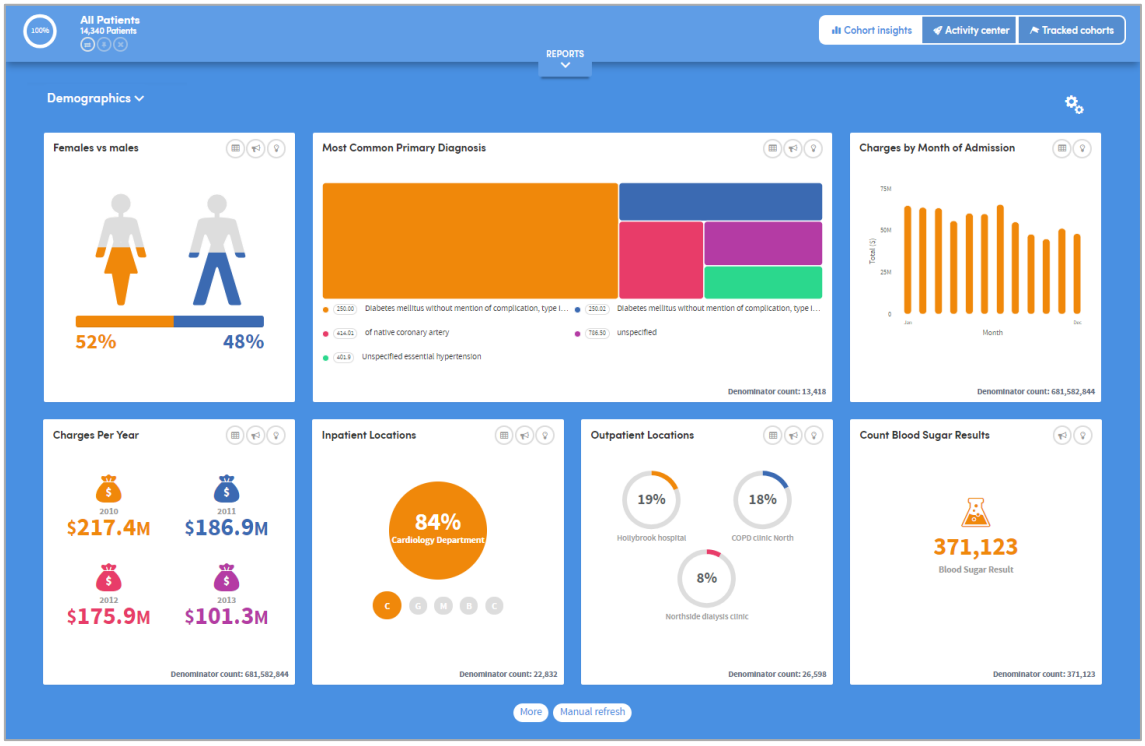
3 Cohort Insights

After you log in to Atmolytics, you will be taken to the **Home** area. This contains the **Cohort Insights**, **Activity Centre** and **Tracked Cohorts** areas. Click the buttons on the top right of the screen to move between them:



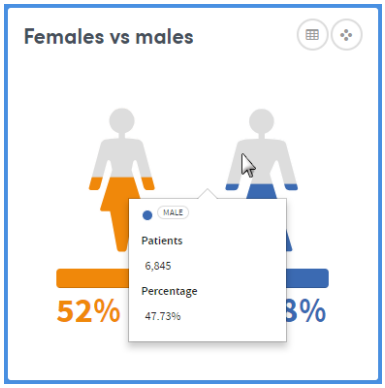
The Cohort Insights area enables in-depth exploration of any cohort you have access to. By default, it will display your **base cohort**, but you can select any of the cohorts available to you. You can then view and explore graphical representations of many different aspects of the cohort you select:



If you're new to Atmolytics, you may not have many (or any) cohorts to explore, other than your **base cohort**. Once you start using Atmolytics to create and possibly share more cohorts, you'll be able to view any of them in Cohort Insights.

Depending on the data available to you, Cohort Insights might show representations of demographic information, details of diagnoses, test results, costs, charges, or locations where patient interactions took place.

Hover the mouse over the images to see this information in greater detail.



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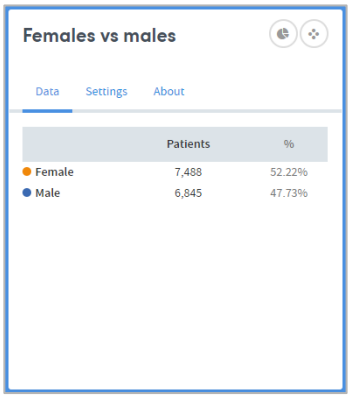
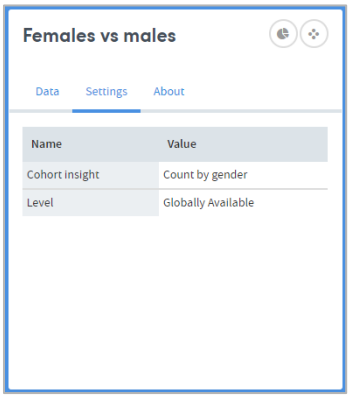
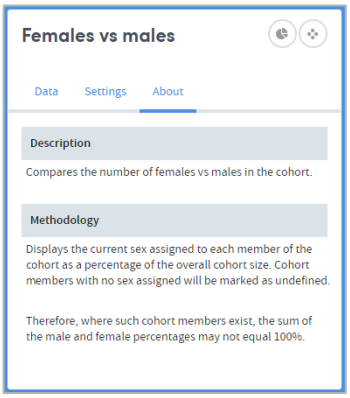
Click the symbol on the top right of each insight to see the **Data**, **Settings** and **About** tabs. These give you more information about the data and methodology used to generate the insight:

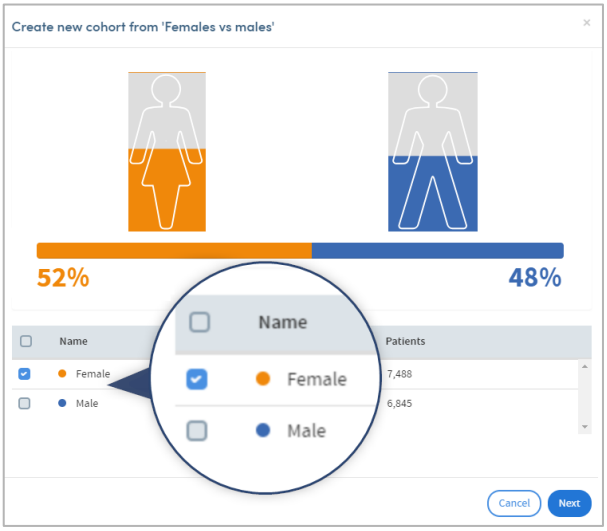




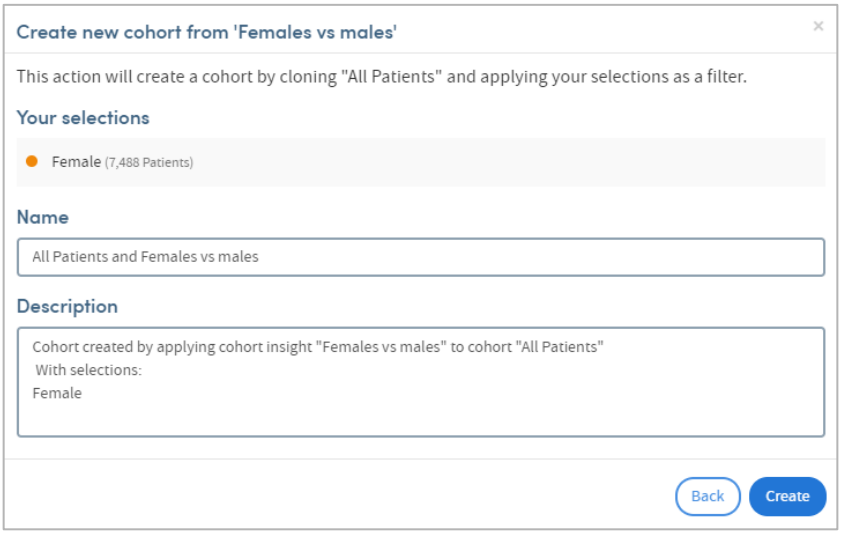


You can also create a new cohort based on the data in the cohort insight:

Click the symbol and select one or more check boxes to create a new cohort containing those individuals.



Click **Next**. The new cohort will be given a name and a description which you can change if you wish.



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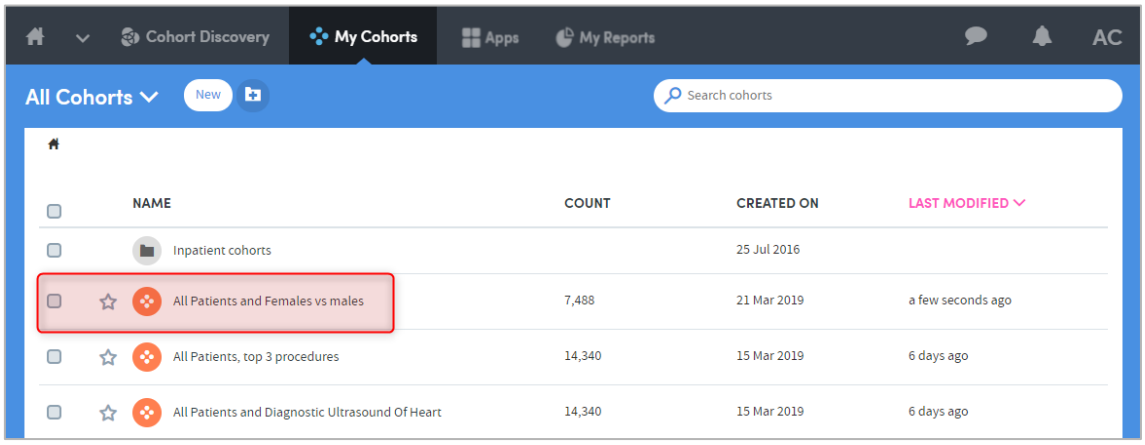
Click **Create** when you're ready. The new cohort will be created, and visible on the **My Cohorts** page:



3.1 Creating Cohort Insights

As well as seeing insights that have been built into Atmolytics for you to view straight away, you can create your own custom cohort insights with just a few clicks, following a simple step-by-step process.

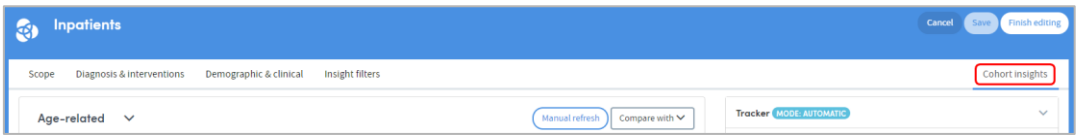
You can select the cohort insight you wish to create, the data you wish to use and how the results should be visualized. You can also create sets of insights, and choose which set to display on screen.

See our separate **Cohort Insights User Guide** for full details of these features.

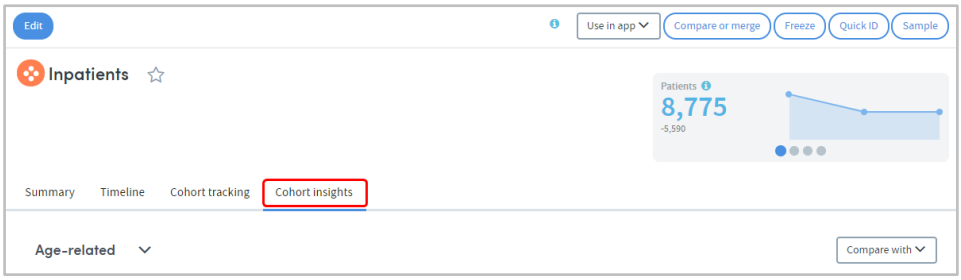
3.2 The Cohort Insights tab within Cohort Discovery

As you move into the **Cohort Discovery** area of Atmolytics, you will see that the **Cohort Insights** feature is also available there.

On creating or editing a cohort the cohort insights are available from the top-right corner.



On viewing a cohort, the cohort insights are available from the cohort insights tab.



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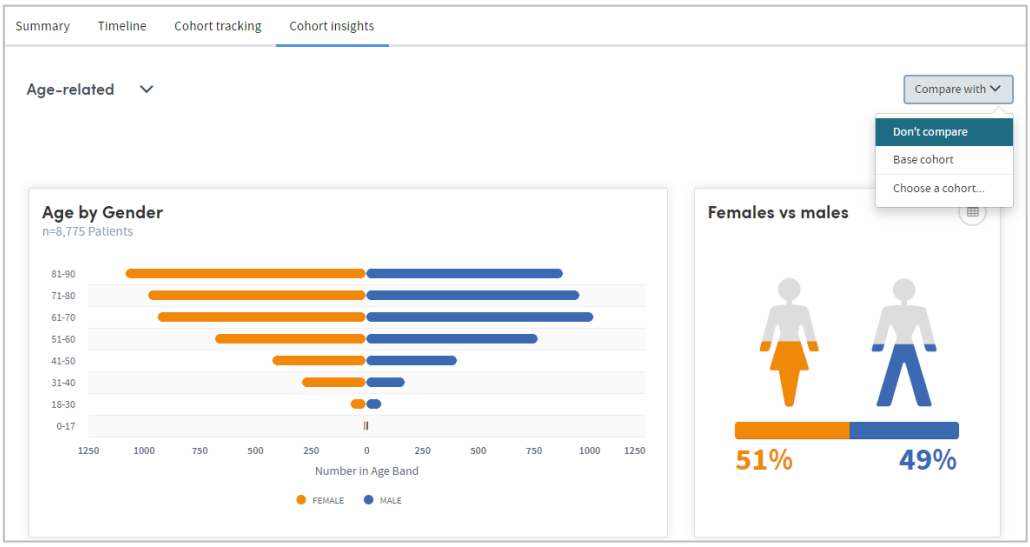
However, within Cohort Discovery, this feature moves beyond your base cohort and reflects the data contained within the particular cohort you have selected, or are currently creating or editing. It also allows you to compare this cohort with other cohorts.

This means that you can select combinations of filters and dynamically view the impact of each selection you make by clicking on the **Cohort insights** tab. These 'instant analytics' complement the more in-depth reporting provided by the Atmolytics Apps, enabling you to dynamically explore a context-specific set of indicators for any combination of cohort criteria.

3.3 Comparing Cohort Insights

The cohort insights displayed for your selected cohort can also be compared with your base cohort or any other cohort you have access to. In this way you can view an instant side-by-side comparison.

Choose the cohort you want to compare the insights with:



The insight comparisons will then be displayed.

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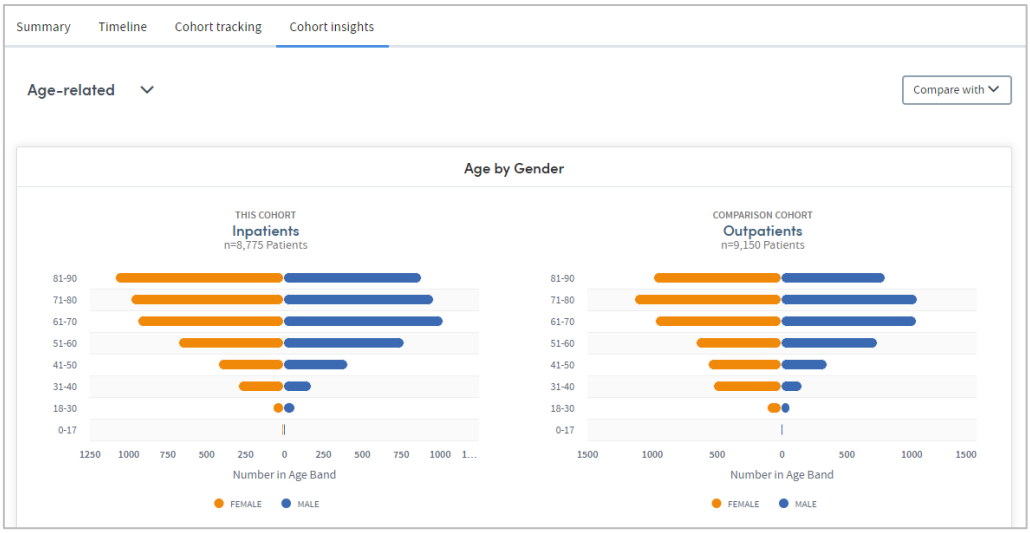

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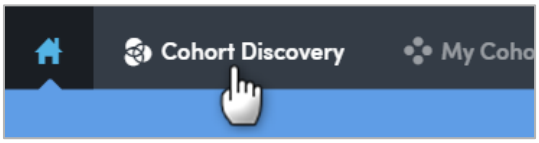
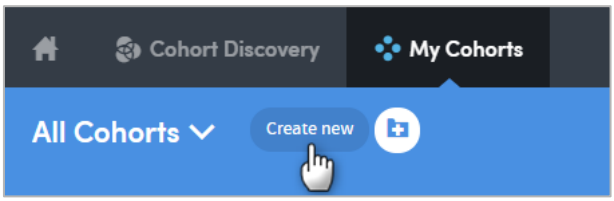
4 Cohort Discovery: getting around

The Cohort Discovery area, where you create and edit cohorts, can be accessed either by clicking on **Cohort Discovery** on the top navigation bar:

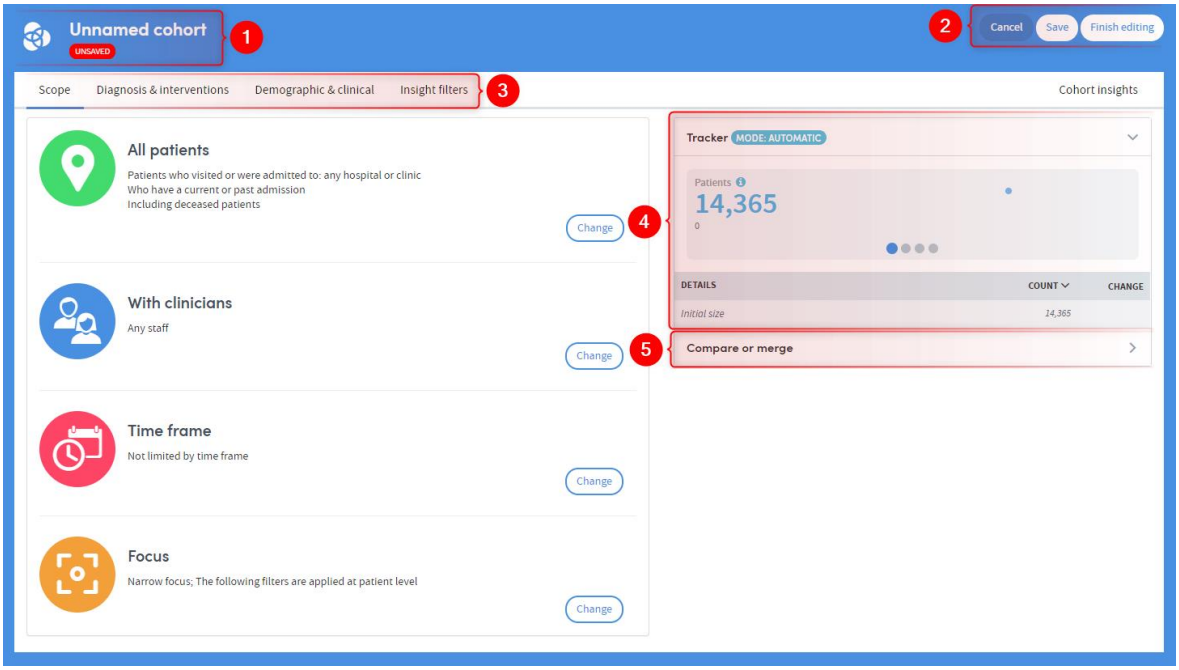


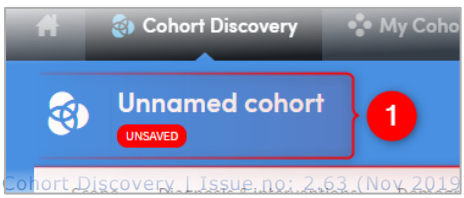
…by clicking on **Create new** within the **My Cohorts** area:



…or by clicking the **Create new** button in the **My Cohorts** area of the Activity Centre:

Whichever way, you will be taken to the Cohort Discovery screen. From here you set the criteria that will be used to select the individuals in your cohort:





Your new cohort will be given the default name **Unnamed cohort**. You can edit the name to something more appropriate at any time. Just click

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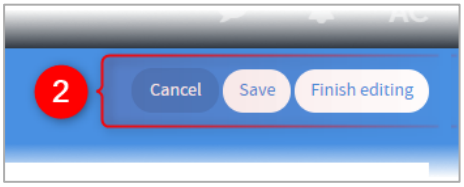
the title and you will be presented with the option of changing it and adding a description of the cohort. The description is not mandatory, but it may be useful to enter one to remind yourself (and inform others) of the thinking behind the cohort you've created (e.g. why you created it, why you selected the filters, etc.). This can be particularly helpful when you have used several filters in defining your cohort.

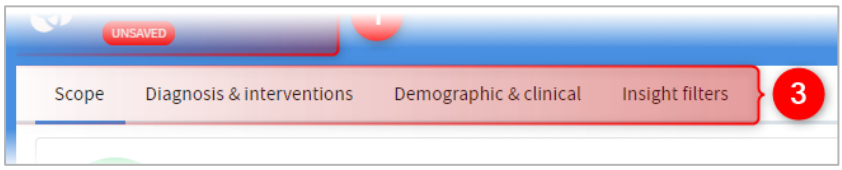
Your new cohort is labelled **UNSAVED**. It is not saved until you explicitly choose to do so by clicking either the **Save** button or the **Finish editing** button.



Click **Save** to save ongoing changes to your cohort and remain within the Cohort Discovery area. If you move away from the Cohort Discovery area the saved cohort will appear in your list of cohorts in the **My Cohorts** area.

If you click **Finish editing**, your cohort will be saved, and you will also be prompted to edit its name and add a description. You will then be taken to the **Cohort Summary** screen which shows the full details of your new cohort.

If you click **Cancel** you will be taken to the **My Cohorts** area and your work will not be saved.

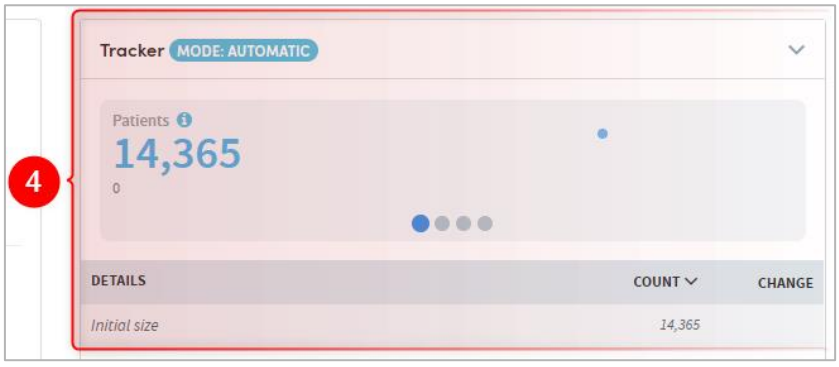


The left-hand side of the screen is where you make your filter selections to define your cohort.

Filters can be selected from four main areas:

- Scope
- Diagnosis & interventions
- Demographic & clinical
- Insight filters

A different range of options is available depending on the type of filter you are working with. These areas are explained in more detail in further sections of this guide.



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On the right-hand side of the screen is the **Tracker**. This shows you the current size of your cohort as a count, percentage, patients per 1,000 and a count of admissions in real time. It also shows how each of your selected filters affects the overall size of the cohort. The number shown upon arrival in Cohort Discovery is the number of patients in your **base cohort** (14,365 in this example).

The **Compare or merge** function allows you to compare the cohort you are currently defining with any other cohort available in your **My Cohorts** area. A dynamic output shows you the number of patients who are in both cohorts, and the number in one cohort but not the other. If you are especially interested in one of these groups of patients, you can save it as a special type of cohort called a **subgroup**.

Chapter 15 of this guide explains the Compare or merge feature in detail.

DON'T FORGET:

If you move from the Cohort Discovery area to any other part of Atmolytics while creating or editing a cohort, you must save your work first or it will be lost.

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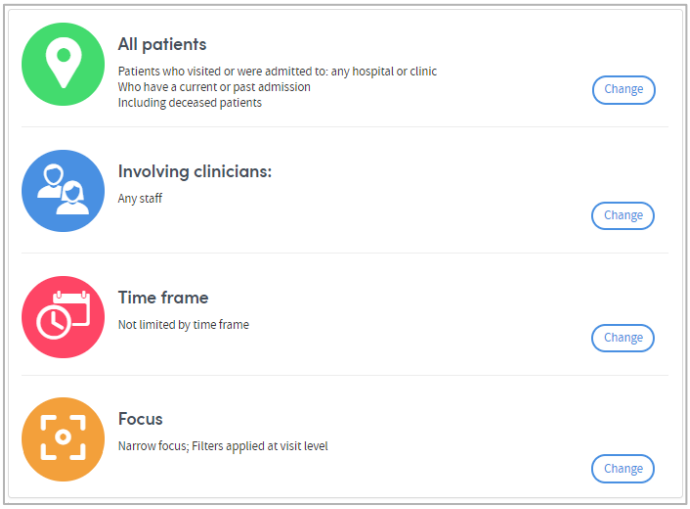
5 Scope

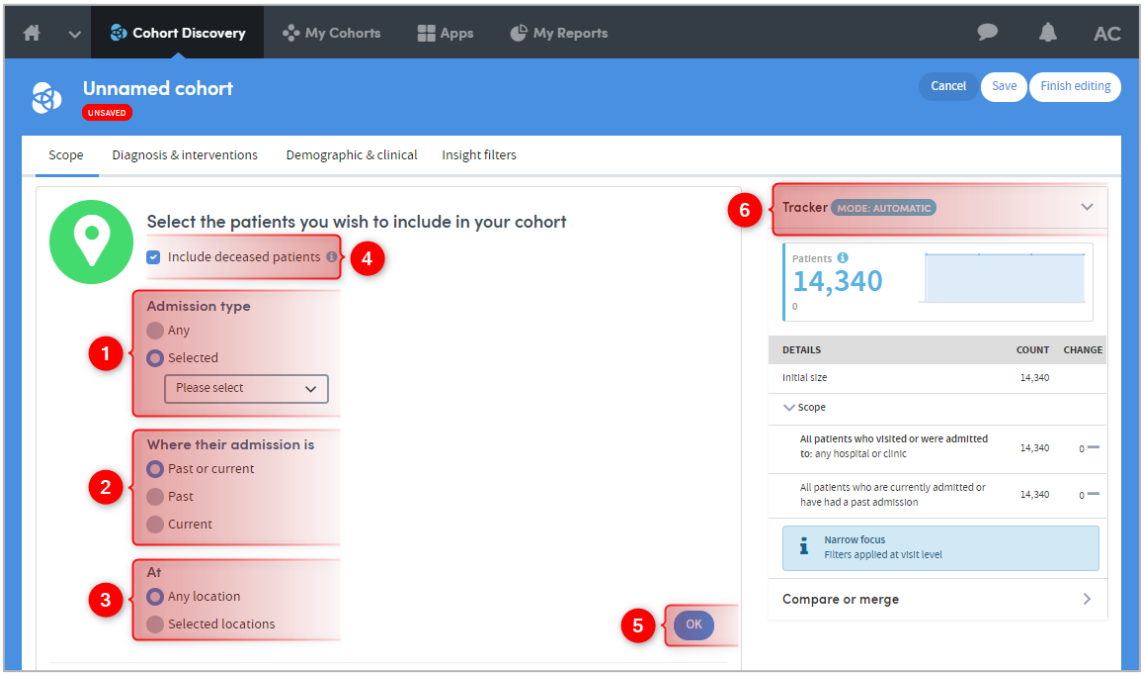
The **Scope** filters relate primarily to the clinical context in which the patient is seen. This could mean, for example, the hospital or clinic which they were involved with, the clinicians who worked with them, or the period of time during which their patient data was collected.

The Scope filters are divided into four sets of selections:



5.1 Patients

Click the **Change** button on the far right of the green **patients** icon. The screen unfolds to offer you different patient admission types and locations to choose from. The admission types will depend on the information contained within your organisation's Atmolytics data:



The screen has unfolded to show the following:

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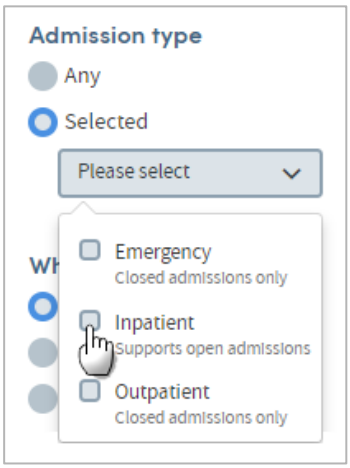
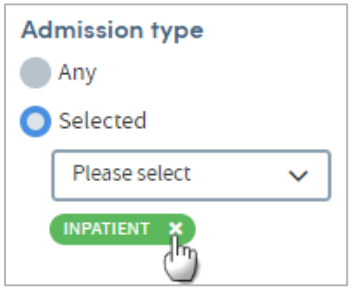
1 You can select **Any** admission type, or click the **Selected** button to access a drop-down list including (in this example) the options **Emergency**, **Inpatient** and **Outpatient**:

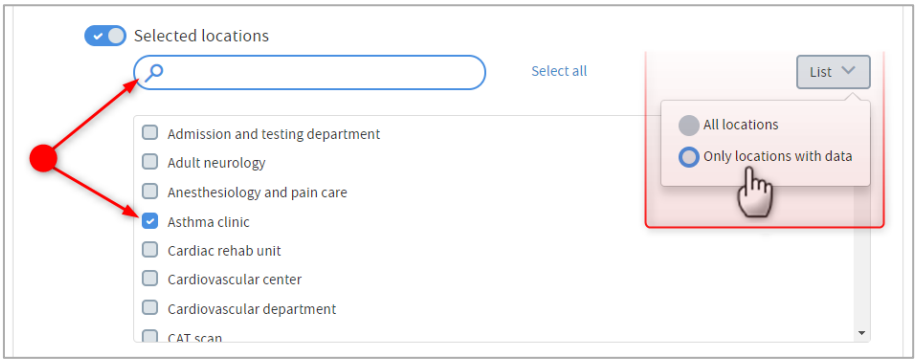




You can select any combination of these by choosing one at a time from the drop-down list. To remove a selection, click the arrow to the right of the name:

2 You can also choose the status of the patients' admission to include in your selection. Inclusion of patients whose admission is **Past or current** is the default (i.e. all the patients on the system with an inpatient admission at any time). Click the buttons here to select those who have only had a past admission, or those who only have a current admission:

3 You can select **Any location**, or click the **Selected locations** button to see a list of all the inpatient locations in your system:



Any location is selected by default, but by clicking here you can choose one or more **Selected locations** from the list, either by clicking the checkboxes, or by typing in the search field. You can also click **List** at the top right of this section to filter the list by either **All locations**, or **Only locations with data**.

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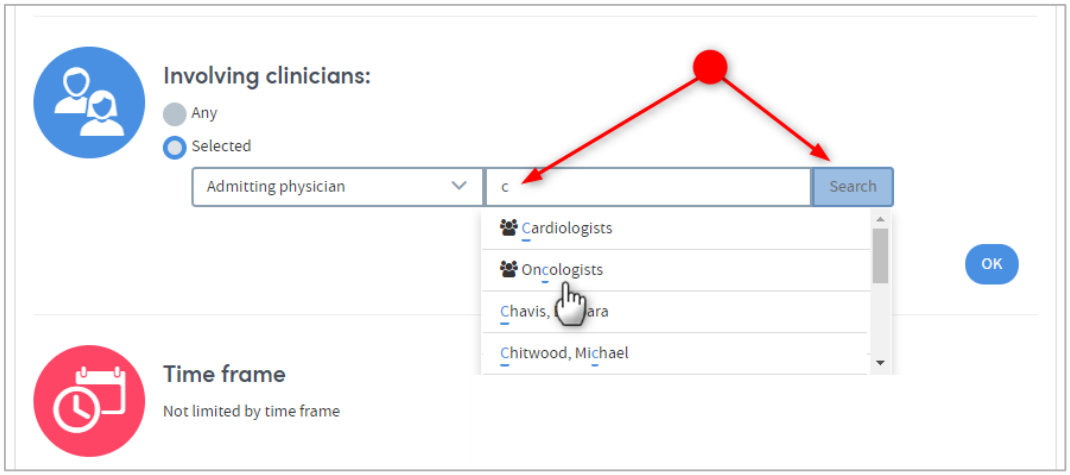
4 You can choose whether to include deceased patients in your cohort.
Note: Unchecking of this option will exclude all patients with a recorded date of death, regardless of whether they were deceased during any time frame you may select (see below).

5 Click **OK** when you have made your selections.

6 The tracker shows the impact of every selection you make on the number of patients in your cohort.

5.2 Staff

You can choose to filter patients according to the clinicians or other staff members that they were involved with during the admissions that you have just selected using the **Patients** options above. Click **Change** to the right of the blue **Clinicians** icon, then click **Selected**:



Enter your search text and click **Search**. You can search for and select clinicians according to combinations of role and name. In addition, clinicians may have been grouped into **personnel groups** by your system administrator. In the example above, personnel groups of Oncologists and Cardiologists have been set up. Selection of a personnel group will filter patients according to all members of that group.

The staff roles and the named staff members that are available to you to choose from will depend on your organisation's data and your own user permissions.

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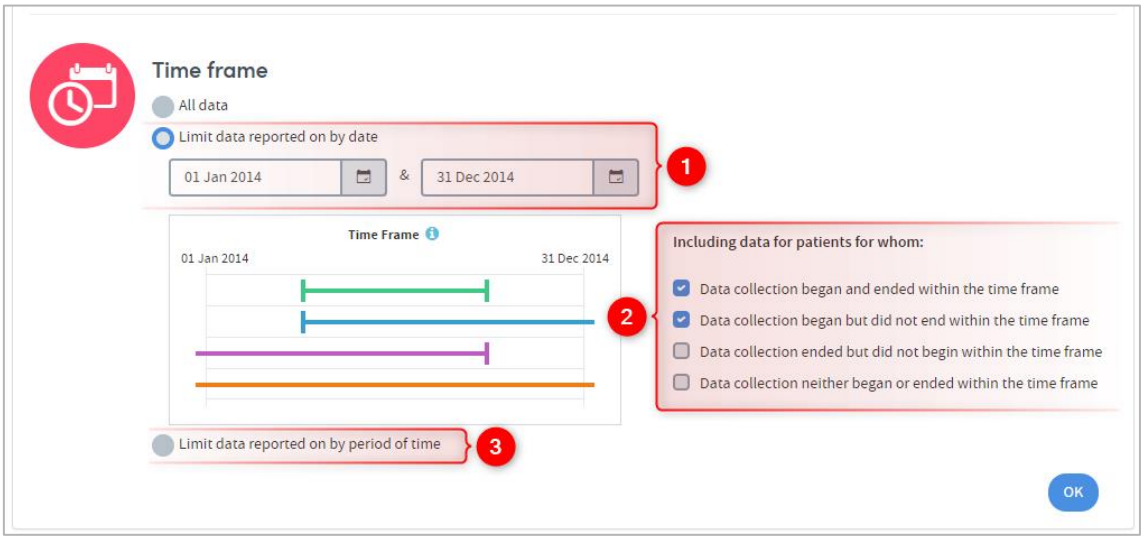
5.3 Time Frame

You can impose a **time frame** on the patients included within the cohort. Note that by setting this time frame you are choosing to include patients in the cohort according to **when their data was collected**. The timeframe is specific to the Scope settings and does not prevent the setting of other time frames using other areas of Cohort Discovery, (e.g. setting a date range on medication). You can choose to impose a specific date range, or a set period of time (the last week, the last year, etc.).



1 The time frame has been limited in this example by date range, the range selected being from 1st Jan 2014 to 31st Dec 2014.

2 Once you've set a date range you need to decide which data should be included within that date range. Because admissions themselves have a duration, there is the potential for overlap between the duration of an admission (and the data collected within it) and the date range selected. So, for example, there may be patients whose data collection began before 1st January 2014 but who were still in hospital during January 2014. Do you want to include such patients in your cohort?

3 As well as setting specific date ranges you can also filter patients by **period of time**, e.g. all patients admitted to hospital in the past three months. This can be very useful when producing reports on a regular basis. For example, if every Monday you want to create a report containing data collected from all patients admitted in the past week, then it will be easier to do this by defining a single cohort: 'Patients whose data collection began within the past week' and scheduling a report using this cohort to run every week, rather than producing a new cohort each week and specifying the dates of the beginning and end of the past week.

It's important to note that your selection will have an impact on report outputs. For example, if you include patients who were in hospital at the beginning of 2014 and still not discharged at the end then this may have a significant impact on calculations of length of stay for that cohort.

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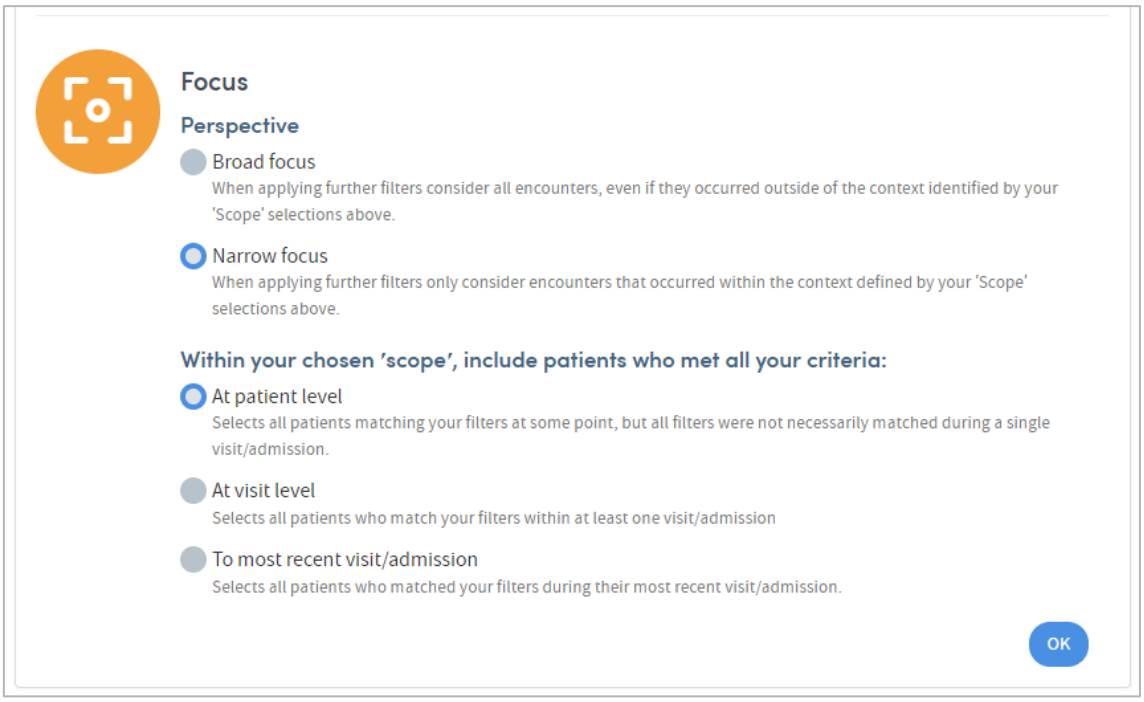
5.4 Focus

Remember that within the Scope section of Cohort Discovery, you're setting the **clinical context** of the patients in the cohort you're creating. You use the Scope settings to determine, for example, which hospital the patients were admitted to, under the care of which clinician, during which period of time. You'll use other features of Cohort Discovery to apply filters using clinical, demographic or diagnostic criteria.

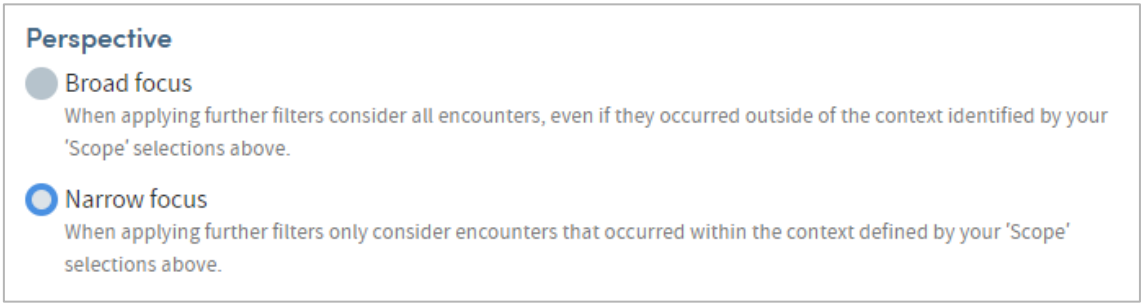
The **Focus** section determines the 'area' from which the patients in your cohort will be selected:



It has two parts, **Perspective** and **...include patients who...**

5.4.1 Perspective

Perspective has two options: **Broad focus** and **Narrow focus**. Narrow focus is selected by default:



An example will help to clarify the difference between **Broad focus** and **Narrow focus**. We're using Admission type, clinician and a diagnostic filter here, but the same rules apply to any of the Scope settings (Patients, Clinicians, Time frame) and any subsequent filter criteria (diagnoses, test results, etc).

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Our Atmolytics user, **Jane Smith,** creates a cohort by setting the following Scope parameters:

- Admission Type: **Dental**
- Clinician: **Dr Robinson**

One of the members of Jane Smith's base cohort is **Patient A**. Patient A had a dental admission where the clinician was Dr Robinson. Patient A was also seen by **Dr Stuart** in a separate inpatient admission, where he was diagnosed with diabetes. Since he matches the Scope criteria of a dental admission with Dr Robinson, he's included in the new cohort at this point.

Next, Jane Smith creates a **Diagnosis & intervention** filter (this is covered in Chapter 7) to find patients assigned a diabetes diagnosis.

Narrow focus

> **Narrow focus** means the Scope settings will remove all admissions apart from the ones where the patient attended Dental and the clinician was Dr Robinson. All **subsequent** filters (i.e. the diabetes diagnostic filter) will **only be applied to Dental admissions where the clinician was Dr Robinson**.
>
> Choosing Narrow focus here would mean that in this case, no relevant patients would be found, because Dr Robinson, being a dental clinician, wasn't the clinician to assign the diabetes diagnosis. The Scope filter would remove all the relevant admissions, because different clinicians would have been involved.
>
> Patient A would no longer be included in the cohort, despite his diagnosis, because he was diagnosed with diabetes by Dr Stuart during an inpatient admission, NOT by Dr Robinson during a dental admission.

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Broad focus

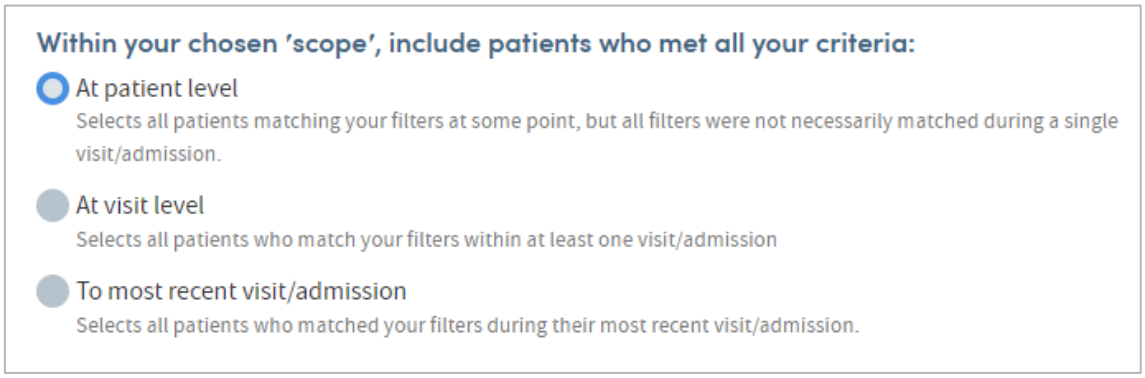
If Jane Smith chooses **Broad focus**, the Scope settings will still remove all admissions except the ones where the patient attended Dental and the clinician was Dr Robinson. At this point, Jane's new cohort will still contain the same number of patients as it would using Narrow focus.

However, all **subsequent** filters (i.e. the diabetes diagnostic filter) **will be applied to all admissions for the identified patients regardless of the type of admission or the clinician** (however, the total 'pool' of patients is always limited to those in Jane Smith's own base cohort).

As we are now considering **all** admissions belonging to dental patients seen by Dr Robinson, Patient A is included in the cohort. Dr Stuart diagnosed Patient A with diabetes during an Inpatient visit, but because Broad focus includes **all** admissions for Patient A, he would now meet the criteria "Diagnosis of diabetes".

5.4.2 …include patients who…

The various clinical, demographic or diagnostic filters you may choose to specify can be applied at one of two levels: the **patient** level or the **visit/admission** level. If applied at admission level, they may be applied across all admissions or across only the most recent visit/admission for each patient:



At patient level. If filters are applied at patient level, then all patients will be identified for whom all filters are or have been true at some point in time. However, these options need not have been true concurrently. So, for example, a patient may have had a headache at some point in their life and may also have taken paracetamol but may never have taken paracetamol to treat a headache. Nevertheless, they will be identified as a member of the cohort if both statements are true.

At admission/visit level. In contrast, if filters are applied at admission/visit level then a patient will only belong to the cohort where **had a headache=true** and **taken paracetamol=true** if both statements were true within a single admission (regardless of when this single admission took place). This option therefore captures a strong element of what might be meant by the filters being true 'concurrently'.

To most recent admission/visit. In this final case the filters are applied only to the most recently-commenced data collection for each patient rather than to all historic instances. So, for example, if you wanted to identify all patients who upon their most recent discharge had a headache and were taking paracetamol then you would select

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Have a past admission under **Scope**, **headache=true** and **paracetamol=true** under clinical filters and apply this **most recent** clinical filter to the data.

As Atmolytics can count and display patients without admissions, it's important to note that if a cohort focus is not selected as **patient level**, the patients without admissions will be excluded. As part of an Atmolytics installation some configuration settings will need to be changed if **no admission data** is to be imported into Atmolytics, as the system would need to default to **patient level** focus.

5.5 Combining Scope selections

The different types of scope selection are closely connected. For example, if you select **Location X** and **Doctor Y**, then you will only be selecting the patients who saw Doctor Y while receiving care at Location X. Similarly, if you then select a time frame of 1st January – 31st December 2014, selecting only patients whose data was collected within that time frame, you will then be only selecting patients who were seen by Dr. Y in Location X during 2014.

5.6 When to avoid using the Scope feature

Whilst it can be tempting to apply Scope criteria in most cohort definitions, it should be pointed out that this is often not needed. For example, if you wished to report upon admissions to **Hospital A** during **2014** there is no need to restrict your cohort by setting the following Scope filters within the cohort definition:

- Hospital = **A**
- Date range = **1st Jan 2014 - 31st December 2014**

This is because during report creation you have several options when selecting the data to be included in the report. At that stage you can limit the report to admissions to **Hospital A** in **2014**.

Furthermore, if you include **Hospital A** in the cohort definition then, unless you also select Hospital A as the sole data source during report creation, you could easily end up creating a report that covers data pertaining to admissions to **Hospital B** as well as Hospital A (patients in your cohort who were admitted to Hospital A in 2014 may also have other data recorded about admissions to Hospital B, which could be included in the report output if you don't actively exclude it).

The critical point is for you to be clear in yourself about the difference between:

- The **patients** who need to be included in the **cohort**, and
- The **data about those patients** that needs to be included in any **report**.

5.7 Saving your work

Once you're happy with the filters you've applied, click the **Save** or **Finish editing** buttons at the top right of the screen.

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DON'T FORGET:

If you move from the Cohort Discovery area to any other part of Atmolytics while creating or editing a cohort, you must save your work first or it will be lost.

5.8 Exercise 1

Before going further, stop and try out the features described so far:

- Check your base cohort.
- Click each of the **Change** buttons under **Scope** and see what happens.
- Create some cohorts using the **Scope** filters
- Name the cohorts as you please and in each case check that the cohort has been saved to your **My Cohorts** area.

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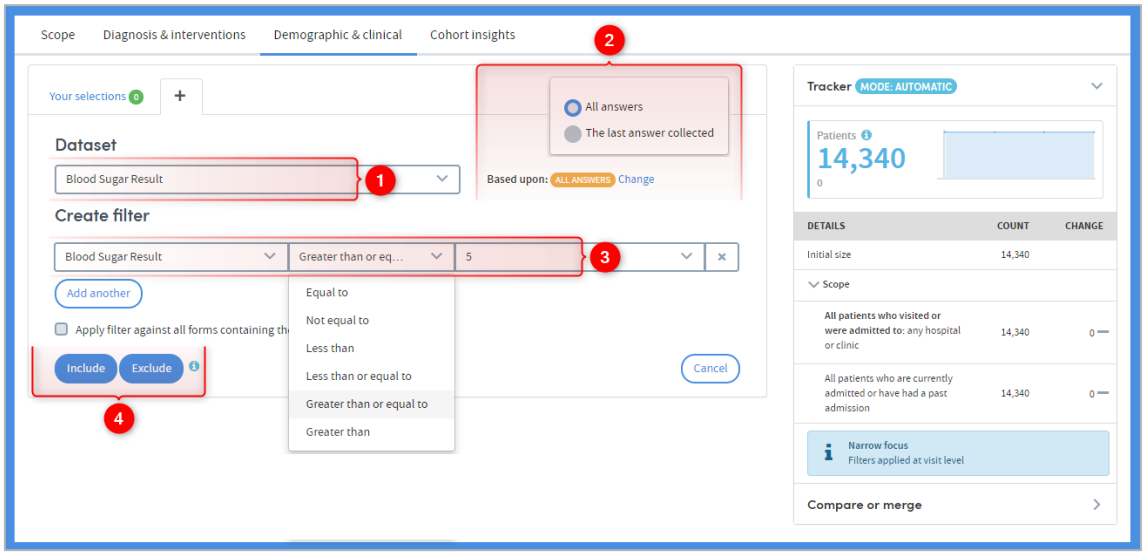
6 Demographic & Clinical

The **Demographic & Clinical** area enables you to select patients based on combinations of filters from the various datasets available to you in Atmolytics. Any data item included within any dataset will automatically be available to you as a filter within Cohort Discovery. The process for selecting filters and the various options available are described below.



1 First, select the **Dataset** from which you wish to choose your filters. In this example, the user has selected the Blood Sugar Results dataset.

2 Click **Change** to choose whether to include **All answers** or **The last answer collected**.

By default, each filter is applied to **All answers**, i.e. all the data collected from each patient currently included within the cohort. However, there may be instances where it matters when the selected value was recorded.

For example, you might wish to see whether there were any patients who, upon discharge, had a Beck Depression Inventory Score of greater than 25. This might be of concern as it might imply the patient was being discharged while still a potential suicide risk.

In this case the option **Based upon: All answers** can be altered to **Based upon: The last answer collected**, by clicking on **Change**.

When this selection is made the filter will be applied to the most recent answer within each admission/visit, i.e. the answer closest to the date of discharge, rather than any and all answers recorded for each patient.

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3 Browse through the list of items within the dataset and select one. Every selection has three elements:

- The **data item** or question, e.g. Temperature
- An **operator**, e.g. greater than
- The **answer**, e.g. 39.2c

So, in the example above the user has selected **Blood Sugar Result greater than or equal to 5** as a filter.

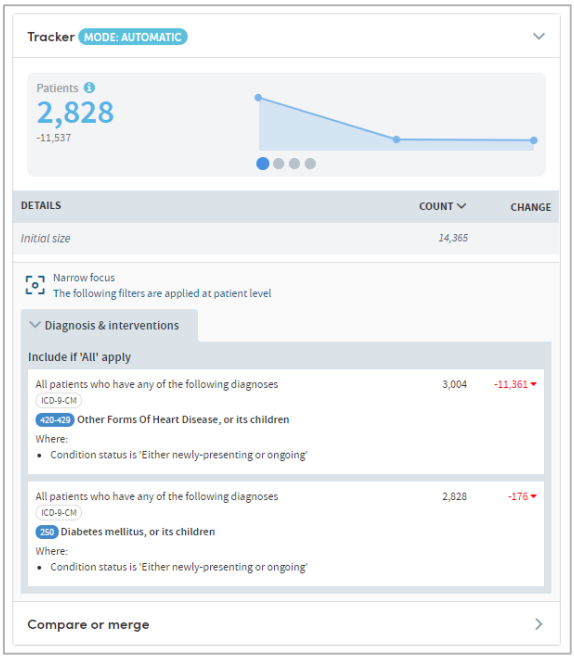
Click the **X** on the right if you want to remove a filter after you have set it.

4 At the bottom of the screen there are two buttons, **Include** and **Exclude**. When you've created a filter, the last step is to choose whether your cohort should **include** or **exclude** the patients meeting it, by clicking on one of these options. Once you've done that, your filter will be applied, and you can select another dataset or data item if you wish to add more filters.

If you want to create several **Include** filters from the same dataset, click **Add another** to add more filter items from the selected dataset, before clicking on the **Include** button. The same applies to the **Exclude** option.

6.1 The Tracker

As you create and apply filters, the Tracker on the right of the screen will show how many patients match these criteria:



Here, we can see that 2,828 patients out of a total base cohort of 14,365 match the selected demographic and clinical criteria.

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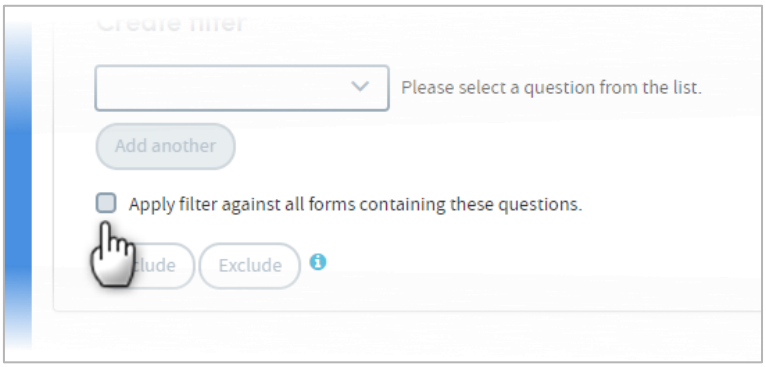
6.2 The Apply filter function

Just below the **Create Filter** fields on the **Demographic & Clinical** screen, you'll see a small check box:



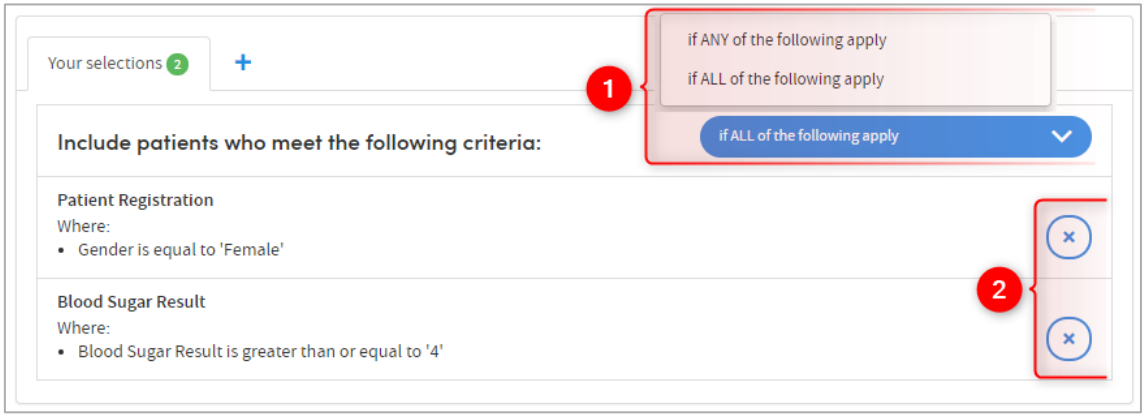
This allows you to apply a filter against ALL forms which contain the selected question(s), rather than just the selected form/dataset.

For example, you might select the Beck Depression Inventory dataset, to see whether there were any patients who had a Beck Depression Inventory Score of greater than 25. If the Beck Score was also recorded in another dataset for some patients, then this feature will identify all patients who have a Beck score of >25, whether the score was recorded in the Beck Depression Inventory dataset or any other dataset.

6.3 Removing and viewing filters

The number of filters you have created can be seen next to **Your selections** towards the top left of the screen:

You can view and, if applicable, make further decisions about how your filters are applied in the **Your selections** tab:



1. Click the white down-arrow to choose whether to select patients who meet **ALL** the criteria or **ANY** of the criteria. This can be selected separately for both inclusions and exclusions.

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Typically, for inclusions you might wish to **include all** patients for whom the inclusion filters apply but **exclude** patients if **any** of the exclusion filters apply.

2 Click the cross to remove a filter from your selections.

6.4 Saving your work

Once you're happy with the filters you've applied, click the **Save** or **Finish editing** buttons at the top right of the screen.

DON'T FORGET:

If you move from the Cohort Discovery area to any other part of Atmolytics while creating or editing a cohort, you must save your work first or it will be lost.

6.5 Exercise 2

- Create two cohorts that you are especially interested in, using combinations of **Scope** and **Demographic and clinical** filters.
- Create larger and smaller versions of these cohorts using your selected **Demographic and clinical** filters by:
    - Identifying cohorts for whom **any** and **all** inclusion filters apply.
    - Adding in one **exclusion** criterion.
    - Adding in two **exclusion** criteria and selecting both the **if any apply** and **if all apply** options.
- Create a cohort of patients who do NOT meet a clinical or demographic criterion, e.g. all patients NOT receiving a particular medication.

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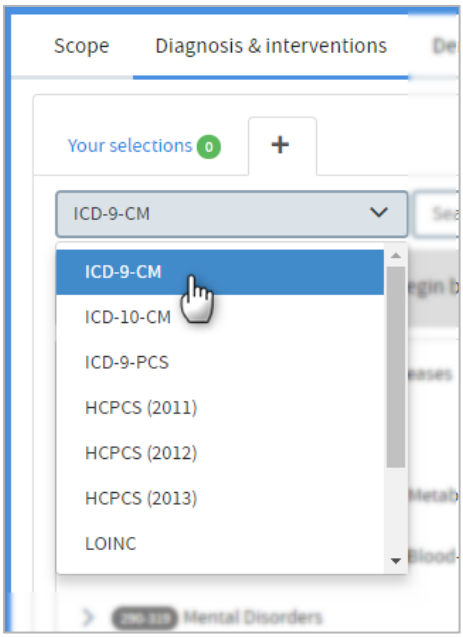
7 Diagnosis & Interventions

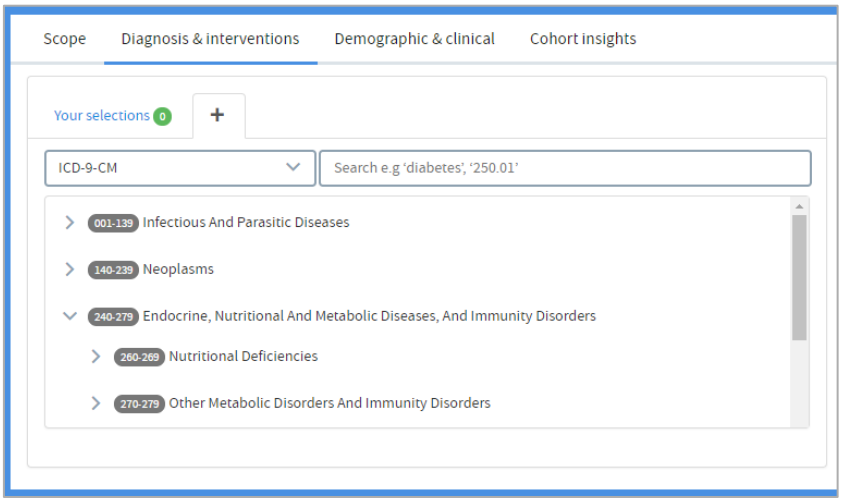
The **Diagnosis & interventions** area enables you to select combinations of filters from the various clinical coding systems available to you within Atmolytics. Any data item included within any coding system will automatically be available to you for selection as a filter within Cohort Discovery. The process for selecting filters and the various options are described below.

7.1 Selecting a clinical coding system

Use the drop-down list to select a coding system:



In this example, this user has selected ICD9-CM. The screen will display a list of the items contained within the coding system. If the system is structured as a hierarchical classification, the list will reflect the levels of the hierarchy:



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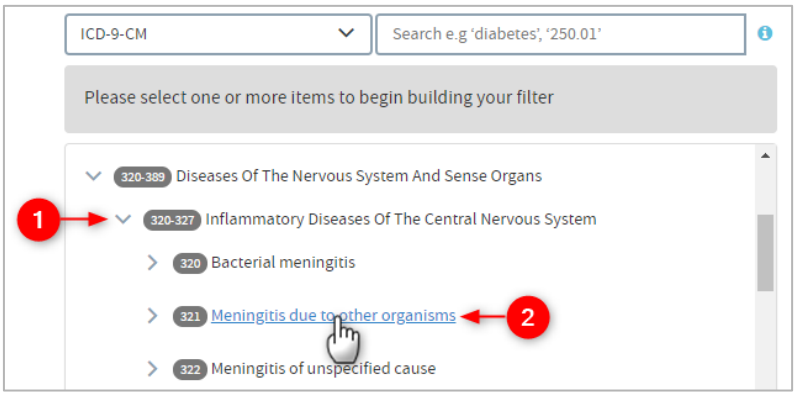
7.2 Selecting filter items

Browse through the list of items within the clinical coding system and select one.

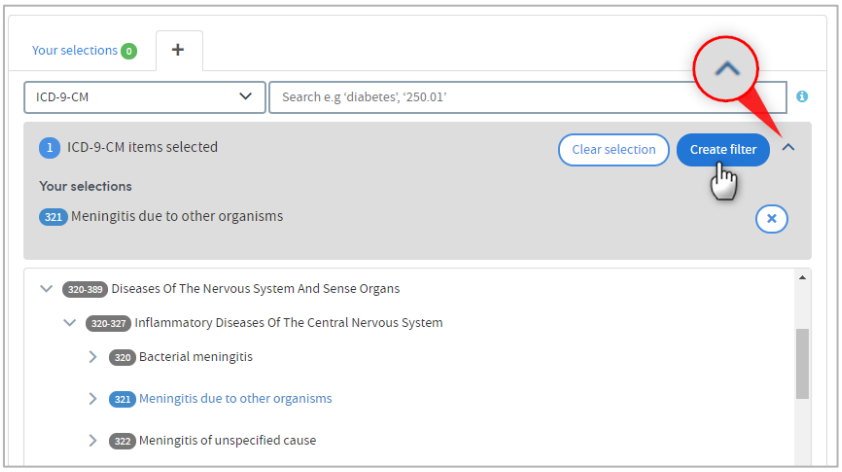
You can locate items either by browsing or by searching (by code or term). You can choose an item from any level of a list. Doing so automatically selects the item and all its descendants.

Selecting items by browsing



1 Browse the list of items by clicking on the arrows on the far left to move up and down between the levels.

2 Click the text of an item to select it:



Click the small down-arrow on the right to see details of your selection.

Click **Create filter** to move to the next step and refine your selection (see 7.3), or continue to choose further items to create a **combined selection** (see 7.6 for details of the latter)

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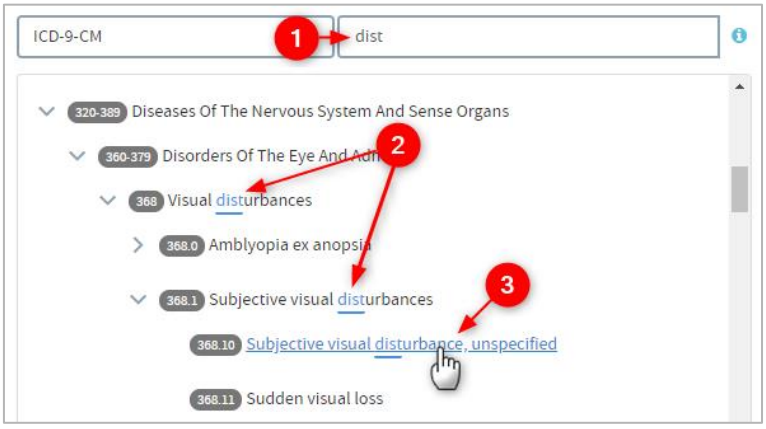
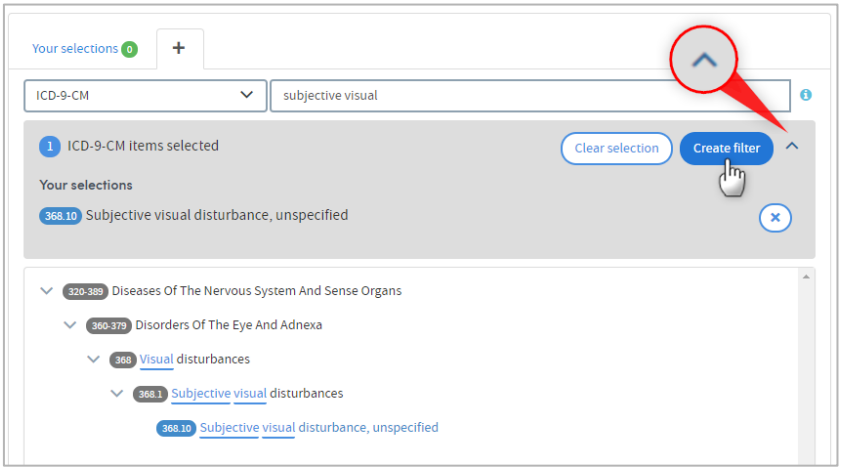
Selecting items by searching



1 Type your search term into the text box. As you can see above, you do not need to type in a complete word or code.

2 As you type, the list below will display all the items containing your search term, wherever it appears in the term text.

3 Click the text of an item to select it:



Click the small down-arrow on the right to see details of your selection.

Click **Create filter** to move to the next step and refine your selection (see 7.3), or continue to choose further items to create a **combined selection** (see 7.6 for details of the latter)

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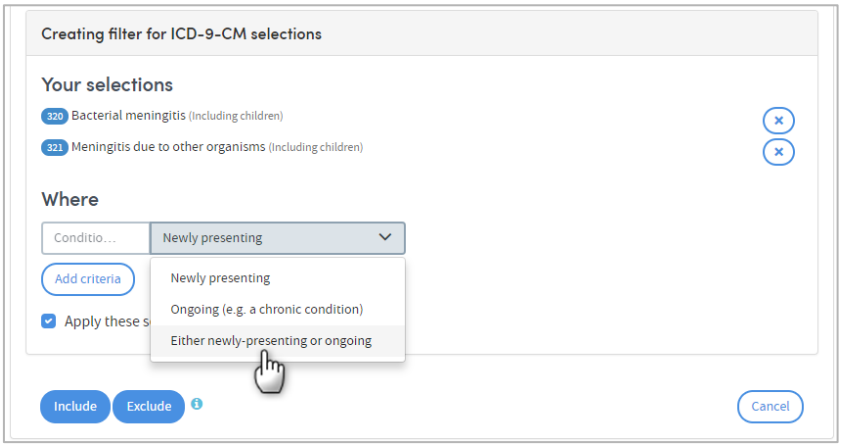
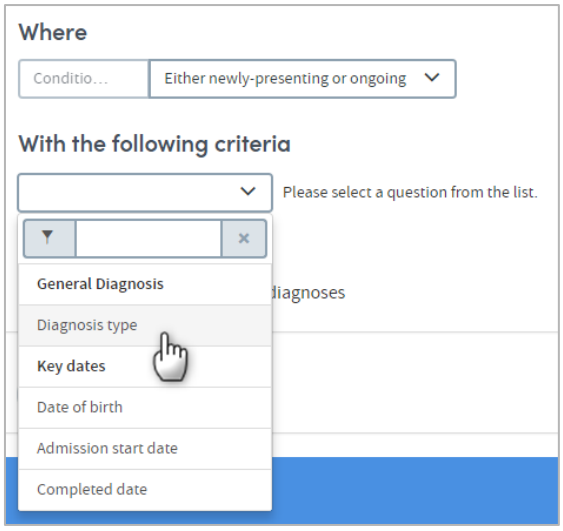
7.3 Refining a selection



If it's appropriate to the coding system you have selected, you will be given further filtering options once you've selected an item and clicked **Create filter**. Above, we can see that for the diagnostic data of ICD9-CM, you have the option of filtering by **Condition status**. Select from the drop-down list.

You may also have an option to **Add criteria**:

Click this button to access drop-down lists that enable you to filter by, for example, diagnosis type or patient's date of birth. The choices available to you will depend on your own Atmolytics data. In the following example, we're filtering by primary diagnosis. We select **Diagnosis type** from the first drop-down list:



…choose **Equal to** as the operator, and **Primary** from the final list:

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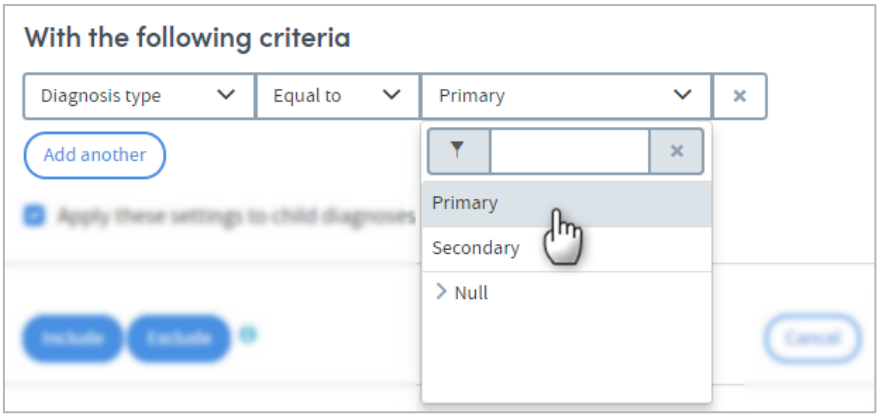
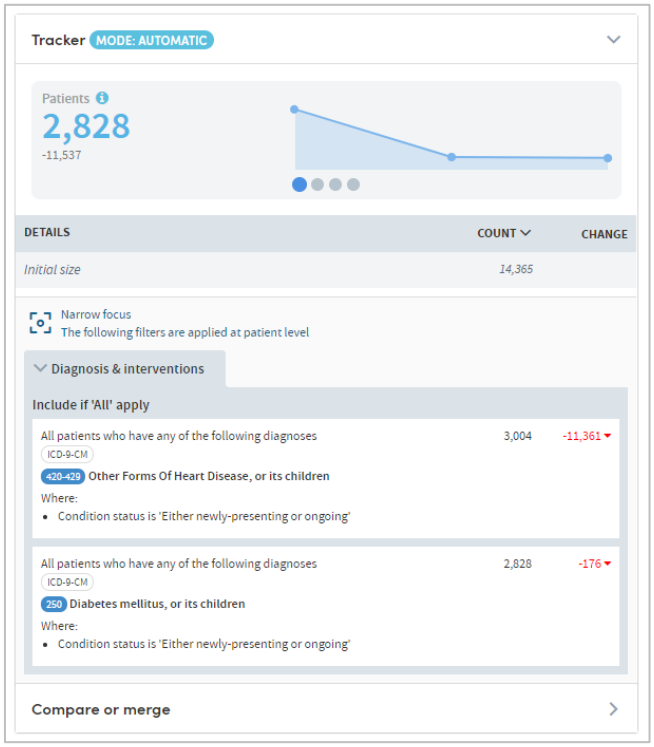


Click **Add another** to add more criteria if desired.

At the bottom of the screen, there are two buttons: **Include** and **Exclude**. When you've created a filter, the last step is to choose whether your cohort should include **or** exclude the patients matching it, by clicking on one of these options. Once you've done that, your filter will be applied, and you can select more items (from the same, or any other coding system) if you wish to add more filters.

7.4 The Tracker

As you create and apply filters, the Tracker on the right of the screen will show how many patients match these criteria. Here, we can see that 2,828 patients out of a total base cohort of 14,365 match the selected diagnostic criteria:



7.4.1 Cohort size

The cohort size can represent a patient count, a percentage of patients relative to the base cohort, how many patients per 100 meet the criteria relative to the base cohort, or a count of the number of admissions the patients matching the criteria have had.

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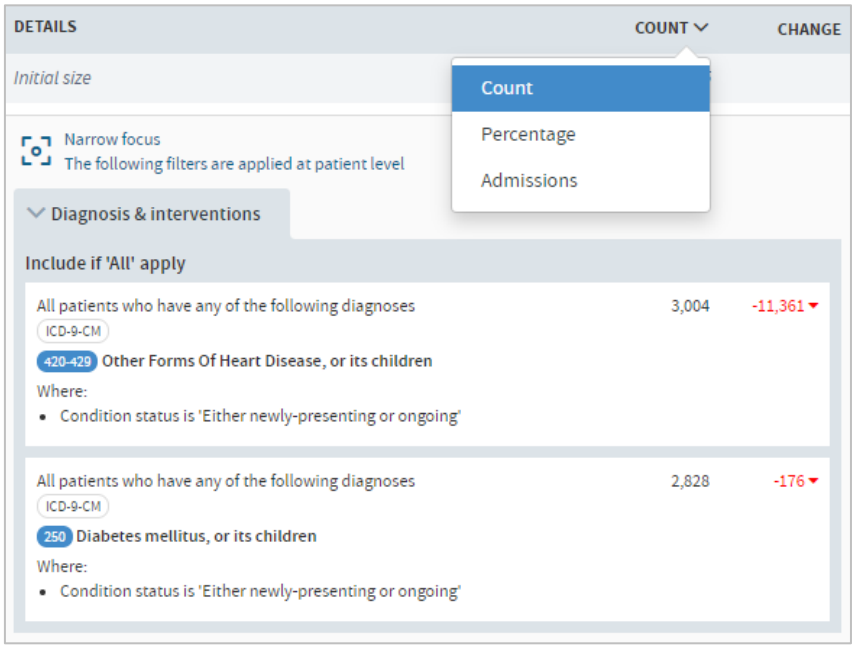
Simply use the toggle feature to access the different cohort size views:

Depending on your reporting requirements you can also choose to view the size of your cohort as a patient count, a percentage of patients, or number of admissions in the tracker using the picklist below:



It's important to note that if no admissions-related data has been imported into Atmolytics then the tracker will not display admission counts.

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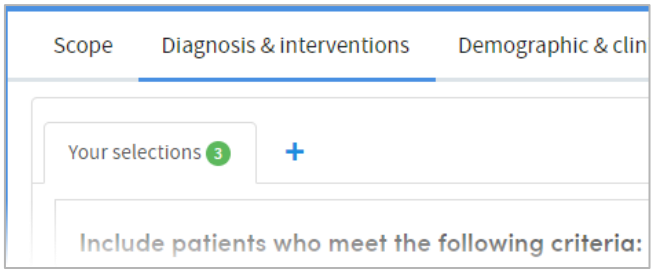
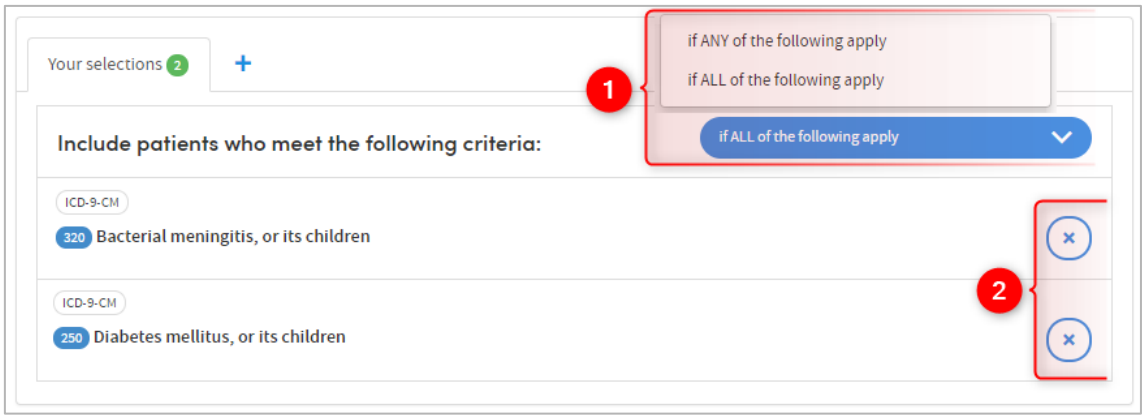
7.5 Removing and viewing filters

The number of filters you have created can be seen next to **Your selections** towards the top left of the screen:



You can view and, if applicable, make further decisions about how your filters are applied in the **Your selections** tab:



1 Click the white down-arrow to choose whether to select patients who meet **ALL** the criteria or **ANY** of the criteria. This can be selected separately for both inclusions and exclusions.

Typically, for inclusions you might wish to **include all** patients for whom the inclusion filters apply but **exclude** patients if **any** of the exclusion filters apply. For example, you might wish to identify all patients who had a diagnosis of depression and were receiving antidepressants, but exclude those who had an additional diagnosis of schizophrenia or bipolar disorder.

2 Click the cross to remove a filter from your selections.

7.6 Grouping clinical code selections

When you're selecting clinical codes, it's possible to choose multiple codes and group them into one selection. After choosing as many codes as you need and clicking on **Create filter**, the codes you selected remain grouped into one filter. The other steps you follow (new or ongoing presentation, include or exclude, etc) will apply to all the codes in your combined selection.

The filter will be based on if a patient has been coded with **ANY** of the codes in the filter (rather than **ALL**).

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The benefit of this is that the details of your selection will be summarised within the tracker in line with the selection made.

Note: You can filter on multiple codes only when selecting items from the same Coding System.

7.7 Saving your work

Once you're happy with the filters you've applied, click the **Save** or **Finish editing** buttons at the top right of the screen.

DON'T FORGET:

If you move from the Cohort Discovery area to any other part of Atmolytics while creating or editing a cohort, you must save your work first or it will be lost.

7.8 Exercise 3

- Create two cohorts that you are especially interested in, using combinations of **Scope** and **Diagnosis and interventions** filters.
- Create larger and smaller versions of these cohorts using your selected **Diagnosis and interventions** filters by:
    - Identifying cohorts for whom **any** and **all** inclusion filters apply.
    - Adding in one **exclusion** criterion.
    - Adding in two **exclusion** criteria and selecting both the **if any apply** and **if all apply** options.
- Create a cohort of patients who do NOT meet a Diagnosis and interventions criterion, e.g. all patients who do NOT have a particular diagnosis.

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8 More about selecting multiple filters

When two or more filters are chosen from a single dataset, the selections have a different effect depending upon whether they are selected 'together' or separately.

For example, if you:

1. Select the **Risk Assessment** dataset and the question: **suicide risk=high**;
2. Click **add another**;
3. Select **risk to others=high**;
4. Click **include**.

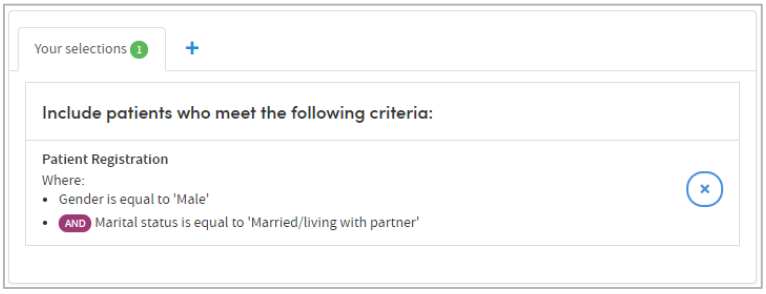
You will identify all patients for whom *within a single instance of that dataset* (i.e. within a single risk assessment), had a high risk of suicide *and* a high risk to others.

However, if you add an extra step to the process (step 2):

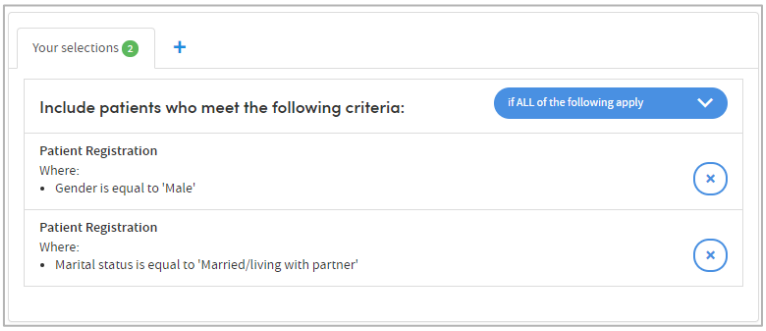
1. Select the **Risk Assessment** dataset and the question: **suicide risk=high**;
2. Click **include**;
3. Click **add another**;
4. Select **risk to others=high**;
5. Click **include**.

This will select all patients for whom both selections have been true, but *not necessarily within the same instance of that dataset*.

The two different approaches to selection display differently as shown in the images below. In the first case the two selections are displayed as a single selection:



Whereas in the second case they are displayed as two separate selections:



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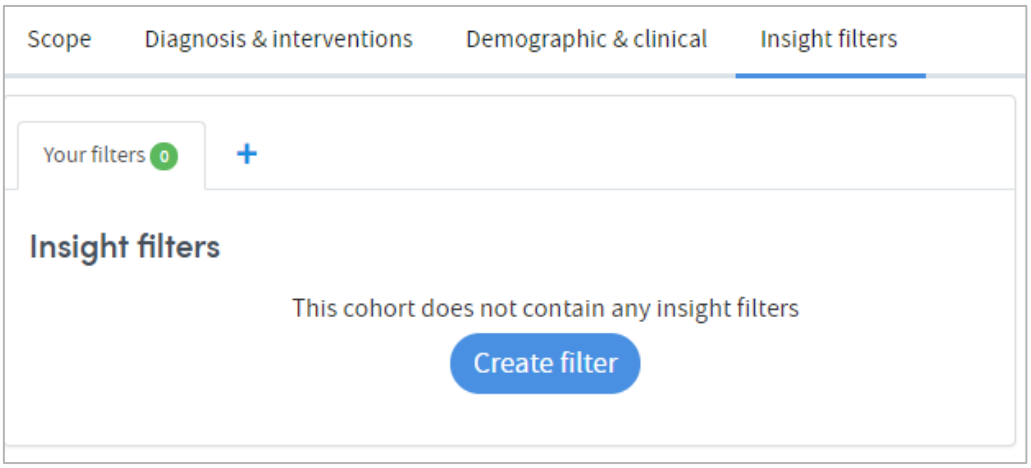
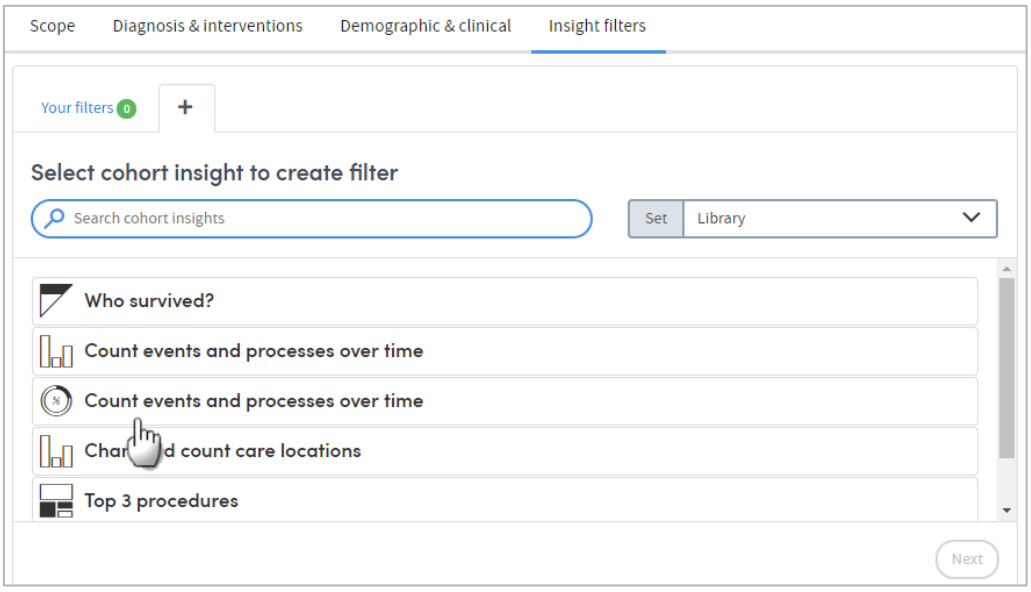
9 Insight Filters

You can use **Cohort insights** as cohort filter criteria, as well as the existing **Scope**, **Diagnosis & interventions** and **Demographic & clinical** options.

Click the **Insight filters** tab in the Cohort Discovery area:



Any insight type which supports filtering will be available to you. Click **Create filter** to select one:



Next, you'll choose the filter criteria from the data available to you:

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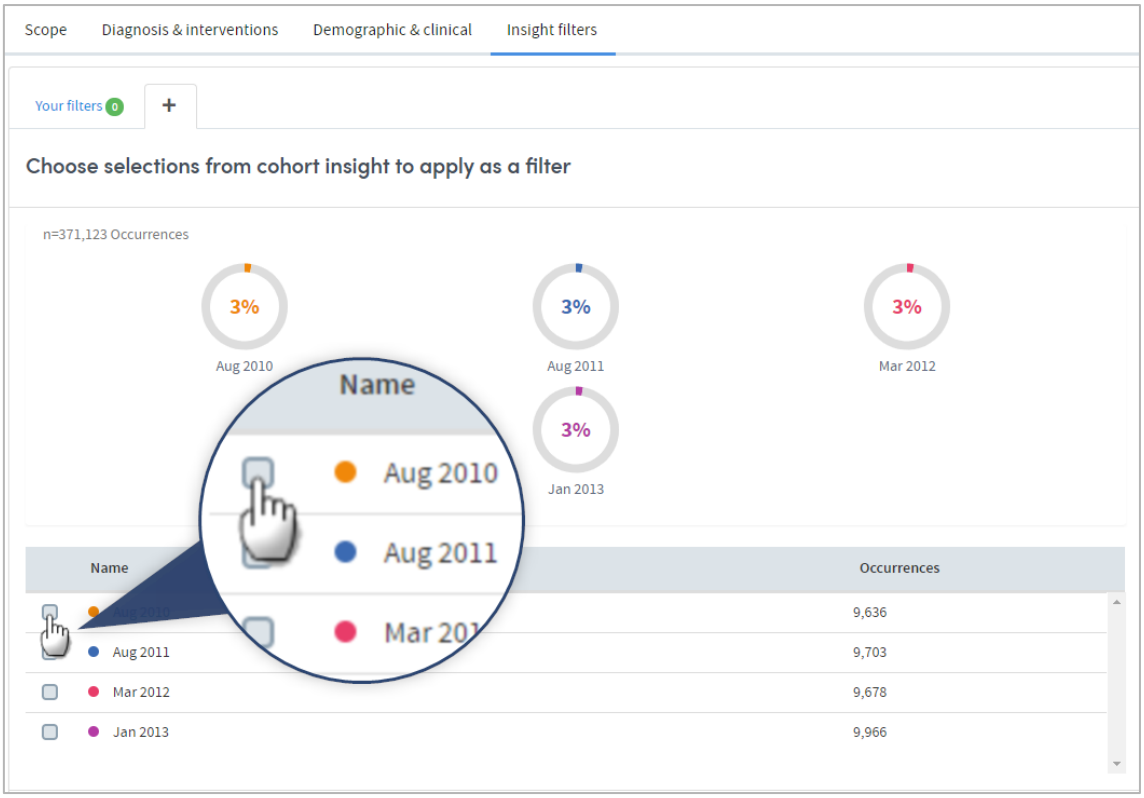
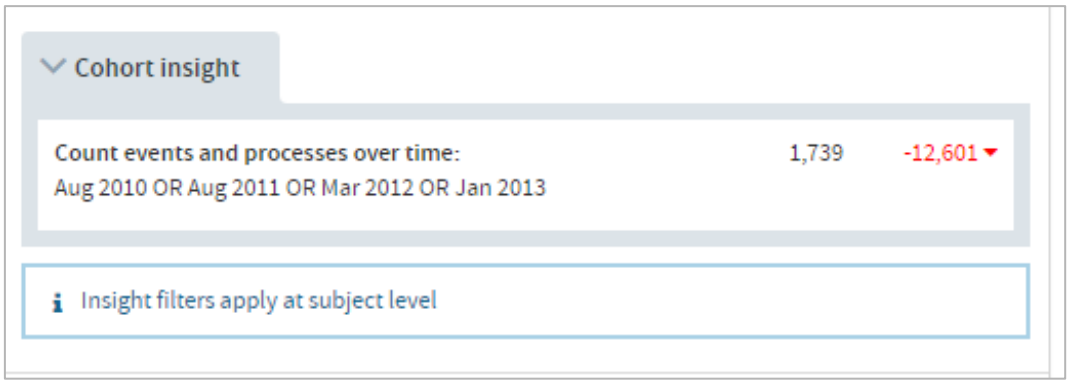


The choices you make will be applied to the cohort:



If you add more than one cohort insight filter, they will always be treated as **AND** filters and will always be applied at the individual level, not at the admission level. (i.e. if individual A matches filter 1 AND filter 2 AND filter 3).

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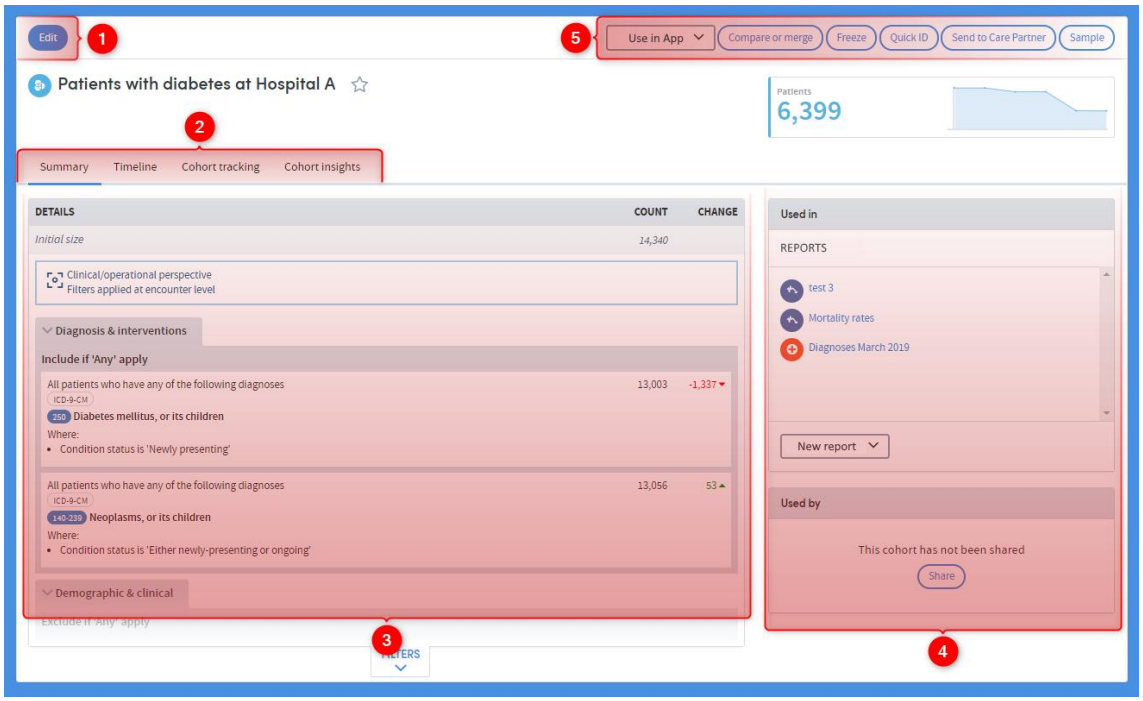
10 Cohort Summary

Once you have **saved** and/or selected to **Finish editing** a cohort, it will be saved and listed within your **My Cohorts** area. Additionally, a **Cohort summary** is created which summarises the key features of your cohort and also gives you access to a wider range of functions than those made available during cohort creation or editing. The Cohort summary is accessed either by clicking on the name of any cohort listed in your **My Cohorts** area or by clicking **Finish editing** when creating or editing a cohort.

The image below shows a Cohort summary:



The key features to note are:

1 To edit the cohort, click **Edit** and you will be taken back into **Cohort Discovery**. You can change, remove, or apply new filters and save your changes when you've finished.

2 Four tabs are visible on this screen. The image above shows the **Summary**. You can also access the **Timeline** (Chapter 12), **Cohort tracking** (Chapter 11) and **Cohort insights** (Chapter 3) tabs.

3 This section gives details of all your selected filters and the impact of their selection on the number of patients in the cohort.

4 All the reports using the cohort are listed here, as are all the users who have access to the cohort. This is important because if you edit a cohort it will automatically have an impact on other users, and on any future instance of any report that uses that cohort (previously-run instances will not be affected).

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5 Several functions are available here:

You can use a cohort directly in any App by clicking on the **Use in app** button. This is a shortcut that bypasses the App selection screen and automatically inserts the cohort name into the first step of the report creation process.

The **Compare or merge** function can be accessed here (see Chapter 15 for a full explanation of this feature).

The **Freeze** function enables you to freeze the membership of the cohort as of the date of freezing. So, for example, if you have defined a cohort as 'All patients admitted in the past month', then using that cohort in a month's time would ordinarily produce a different set of patients from use of it on the day of creation. However, if you freeze that cohort it will always use the same patients as of the date of freezing.

> **Not**e: You cannot edit any of the selection criteria for a cohort once it is frozen. You can unfreeze a cohort at any time.

The **QuickId** function enables you to download a list of names and IDs of all patients belonging to the selected cohort.

The **Sample** function enables you to select a random or regular sample of members of the cohort and save that sample as a subgroup.

10.1 Exercise 4

- Look at the Cohort summary of one of the cohorts you created in Exercise 2. Hover over the Tracker graphic (the blue graph on the top right) to see the impact of each selection on the graph.
- Click **Use in App** and then select **Identity Check**. This will take you to **Step 1** of report creation. From there, click back onto **My Cohorts** and then return to the Cohort summary you were looking at previously.
- Create a cohort using a **moving** time frame, such as **the last year**. **Freeze** the cohort and check that it is visible in the **My Cohorts** area.
- Click **Sample** and create a cohort comprising a random sample of 20% of the cohort you are looking at.

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11 Tracking cohorts

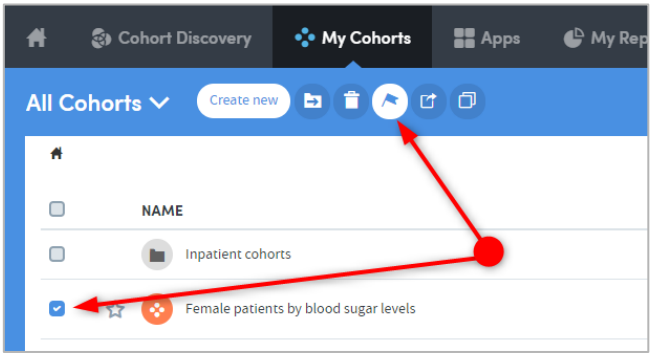
The cohorts you create and work with can change over time. For example, you might create a cohort containing all the patients from your base cohort who were admitted to hospital in the last 3 months. As time passes, patients will join, and others will leave this cohort as they are admitted and discharged from hospital. This means that the number of patients in the cohort will change. Tracking the members in a cohort over time is key when monitoring care quality and risk.

Once you have created and saved a cohort, you can choose to track it and be notified when certain changes occur. There are two types of changes that can be tracked:

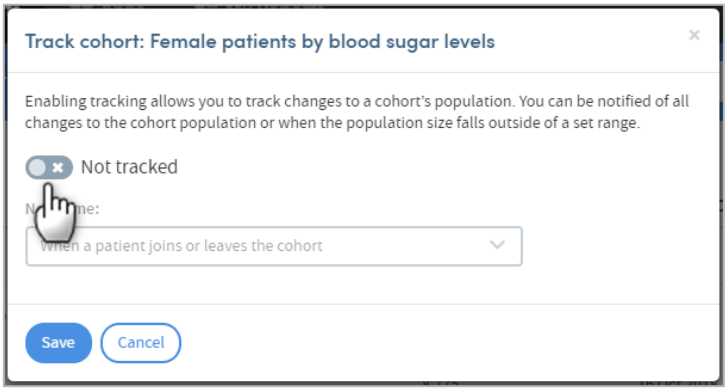
- **When a patient joins or leaves the cohort:** Any change to the members in the cohort will generate a notification email. It may be, for example, that your cohort defines a high-risk group and as soon as a patient enters the group, you wish to be notified so that certain actions can be taken.
- **When the cohort size falls outside bounds:** You define the bounds you are interested in and once the cohort size falls outside the bounds, you are notified by email. There are many reasons to be interested in a cohort falling outside defined bounds. One example would be if a researcher wanted to track the viability of a study that required a minimum cohort size and wanted to be notified when the required number of patients to conduct the study had been met.

11.1 How to track a cohort

To track a cohort, go to **My cohorts**, select the cohort you want to track by clicking the check box, and click the **Track cohort** button:



A panel will appear:



Click the button to enable tracking:

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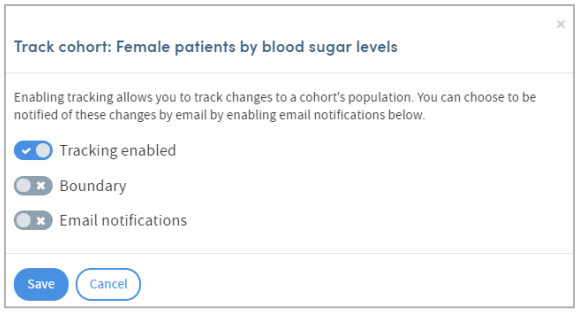
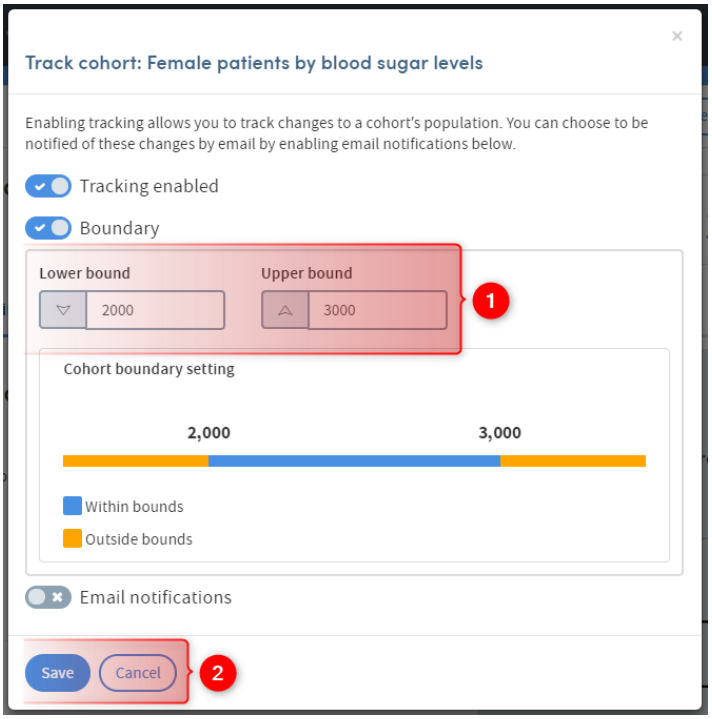


Boundary

If you want to be notified when the cohort size falls outside a set of bounds, click this button. The following panel will appear:



1 Set your required upper and lower bounds by typing in the fields.

Update **Email notifications** (see below) or:

2 Click **Save**. You'll be taken to the **My cohorts** page, and you'll see that the cohort is now tagged as **Tracked**:

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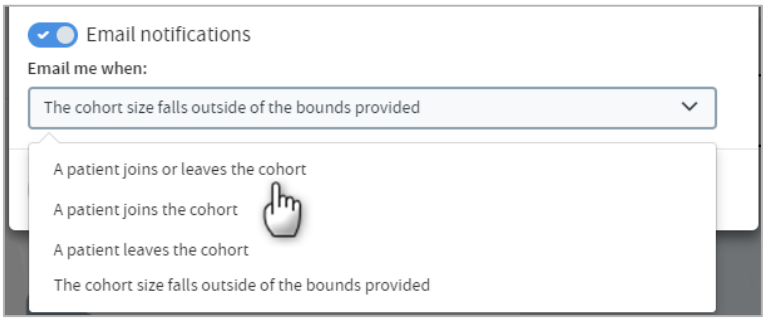
Email notifications

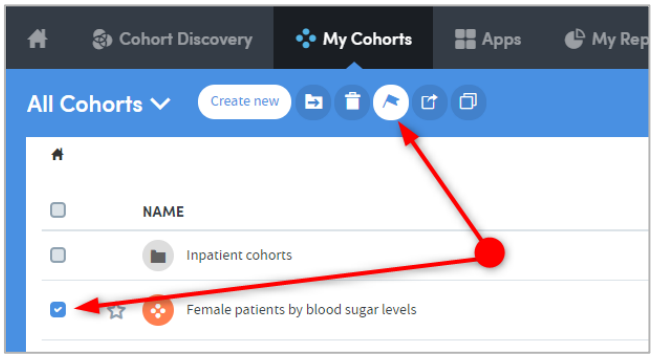
If you want to receive an email when the cohort size falls outside a set of bounds, or a patient joins or leave the cohort, click this button. You'll be able to access a drop-down list:



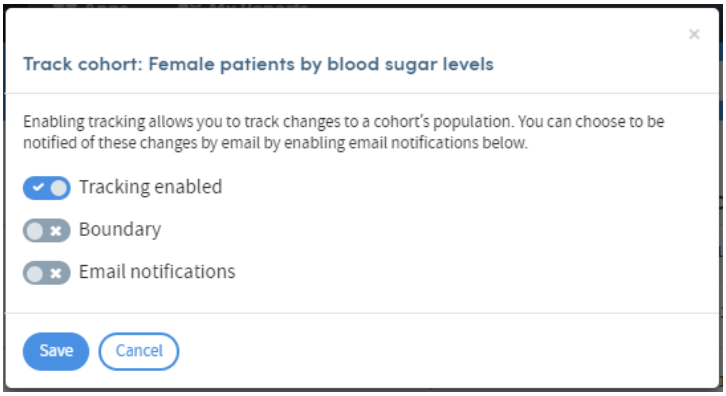
Choose from the list and click **Save**. You'll be taken to the **My cohorts** page, and you'll see that the cohort is now tagged as **Tracked**:

11.2 Cancel cohort tracking

To stop tracking a cohort, go to **My cohorts**, select the cohort you want to track by clicking the check box, and click the **Track cohort** button:



The following panel will appear:



Click **Tracking enabled** to cancel this feature, and click **Save**. You'll be taken to the **My cohorts** page, and you'll see that the cohort is no longer tagged as **Tracked**:

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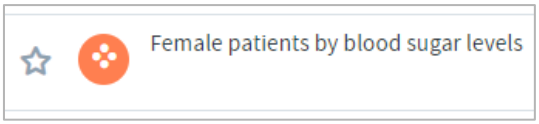
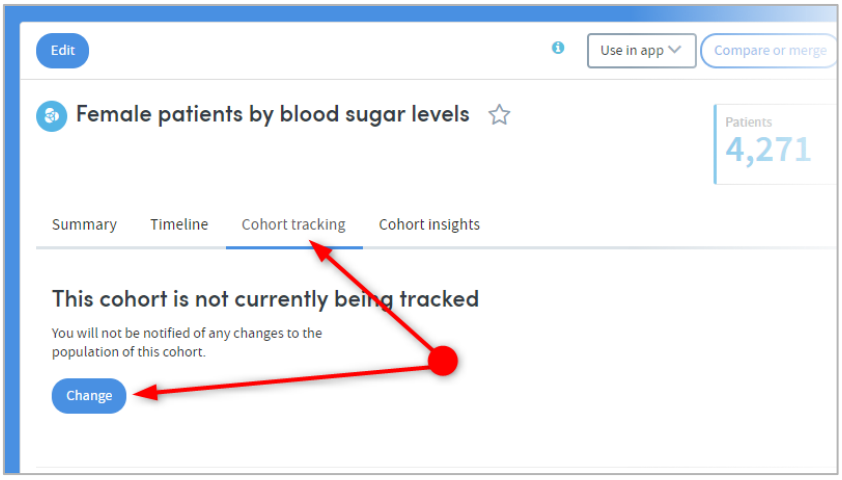


11.2.1 Another way to track a cohort

You can access the Cohort tracking feature from any Cohort summary. Cohort summaries are accessed either by clicking on the name of any cohort listed in your **My Cohorts** area or by clicking **Finish editing** when creating or editing a cohort.

Click the **Cohort tracking** tab on the **Cohort summary** page:



If your cohort is not currently being tracked, click **Change** and follow the same steps described above in section 11.1.

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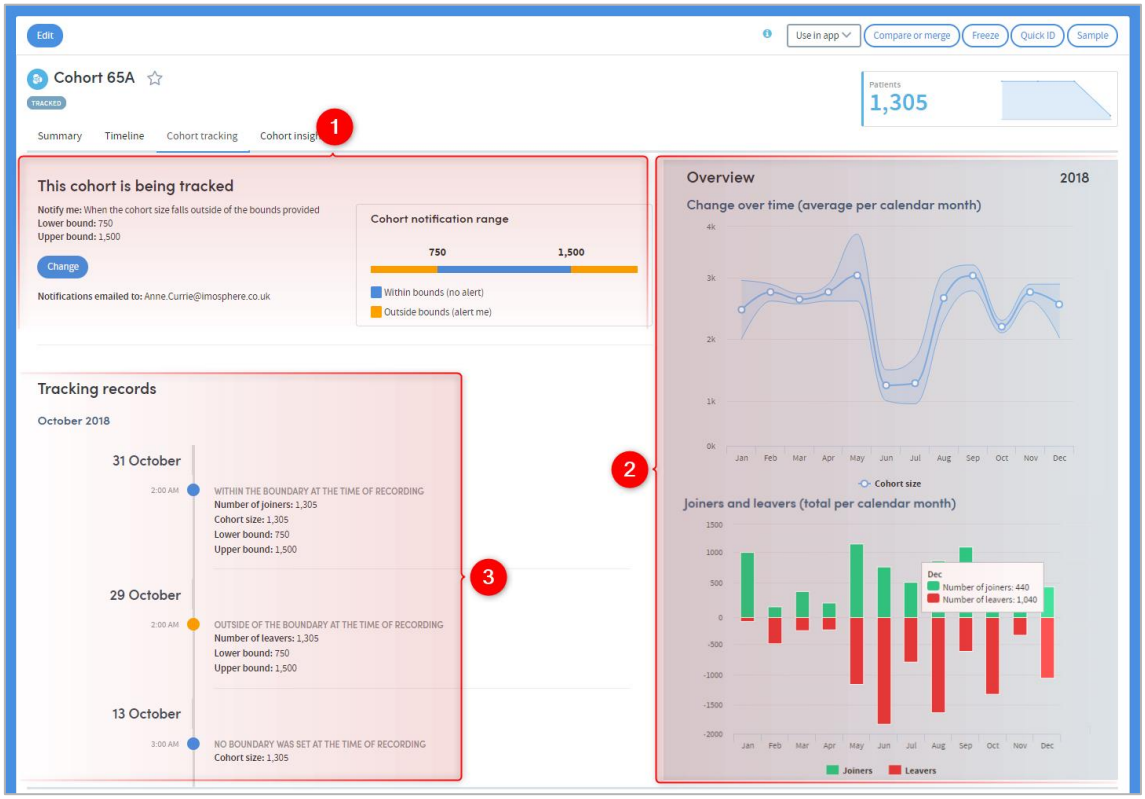
11.3 Cohort tracking information

Once you track a cohort, information is continuously gathered and made available for you to view. Over time, this information will increase in depth and detail. Here's an example of a typical tracked cohort:



1 This section gives details of the notifications you've requested, and the bounds (if any) you have set. You can also **Change** the setting here by clicking the blue button.

2 These two charts visualise the cohort changes. The first chart shows the population size for a given year, along with an area range showing how many joined and left the cohort. The second chart tracks the joiners and leavers over time in more detail.

3 This section shows a timeline of the cohort's changes. You can see the cohort size, the numbers of leavers and joiners and the boundary settings, at every point of change.

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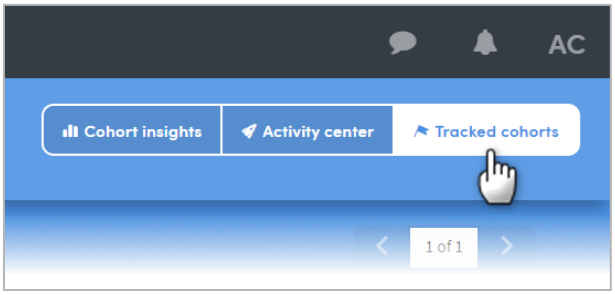
11.4 Viewing your tracked cohorts

You will receive a daily email that summarises any changes to your tracked cohorts.

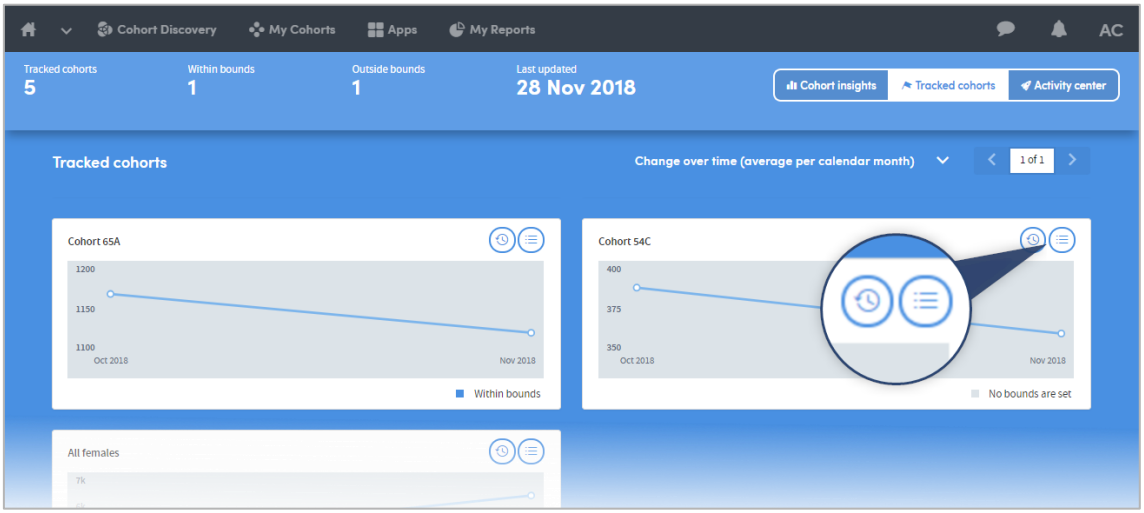
Within Atmolytics you can look at any cohort and its associated tracking information by clicking on the cohort name on the **My cohorts** screen, and clicking the **Cohort tracking** tab.

There's also a quick (and sometimes simpler) way to access and view all your tracked cohorts:

From anywhere in Atmolytics, click the Home icon then click **Tracked cohorts** at the top right of the screen:



You'll be taken to a summary page of all your tracked cohorts:



The **Tracked Cohorts** screen shows you a summary graph of each cohort you have chosen to track. Click the icons on the right of each graph to see more information about a cohort:

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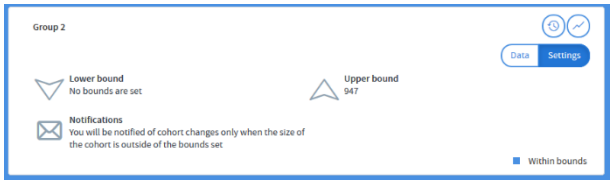
11.4.1 Summary

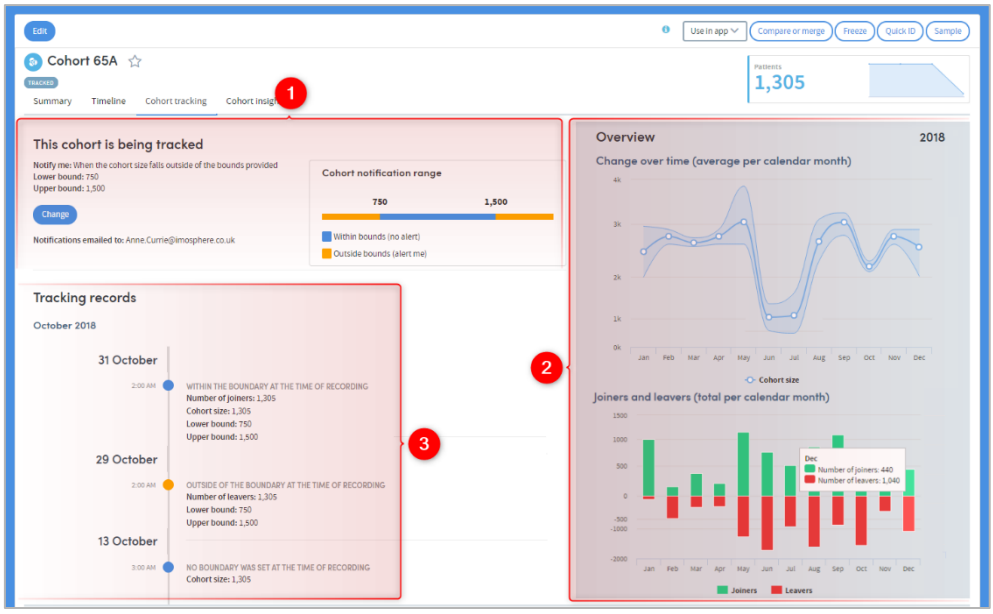
Click **Data** to see details of the cohort:

Click **Settings** to see details of the tracking bounds and notifications you've selected:



11.4.2 View History

Click here to be taken to the Cohort Tracking tab of the Cohort Summary screen:



1 This section gives details of the notifications you've requested, and the bounds (if any) you have set. You can also **Change** the setting here by clicking the blue button.

2 These two charts visualise the cohort changes. The first chart shows the population size for a given year, along with an area range showing how many joined and left the cohort. The second chart tracks the joiners and leavers over time in more detail.

3 This section shows a record of the cohort's changes. You can see the cohort size, the numbers of leavers and joiners and the boundary settings, at every point of change.

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12 The Timeline feature

The **Timeline** feature makes it easier for you to keep track of your actions within Atmolytics. You can view and annotate any action that Atmolytics has recorded as part of your work process. Understanding the provenance of any generated information is vital when undertaking research or making clinical decisions, and it's easy to lose track of the many actions you might undertake when working in Atmolytics.

For example, you could:

1. Create a new cohort
2. Alter the cohort after reviewing it with a colleague
3. Receive another cohort from a colleague
4. Compare the two cohorts using one of Atmolytics' many apps
5. Create a subgroup from the results of the app

The **Timeline** feature automatically records and displays the following actions:

- Cohort creation, modification and editing
- Report creation and generation
- Full report history with links through to each cohort used within the report
- Transparent usage of a cohort in a report with links through to the report output
- Tracks when new patients are added to the system
- User role management (i.e. what data a user has access to)

You can access the Timeline feature from any Cohort summary. Cohort summaries are accessed either by clicking on the name of any cohort listed in your **My Cohorts** area or by clicking **Finish editing** when creating or editing a cohort.

Click the **Timeline** tab on the **Cohort summary** page:

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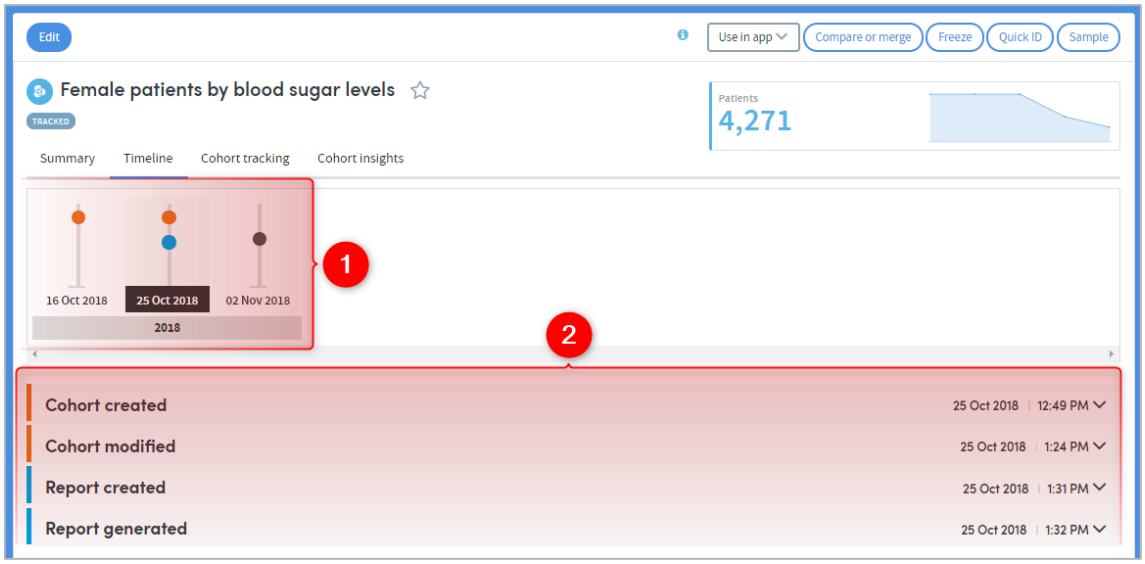
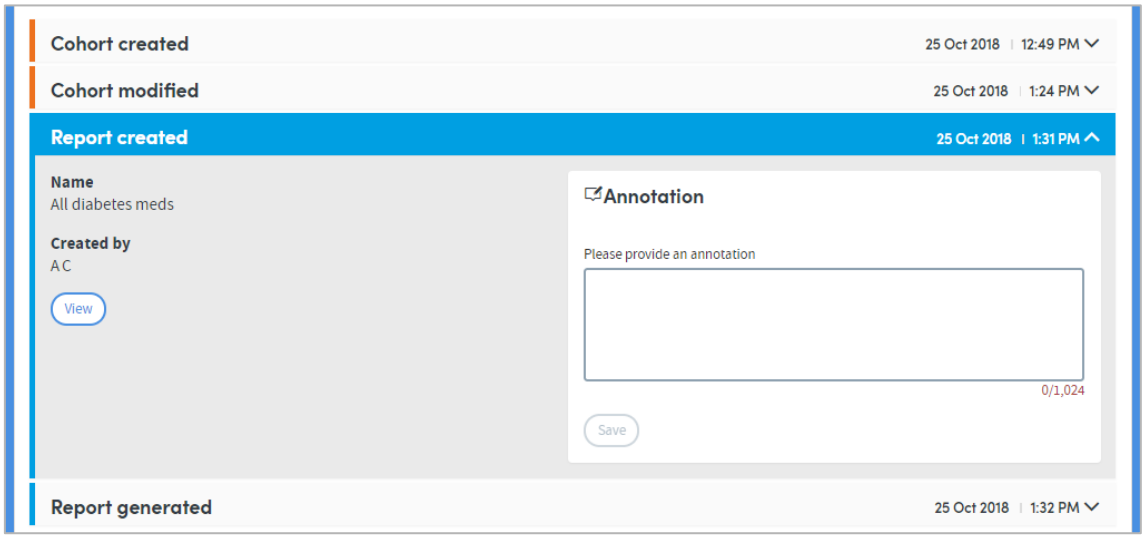


1 Each point of change is shown here. Click any of the images to see a list of the related actions below:

2 This is an expandable list of the actions associated with the point in time you've selected. Click the small down-arrow on the right of each action to see more details:



At this point you can add an annotation if you wish.

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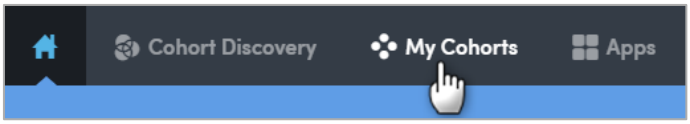
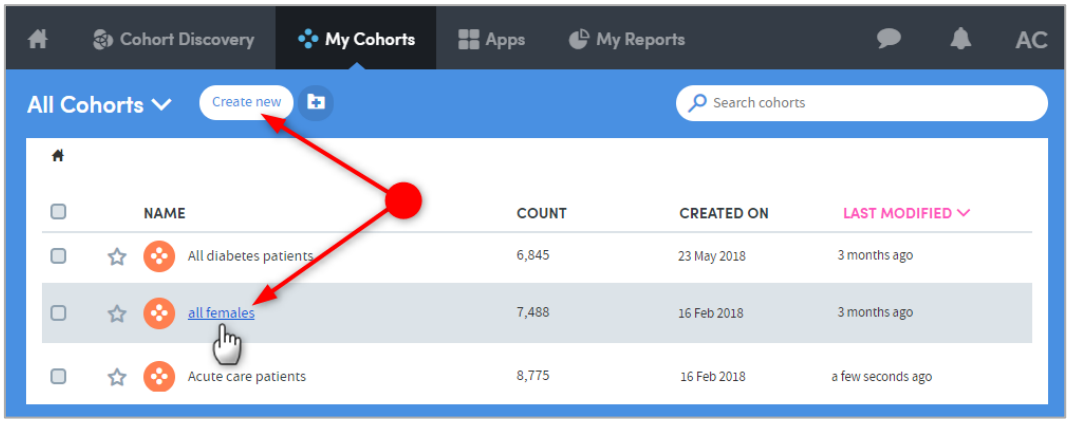
13 My Cohorts: managing and organising cohorts

The **My Cohorts** area displays all the cohorts that you have either created or which have been shared with you by other users of the system. This is also where you can organise your cohorts into folders, and select cohorts to be cloned, shared, or deleted.

The area is accessed directly by clicking on **My Cohorts** on the top menu bar:



You will see a list of all the cohorts you have created, or that other users have shared with you:



Click the name of a cohort to view its **Cohort summary** and access all the features available there (see Chapter 10 for details).

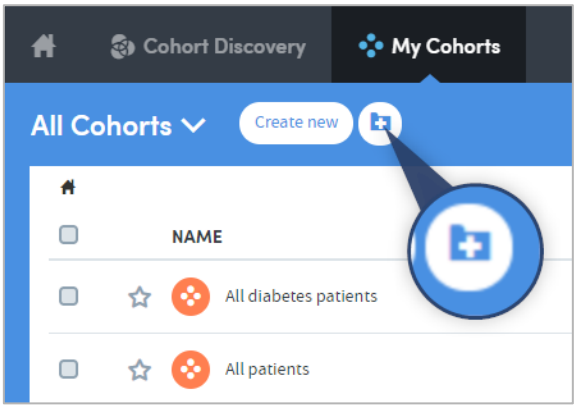
Click **Create new** to be taken to the **Cohort Discovery** area to create a new cohort.

13.1 Organising cohorts into folders

You can create your own folder structure to organise your cohorts, including subfolders within folders. It is important to consider how to organise your cohorts; otherwise, after a while you may accumulate a very long list of cohorts with unintelligible names, which will ultimately make using the system awkward.

13.1.1 How to create a new folder

To create a new folder, go to the **My Cohorts** page (accessed via the top menu bar) and click the **New folder** icon:



NOTE: If you can't see this icon, you have probably selected one or more of the cohorts in the list by clicking in the check boxes on the left, as can be seen with two of the cohorts in the image below:

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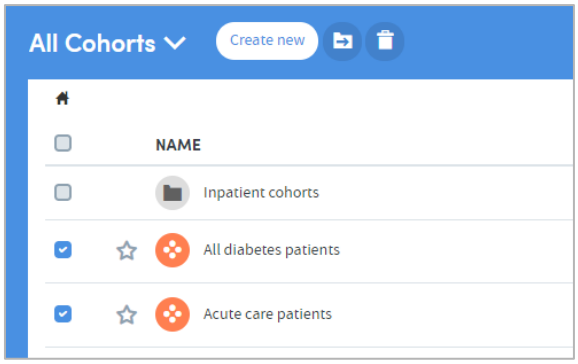


The **New folder** option is only available when none of the cohorts in the list have been selected using the check boxes. Make sure they are all unchecked, and then click the **New folder** icon.

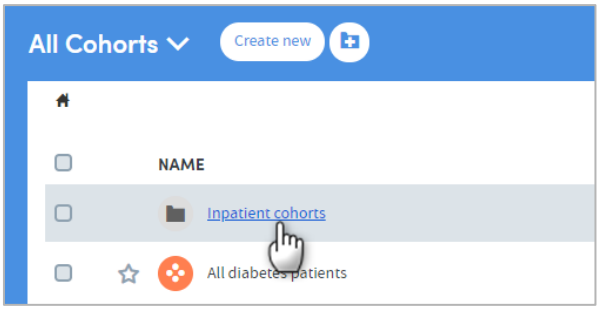
A pop-up box will appear:

Type in the name you've chosen for your folder and a description if you wish to include one. Click **Save** when you have finished.

Your new folder will appear in the list on the **My Cohorts** page.

13.1.2 How to create a sub-folder

To create a sub-folder within an existing folder, go to the **My Cohorts** page (accessed via the top menu bar) and click the name of the existing folder:



You will see a list of the contents of the folder. Click the **New folder** icon:

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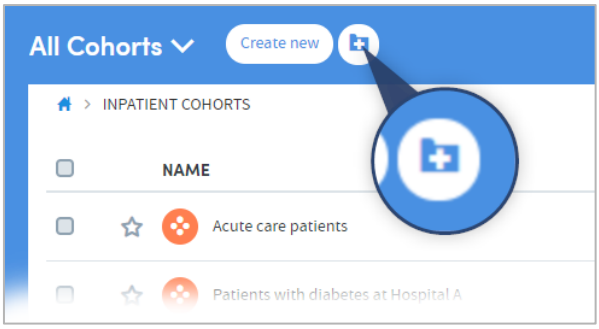
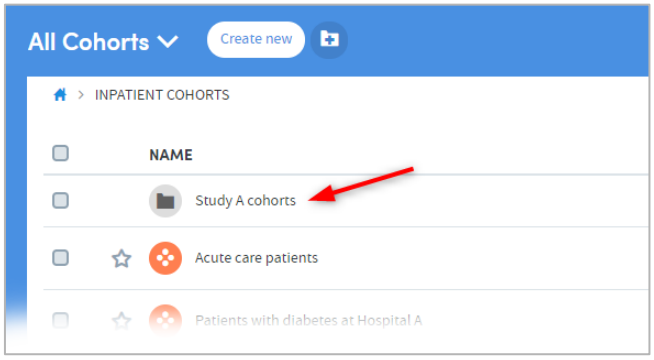


A pop-up box will appear:

Type in the name you've chosen for your folder and a description if you wish to include one. Click **Save** when you have finished. Your new folder will appear in the existing folder's list of contents:



13.1.3 How to add cohorts to folders

Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkboxes to the left of the cohort names to select the cohorts you wish to add to the folder:

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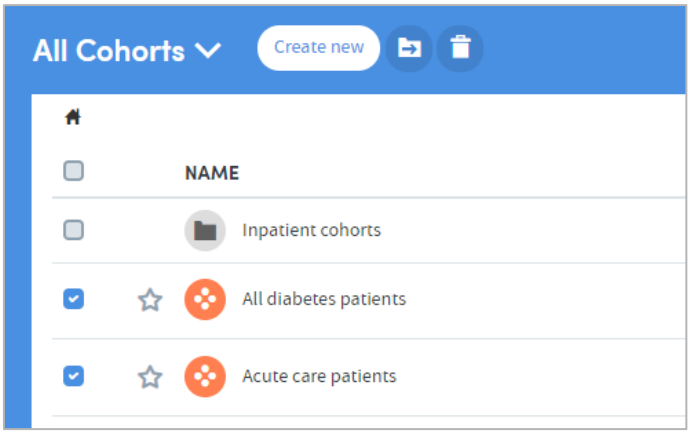
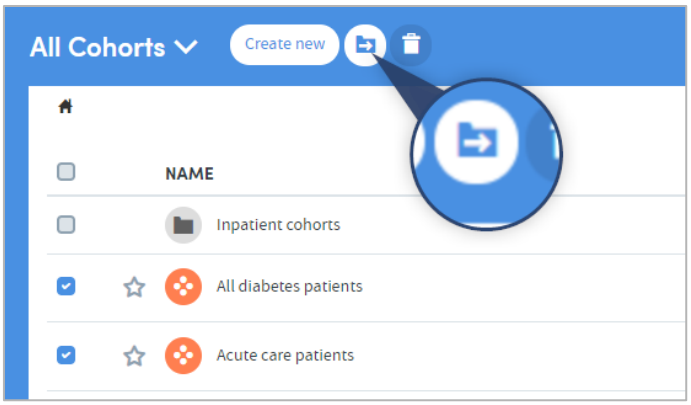
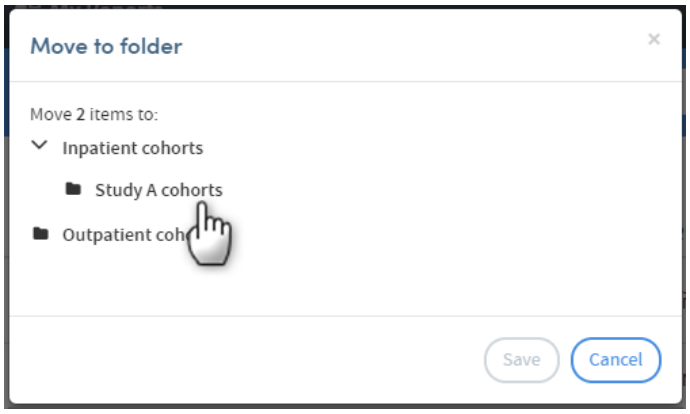


Click the **Move to folder** icon:



A pop-up box will appear:



In this example, there are two main folders (**Inpatient cohorts** and **Outpatient cohorts**). **Inpatient cohorts** contains a sub-folder, **Study A cohorts**. We've navigated to this by clicking on the small arrow to the left of the parent folder's name.

Click the name of the folder to select it as the destination for the cohorts you wish to move, then click **Save**. The cohorts will now appear in the destination folder:

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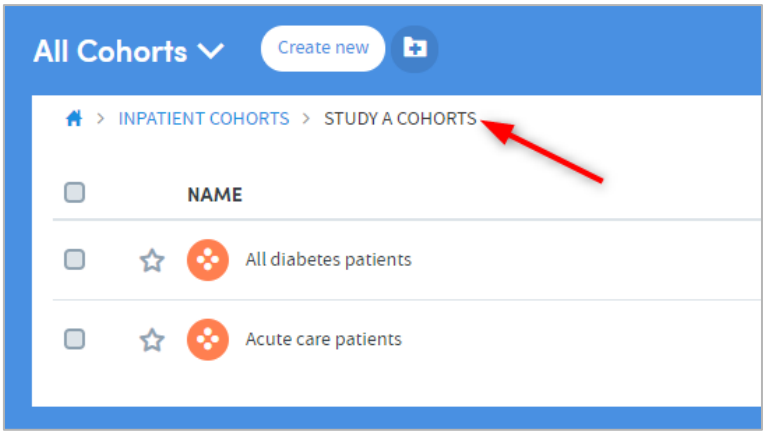
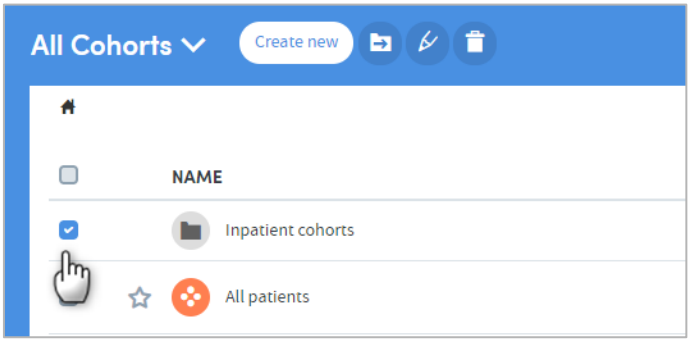
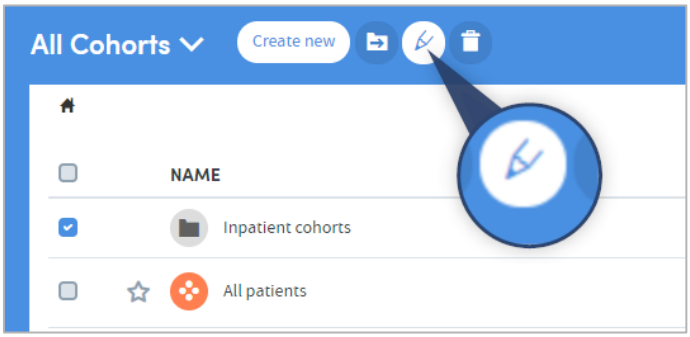


13.1.4 How to rename a folder

Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkbox to select the folder you wish to rename (**Inpatient cohorts** has been selected here):



Click the **Rename folder** icon:



A pop-up box will appear. Edit the folder name and description as necessary, and click **Save** when you have finished.

13.1.5 How to delete a folder

Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkbox to select the folder you wish to delete (**Inpatient cohorts** has been selected here):

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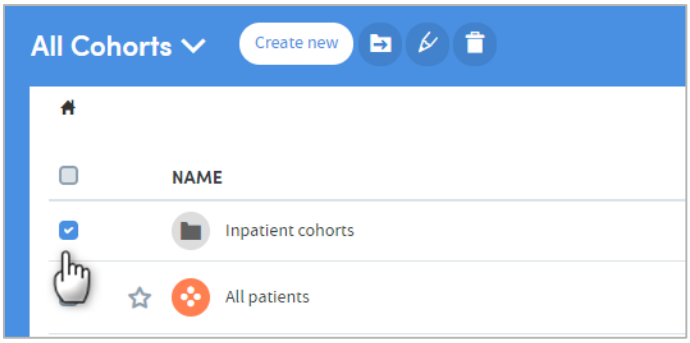
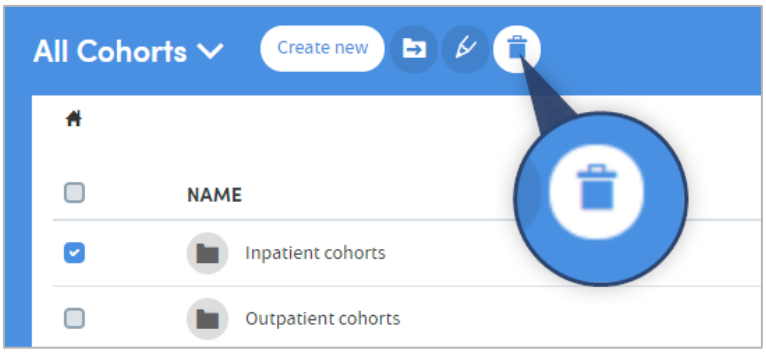
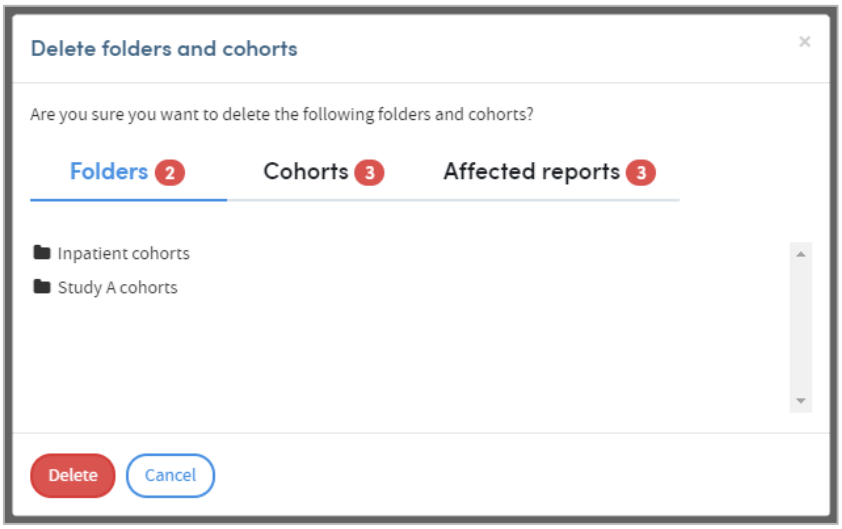


Select the **Delete folder** icon:



A pop-up box will appear:



This will remind you of the contents of the folder (sub-folders and cohorts), and the reports that will be affected if you confirm the deletion. If you are sure you wish to delete the folder ***and all its contents***, click **Delete**.

If you want to delete the folder, but not its contents, you will need to move the sub-folders or cohorts out of the folder, before selecting the **Delete folder** icon.

13.2 Freezing cohorts

If you wish, you may freeze a cohort. This locks the patients within the cohort at the current moment in time. As such, the same set of patients will be used each time a report is run using this frozen cohort.

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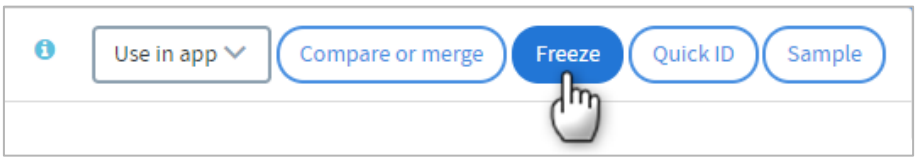
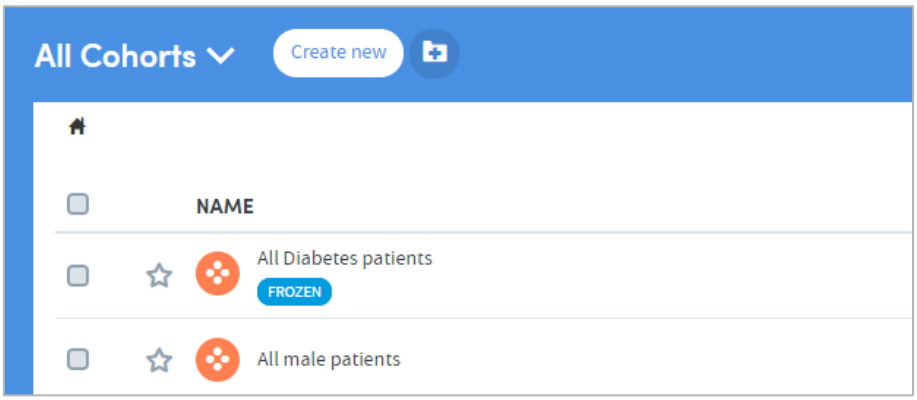
You cannot edit any of the selection criteria for a cohort once it is frozen. You can unfreeze a cohort at any time.

13.2.1 How to freeze a cohort

Click the name of a cohort on the **My Cohorts** screen. This will take you to the cohort details section of **Cohort Discovery**. Click the **Freeze** button in the menu bar on the top right:



You will be asked to confirm that you wish to freeze the cohort. Once you have confirmed this, the name of the cohort on the **My Cohorts** screen will be tagged as **FROZEN**:



13.2.2 How to unfreeze a cohort

You can unfreeze the cohort at any time by clicking on its name again and clicking on the **Unfreeze** button, which will now be visible in the menu bar on the top right:

You will be asked to confirm that you wish to unfreeze the cohort. Once you have confirmed this, the **FROZEN** tag will be removed from the name of the cohort on the **My Cohorts** screen.

13.3 How to clone a cohort

It is possible to create an exact copy of an existing cohort and then edit the selection criteria. This is especially useful if you wish to create a variation of a complex cohort. The easiest way to do this is to clone the complex cohort and then alter the filters, rather than recreating the whole cohort again. To do this:

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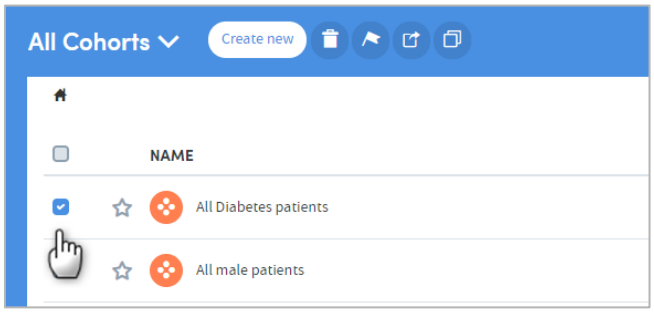
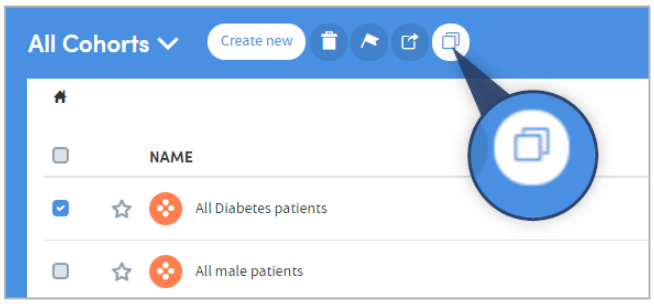
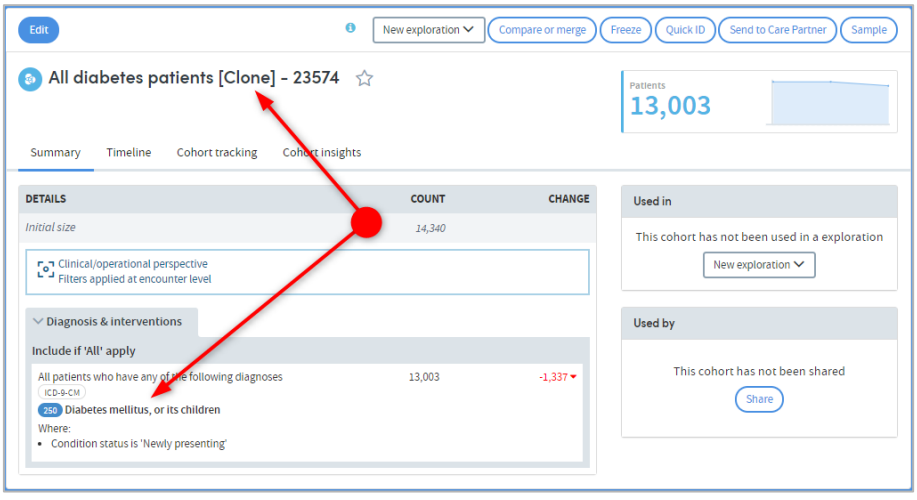
Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkbox to the left of the cohort you wish to clone:



Click the **Clone cohort** icon:



You will be taken straight to the Cohort Discovery screen where the clone of your cohort will be displayed:



Here you can see that the cohort name is that of the original cohort with **[Clone]** added. You can also see that the filter criteria are set to **Diabetes** as per the original cohort.

From this point on you can edit the name, description, and filtering criteria of the cohort as you would any other, and save the changes in the usual way.

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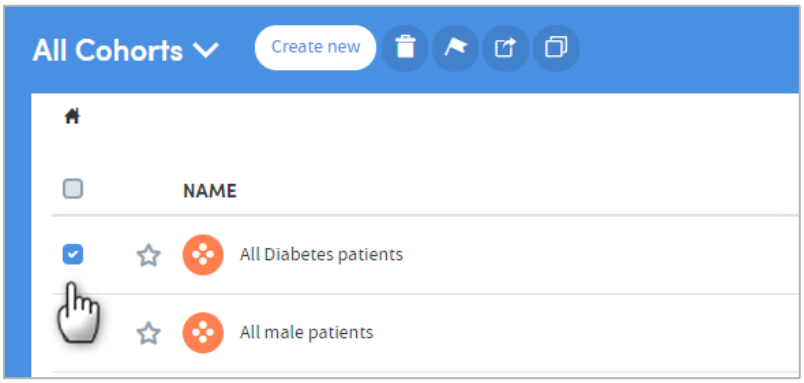
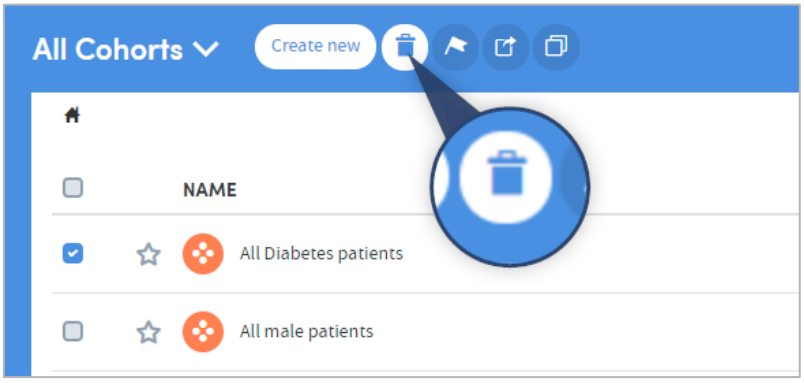
13.4 How to delete a cohort

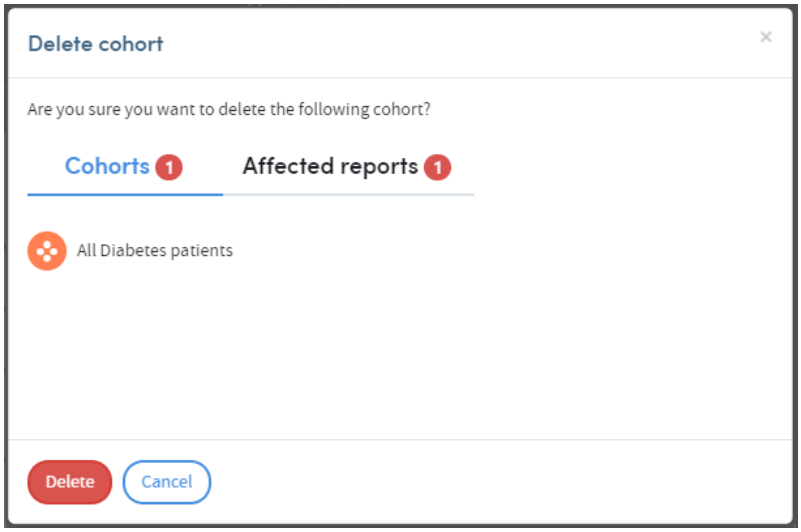
Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkbox to the left of the cohort(s) you wish to delete:



Click the **Delete cohort** icon:



A pop-up box will appear, listing the cohort(s) you wish to delete and any reports that will be affected by the deletion:



Click **Delete** once you are sure you wish to proceed.

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14 Sharing cohorts

If you have the relevant permissions as part of your role, you can choose to **share cohorts** with other users. This sharing feature removes the need for users to accurately recreate all the cohort definition criteria themselves if they wish to report on patients meeting similar criteria to those set by a colleague.

There are some specific rules which Atmolytics applies when cohorts are shared. Every user of the system is assigned a **Role** by their system administrator (in some cases a user may have multiple roles assigned to them). This role defines the type and level of permissions the user has when using Atmolytics.

Depending on the role they have, some users may not be permitted to share cohorts. Some users may not be able to create their own cohorts, but may be able to see cohorts that other users have created and shared with them, or generate reports using cohorts that other users have created and shared with them.

14.1 Some important points about sharing cohorts

The Principles of Sharing Data within Atmolytics

Users should be able to freely share information with other users who need to see it. In doing so, they should not be able to:

- Expose other users to information that they should not have access to.
- Make hidden modifications to other users' content.

Sharing a cohort actually means that you share the **definition** of the cohort with the recipient, and not the patients contained within the cohort. If the recipient's **base cohort** is different from yours, their version of the shared cohort may contain different patients from yours, but they will be selected using the same criteria.

For example:

Your base cohort consists of all the inpatients in Hospital A and Hospital B. You create a cohort of all the male patients in your base cohort. You then share this cohort with a colleague. Their base cohort only consists of all the inpatients in Hospital A, so their version of your shared cohort will only contain the male patients from Hospital A.

You can continue to edit a cohort once you've shared it, but any changes you make will not be carried over to the recipient unless you choose to share it again.

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When sharing cohorts, it's important to keep the following points in mind:

Shared cohorts can be edited by the sender, but neither edited nor shared by the recipient. They can however be **cloned** by the recipient and the clone can then be shared or edited. If shared cohorts could be edited by recipients this could lead to a multiplicity of cohorts with the same name but different definitions, causing confusion.

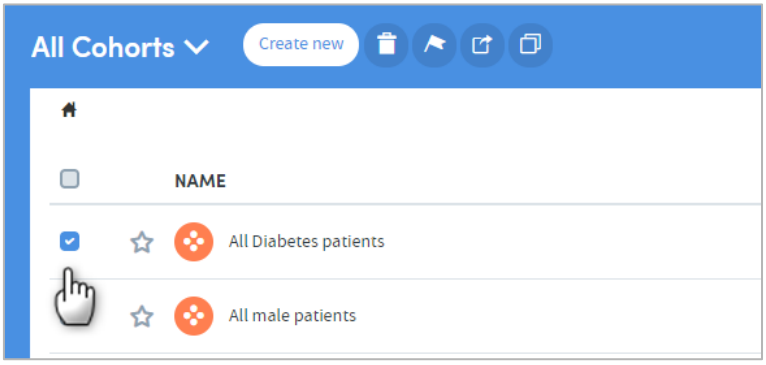
Modifying shared cohorts. If a sender subsequently modifies a previously shared cohort, a previous recipient's version will not also be modified.

Frozen cohorts and subgroups cannot be shared with other users. These types of cohort comprise a set of specific individuals rather than a definition that must be met for cohort membership. As such, were sharing to be permitted there would be the risk of another user being able to view data on individuals whom they should not be permitted to see.

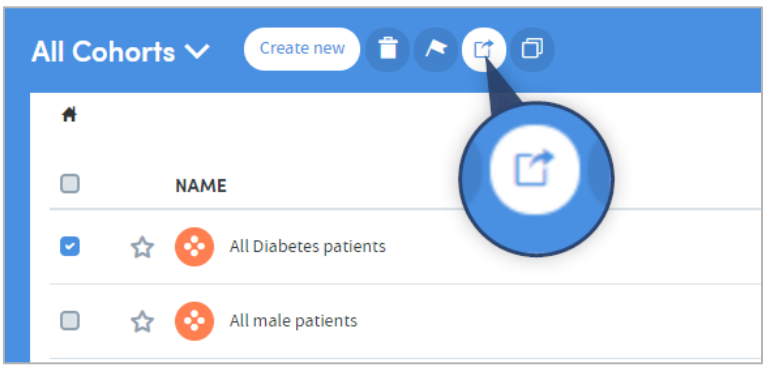
Unfrozen cohorts can be shared, i.e. a cohort that was once frozen but has now been unfrozen can be shared

14.2 How to share a cohort

Go to the **My Cohorts** page (accessed via the top menu bar) and click the checkbox to the left of the cohort you wish to share:



Click the **Share cohort** icon:



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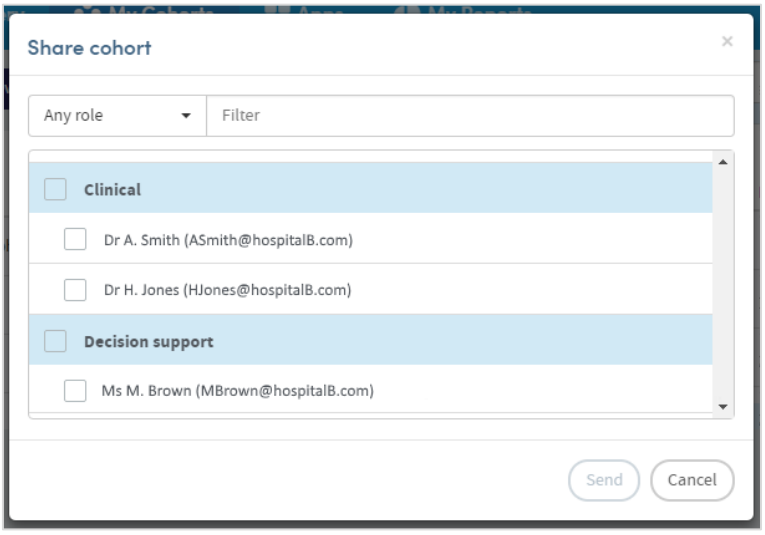
A pop-up box will appear:



If you click the small down-arrow to the right of **Any role,** you can select a specific role to narrow down the list of possible recipients. Alternatively, if you know their name, type this into the **Filter** space at the top, and the list below will display matching names for you to select from.

Click in the checkbox to the left of your chosen recipient, and click **Send**.

14.3 Exercise 5

- Create two or three folders for your cohorts. Include at least one subfolder.
- Place most of your cohorts into a folder.
- Clone your most complex cohort, edit it, rename it and place it in the relevant folder.
- Share a cohort with another user.
- Delete a cohort you no longer need.
- Freeze a cohort and then move it to another folder.

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15 Comparing or merging cohorts

15.1 Why compare or merge cohorts?

The **Compare or merge** function allows you to compare a cohort with any other cohort which is available in your **My Cohorts** area. It enables you to explore the relationship between different cohorts of patients without having to produce formal reports.

A dynamic output shows you the number of patients who are in both cohorts, and the number in one cohort but not the other. If you are especially interested in one of these groups of patients then you can save it as a special type of cohort: a **subgroup**. You can then run reports on this subgroup if you wish to.

You can choose to create a subgroup of:

- Patients in your first cohort who are **not** in your second.
- Patients in your first cohort who are **also** in your second.
- Patients in your second cohort who are **not** in your first.
- Patients who are in **either** your first **or** your second cohort (or both).

For example, having compared two cohorts, if you create a subgroup by selecting all three overlap options, you will create a subgroup that merges the two cohorts compared. This effectively enables you to use the operator OR in combining two cohort definitions to produce a cohort of a complexity not otherwise producible.

The **Compare or merge** feature enables you to define subgroups of patients that it would be difficult or impossible to do using a single set of filtering criteria. It enables you to 'place brackets' around one or more set of criteria used to define a cohort and then combine them with another bracketed set of criteria.

> It's important to note that, unlike other cohorts you may create, once you have created a **subgroup**, you cannot make any more changes to that subgroup's cohort definition criteria.

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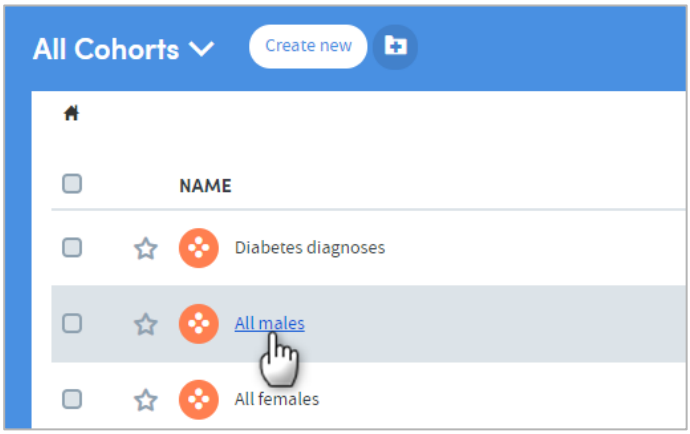
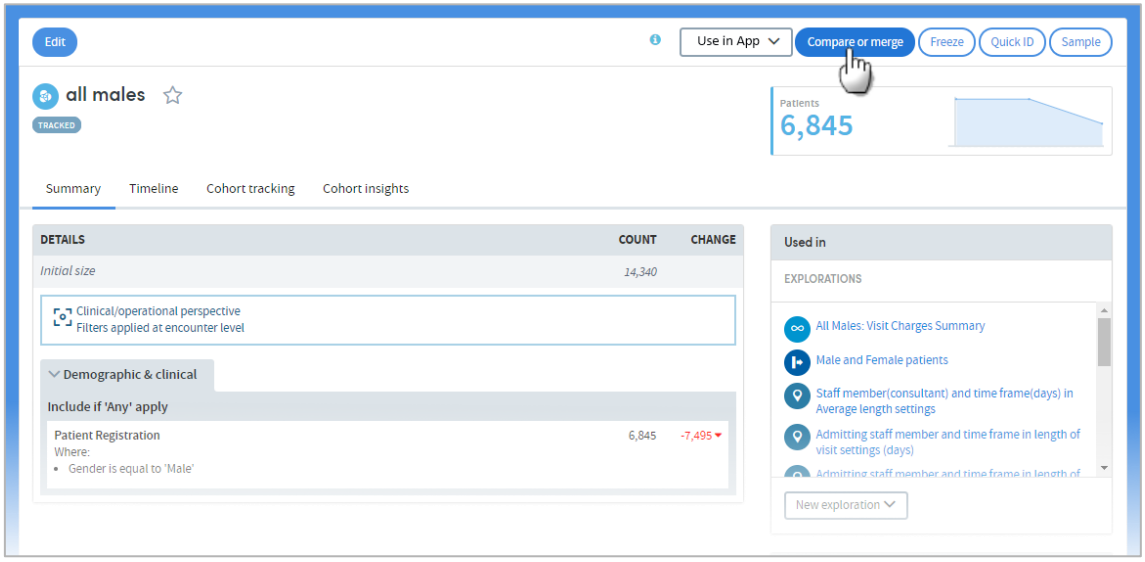
15.2 How to compare or merge two existing cohorts

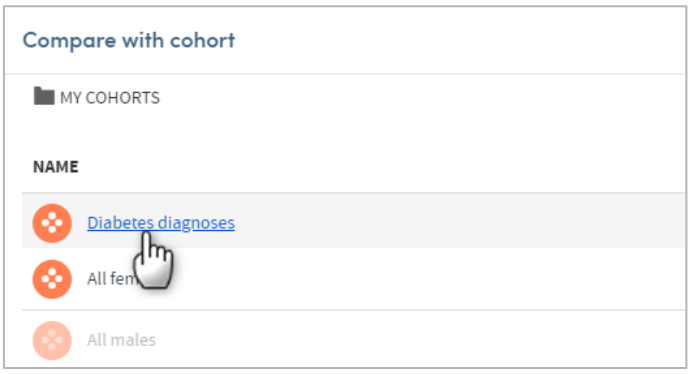
Go to the **My Cohorts** page (accessed via the top menu bar) and click the name of one of the cohorts you wish to compare. Here, we are selecting a cohort consisting of all male patients:



You'll be taken to the cohort details screen. Click **Compare or merge** at the top of the screen:



Select the cohort you want to compare:



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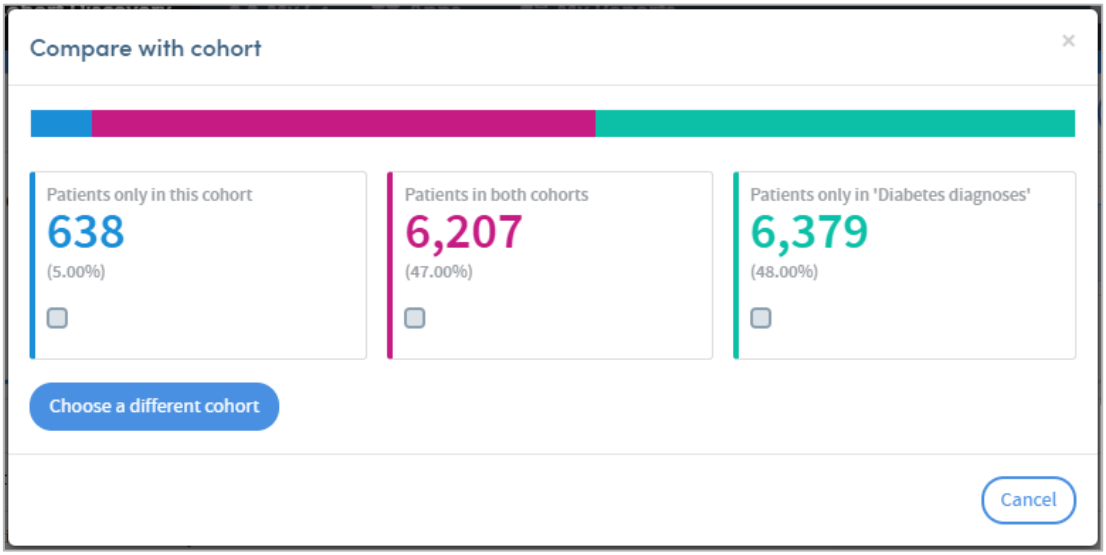
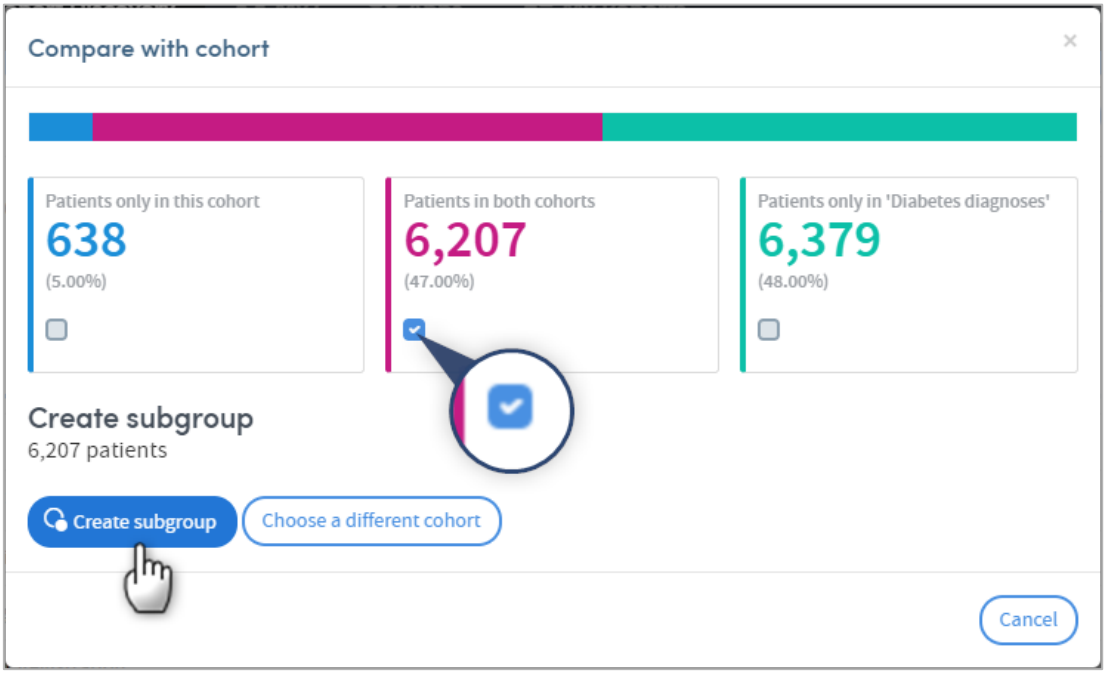
A pop-up box will appear, showing you the comparison between the two cohorts:



Here, for example, we can see that 638 patients are only in the first cohort (i.e. are male and **DO NOT** have a diabetes diagnosis), 6,207 patients are in both cohorts (i.e. are male **AND** have a Diabetes diagnosis), and 6,379 patients are in the Diabetes diagnosis cohort but are not in the Male cohort (i.e. are **NOT** male but **DO** have a diabetes diagnosis).

If we wanted to create a subgroup of all the patients who are male **AND** have a diabetes diagnosis (i.e. the 6,207 patients in the pink cohort), we can do so by clicking the checkbox and clicking on the **Create subgroup** button which will appear:



A pop-up box will appear. A name and description are provided automatically, but you can edit these if you wish:

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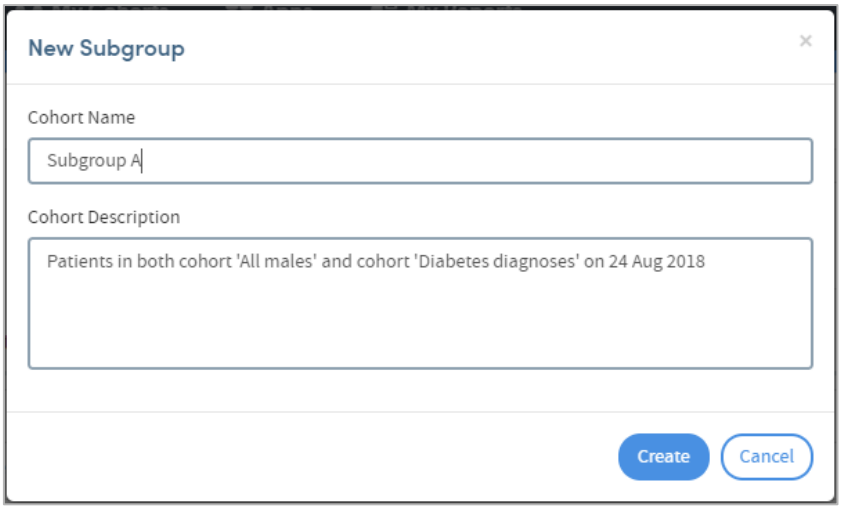
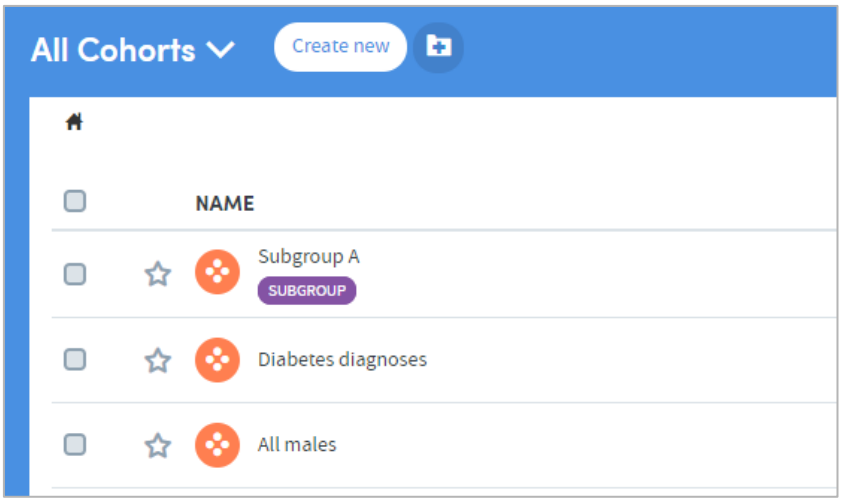


Click **Create** to save your new subgroup. If you then go back to the **My cohorts** area, you will see that the new subgroup has been added to the list:



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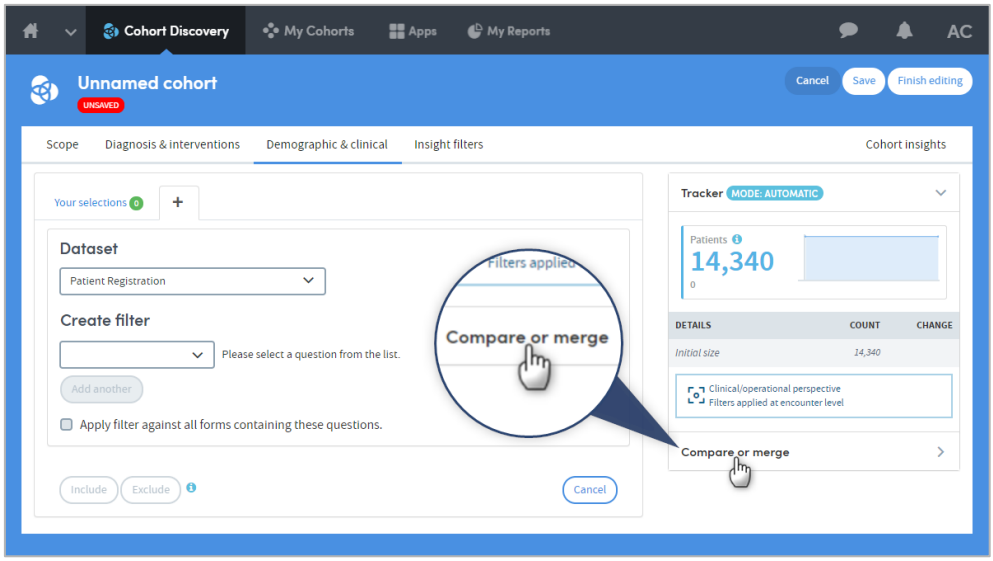
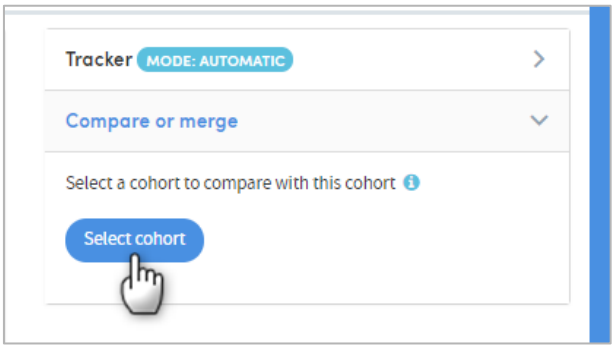
15.3 How to compare or merge a new cohort with an existing one

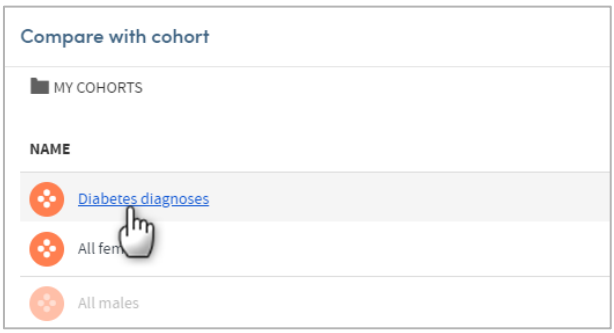
When working in **Cohort Discovery** you have the option to compare the cohort you are working on with an existing cohort in your **My Cohorts** list. The **Compare or merge** feature can be found on the right of the screen, below the **Tracker**:



Click **Compare or merge**, and the Tracker feature will be hidden. You will be prompted to click the **Select cohort** button:



Click this, and then select the cohort you wish to compare:



The right-hand side of the Cohort Discovery screen will show the comparison data:

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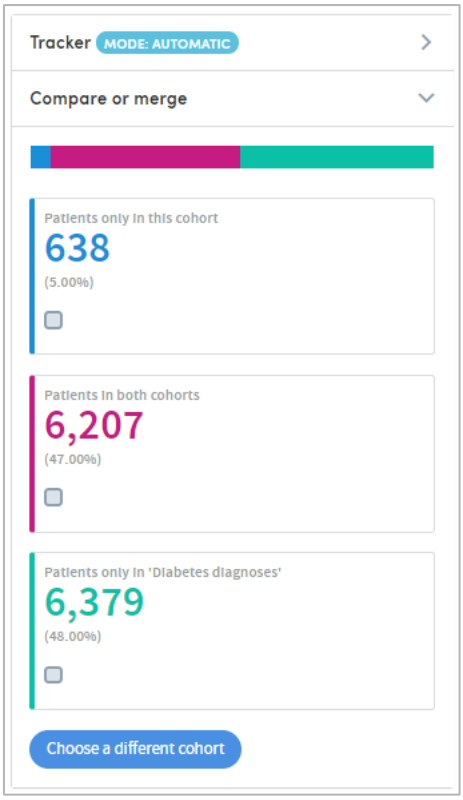
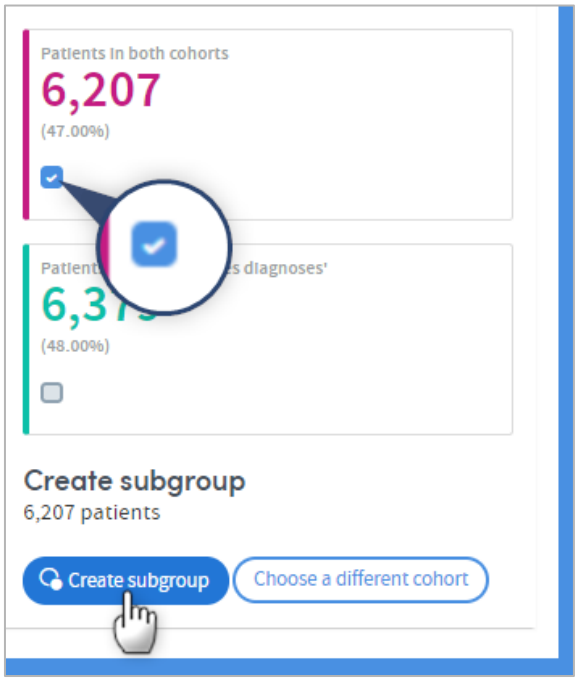


Here, for example, we can see that 6,207 patients are in both cohorts.

If we wanted to create a subgroup of all the patients who are in both cohorts, we can do so by clicking the checkbox, and clicking on the **Create subgroup** button which will appear:



A pop-up box will appear, prompting you to type in a name for the new subgroup. A description is provided automatically, but you can also edit this if you wish:

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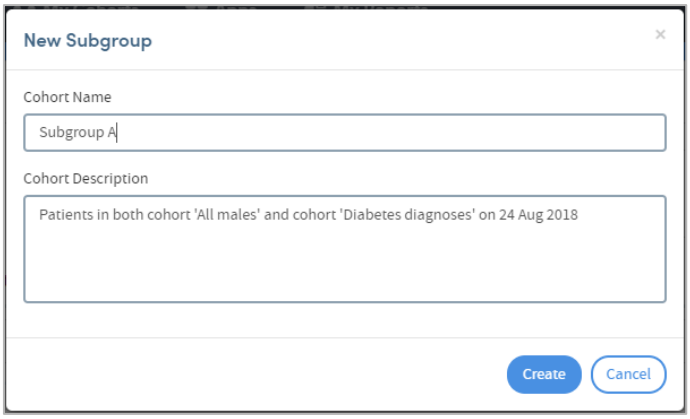
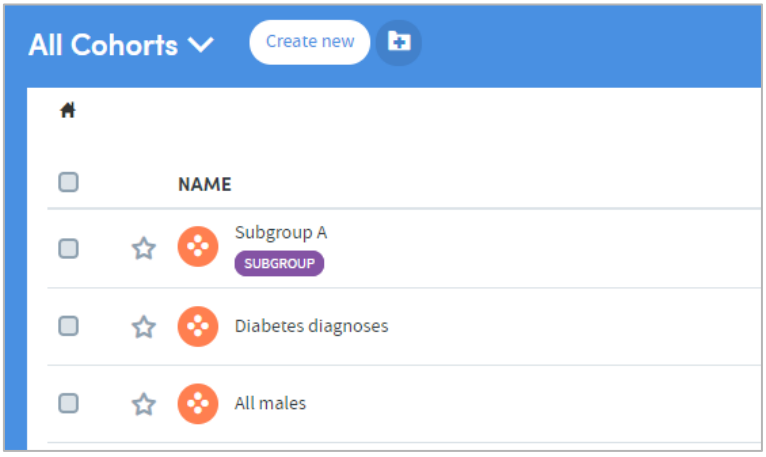


Click **Create** to save your new subgroup.

If you then go back to the **My cohorts** area, you will see that the new subgroup has been added to the list:



15.4 Exercise 6

- Look at the Cohort summary of one of the cohorts you created in Exercise 2
- Click **Compare or merge** and create a subgroup by selecting another cohort that you have previously created, comparing the two, and creating a subgroup from this data.
- When you have named and saved the data, go to **My cohorts** and click the name of the subgroup you have created. You will see that the **Edit** button at the top left of the screen is greyed out, indicating that subgroups can't be edited.

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16 Creating complex cohorts using Compare or merge

We've looked at how the **Compare or merge** function is a useful method of exploring the overlap between two cohorts. However, this function can also be used to create complex cohorts that cannot easily be defined using the standard configuration of Cohort Discovery. Suppose, for example, that you wanted to define a single cohort as follows:

All patients who were:

(1) Admitted to Hospital A under the care of Doctor B in 2013 who presented a severe risk of suicide.

AND

(2) Who were admitted to Hospital B in 2014 under the care of either Doctor C or Doctor D, and who during that period did not present with an apparent risk of suicide.

Such a cohort could not easily be defined using the standard user interface. It would require adaptation of the interface to include complex combinations of multiple selections, bracketing of clauses, etc. However, using the compare or merge function, such a cohort is easy to define by simply creating two cohorts (one corresponding to each of the two sets of filters) and then using the function to identify the overlapping subgroup.

In this way, the Compare or merge function effectively introduces brackets around sets of filters; each set of filters being represented by a single cohort. Selection of intersections and complements thereby strings together sets of bracketed filters, in principle permitting any level of logical complexity to be defined.

17 Broader considerations

These are some broader points concerning cohorts, which are relevant to the process of cohort definition:

17.1 Cohorts are updated whenever they are used in a report

Thus, the number of patients identified in an output may prove to be different from that listed in **My Cohorts** prior to the report being run, due to the data having been refreshed since the cohort was last used or first created.

17.2 Subgroups are a special type of cohort

Subgroups are defined by the **identities** of the individuals who belong to the cohort rather than by the **criteria that select those individuals.** As a consequence, subgroups are not editable in the way that standard cohort definitions are editable, since all that Atmolytics has available to it are the IDs of the individuals in the subgroup rather than a set of criteria that can easily be applied back with Cohort discovery.

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17.3 Cohort selections can interact with report selections

When creating a cohort an important consideration is the extent to which filters that may be applied within the cohort definition could equally be applied in report creation. For example, there is usually no need to define a cohort: **Females admitted to Ward A** and another cohort: **Females admitted to Ward B** since the data included within the scope of a report can be selected on a report-by-report basis. Hence if only **data from Ward A** is included within a report then the cohort **Female patients** will be enough to identify all and only those patients admitted to Ward A within a report.

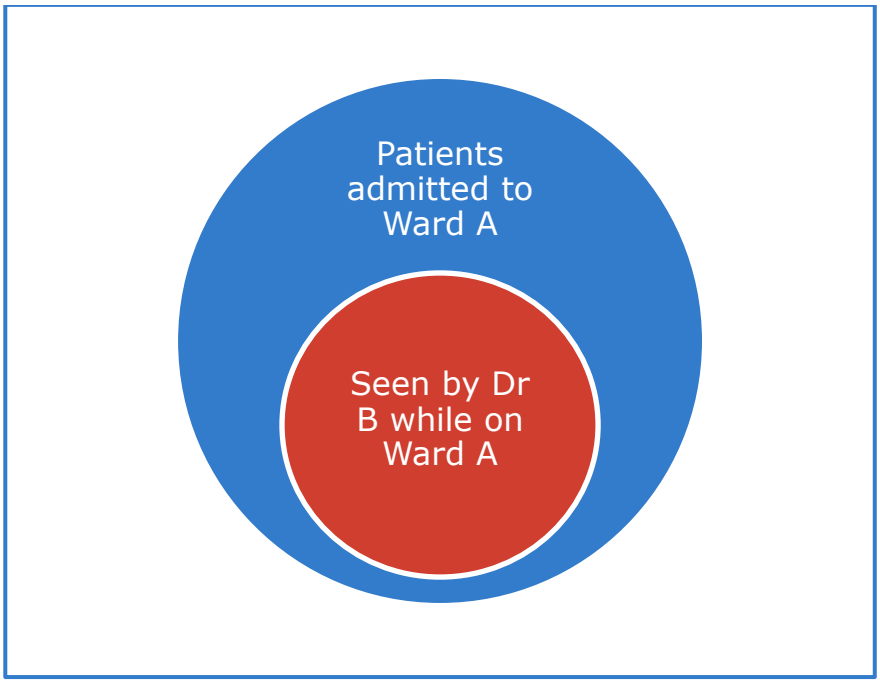
17.4 User-created cohorts interact with base cohorts

There is an important difference in the way cohorts function when used as a base cohort and when used in Cohort discovery. Suppose we have two base cohorts: one comprising **All patients** and the other **Patients admitted to Ward A**. It may appear as if the following two combinations are (or should be) equivalent:

Base cohort=All patients & **Scope**=admitted to Ward A.

Base cohort=Patients admitted to Ward A & **Scope**=All.

However, this is not necessarily the case. The reason for this can be seen by adding in an additional scope selection: **Doctor B** to both examples. In the first case, this will identify all patients who were seen by Dr. B ***while on*** Ward A. This is a strict subset of those patients seen on Ward A (first diagram below).



The second case will identify all patients admitted to Ward A **AND** seen by Dr. B, i.e. the intersection between the two cohorts. The difference is that some of these patients may not have been seen by Dr. B on Ward A (second diagram below). They could, for example, have been seen by Dr. B on Ward C but still meet the selection criteria.

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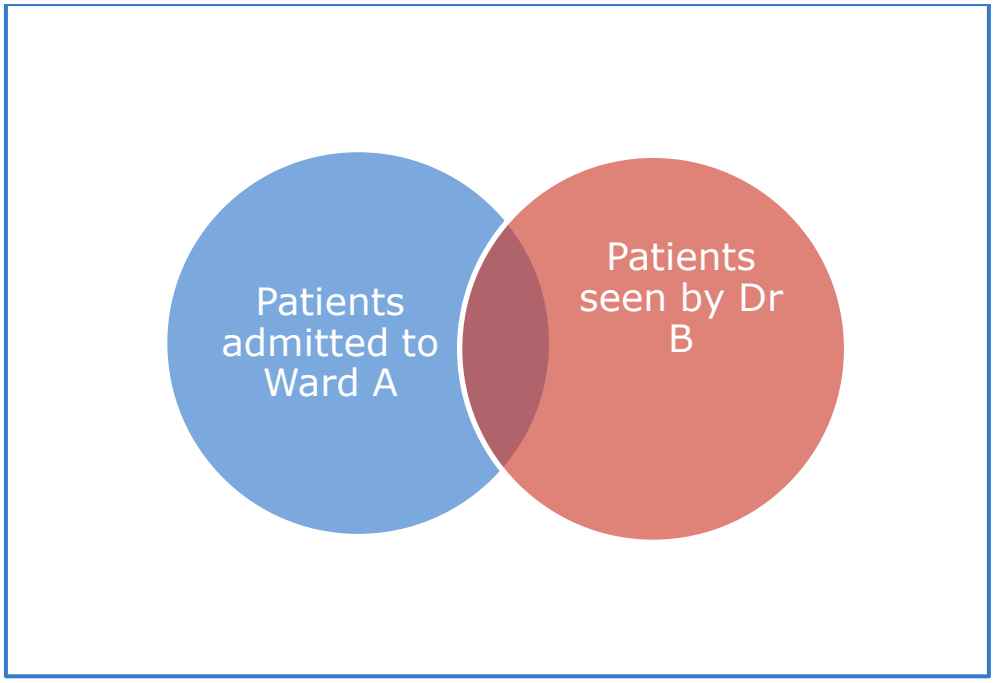

The rationale for this difference can be clarified by the following example. As a practitioner on Ward A you would expect to have access to a patient's full case notes (at least for the service they are involved with) rather than just the notes for admissions to the ward the patient happens to be on at that moment. If the latter was all you were handed you could not begin to undertake any meaningful analysis of that patient's health history. Similarly, with a **base cohort** the data available to a base cohort is ALL data for that cohort, not just data for the period in which the patients met the cohort definition. For example, if the base cohort were **patients with a diagnosis of lung cancer** you would want access to data prior to those patients receiving such a diagnosis. Were such data to be restricted to data collected while they had lung cancer, many meaningful analyses would be impossible. On the other hand, were you to be auditing treatment of lung cancer patients on your ward, you would only wish to identify patients who saw Dr. B whilst on your ward – you would not wish to be inadvertently including data from when they saw Dr. B five years ago on a different ward and prior to the diagnosis of lung cancer.

17.5 The impact of the order in which filters are applied

When using Cohort Discovery, you can select filters from the various tabs in any order that you like. For example, you can select a Diagnosis followed by a time frame and then a demographic filter.

However, the filters are always *applied* in a specific order, beginning with the Scope selections.

For non-Scope filters, the order of application has no impact on the number of individuals identified by the criteria. For example, the number of people who are female and had a diagnosis of depression is the same as the number of people who had a diagnosis of depression and who are female.

When Scope criteria are combined with other filters, it DOES make a difference. For example, the number of patients who have a diagnosis of depression who were admitted

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to Hospital A is different from the number of people admitted to Hospital A with a diagnosis of depression. This is because in order for the latter to be true, the diagnosis must have been recorded in the context of an admission to Hospital A, whereas in the former case it could have applied at any time. Hence:

(A)

Has a diagnosis of depression (ever) + Admitted to Hospital A (ever)

is not the same as:

(B)

Admitted to Hospital A (ever) + Has a diagnosis of depression (during an admission to Hospital A)

Cohort Discovery will **always** apply the two filters in order **(B)**, regardless of the order in which you make the selections.

This does not mean, however, that order **(A)** cannot be achieved using Atmolytics. To achieve the effect of example **(A)** you would need to use one of the following approaches:

- Create two cohorts, one with a diagnosis of depression and the other with an admission to Hospital A.
- Use the **Compare or merge** feature to identify the intersection to which both apply.
- Create a **subgroup** of the intersection of the two cohorts.

or:

- Create a cohort with a diagnosis of depression.
- Select Hospital A as the **data source** in report creation.
- Only include **admissions in which the filters apply** (in which case only admissions to Hospital A will be included).

Which of the above approaches is best will depend upon whether it is critical to your purposes that the **cohort** only includes people to whom both filters apply; or whether it is sufficient that the **data** reported upon pertains only to contexts in which both filters apply.

Again, the critical point is for you to be clear about the difference between:

- The **patients** who need to be included in the **cohort**, and
- The **data about those patients** that needs to be included in any **report**.

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