INVESTIGATE: ONLINE PATIENT SIMULATIONS FOR EDUCATION IN THE RATIONAL USE OF INVESTIGATIONS – FINAL REPORT FOR STAGE 3

Stage 3 of the iNvestigate project has now been completed. This report reviews the extent to which the Aims of the project have been achieved, emphasising developments since submission of the earlier progress report. Because a great deal of detail was provided in that report, this document is a more compact summary focusing on outcomes.

Completion of Stage 3 effectively represents completion of the project as a whole.

Nevertheless, given that the online resource will continue to undergo development and enhancement, the current status is as usual best evaluated by visiting the website: http://investigate.med.unsw.edu.au/

As required, a complete version of the Project Material produced to date is also being provided. Because the Material is a software program, package files are being mailed on a disk together with a hard copy of this report. The version on the disk (3.1) is the June 2012 version of the program and data. However, as explained below, this version is due to be updated shortly. Further software packages can be sent to QUPP on disk if required.

Financial statements of project activities will as usual be provided by the Grants Management Office, UNSW, together with the final invoice.

Plan of action for this Stage

The stated Aims of Stage 3 included:

- Rebuilding the software platform, including the database structure and user interface, to allow multiple audiences and interface extensibility.
- Developing a collection of a minimum of 12-18 case studies in areas of clinical practice relevant to general practitioners.

The proposed strategy for development of the library of case materials was based on the previous successful process, viz.:

1. Identification of a relevant area of complexity/difficulty in pathology test ordering, for development of a case study that has suitable educational value.
2. Collection of potential clinical cases via communication with colleagues across the UNSW teaching hospital network and through the RCPA’s liaison with the Royal Australian College of General Practitioners (RACGP).
3. Quality assessment in terms of completeness of dataset, including availability of digital images e.g. radiological and histopathological studies.
4. Writing of educational content in terms of hypothesis generation and diagnostic strategy.
5. Assembly of one or more case studies per area for peer review.

The iNvestigate website was intended to "go live" for GP education during this stage.
Progress since previous report

Dr Anne Eastwood, Dr Geetha Kunjithapatham and Assoc Prof Rosa Canalese of GP Synergy have continued to be actively involved in the development of case studies for General Practice Registrars, based in part on their review of data from the "Bettering the Evaluation and Care of Health" (BEACH) study. Dr Kate Webber, who has been employed as a 0.2 Fractional Lecturer on the Project, has been involved in the editing, formatting and uploading of draft case studies from colleagues at GP Synergy.

As noted in the first progress report, in collaboration with Dr Wendy Pryor of RCPA, the Participant and Dr Kate Webber had previously reviewed the case studies in the RCPA "Common Sense Pathology" collection, to identify those that were suitable for immediate development of iNvestigate cases for GP Registrars. Dr Webber has continued to be involved in the editing, formatting and uploading of these studies. The Participant has subsequently reviewed all uploaded cases.

As a result of ongoing effort by all concerned, the target number of case studies for GP Registrars has been reached by the end of the Project Period. Further work on case development/refinement will continue into the future.

Various activities have been undertaken to disseminate information about the iNvestigate project, as detailed below.

Further enhancements of the software platform have been planned, as detailed below.

Case studies for GP Registrars

The following case studies are now on line. All of these were targeted as high-priority areas for education of GP Registrars about the rational use of investigations:

1. Chronic fatigue
2. Crohn's disease
3. Arthritis
4. Essential hypertension
5. Non-alcoholic fatty liver disease
6. Post-streptococcal glomerulonephritis
7. Deep vein thrombosis
8. Resistant hypertension
9. COPD and acute bronchitis
10. Immune thrombocytopenic purpura
11. Antenatal screening
12. Haemochromatosis
13. Urinary tract infection
14. Diabetes and carpal tunnel syndrome

Other case studies

As previously advised, the Participant collaborated with Assoc Prof Tara MacKenzie (chair) and other members of the Education and Training Committee of the Thoracic Society of Australia and New Zealand, to develop case studies suitable for education of Respiratory Medicine advanced trainees of the Royal Australasian College of Physicians. Of the planned 6 cases listed overleaf, the first 3 are now on line. Dr Webber has played a key role in achieving this.
1. COPD
2. Tuberculosis
3. Lung cancer
4. Interstitial lung disease
5. Asbestos-related lung disease
6. Bronchiectasis

Availability of these cases for use by trainees was announced in the 2011 TSANZ Annual Report, released at the Annual Meeting in Canberra at the beginning of April 2012. A link has also been provided on the TSANZ members website:

Dissemination activities

The issues surrounding dissemination of *iNvestigate* to prevocational trainees, discussed in previous reports, have not been resolved. Various dissemination activities were mentioned in the progress report. Since that time, the following developments are of note:

- In January 2012 the Participant gave a very successful presentation about *iNvestigate* at the Asia-Pacific Medical Education Conference in Singapore.
- At the end of June 2012 the Participant will give a presentation about *iNvestigate* at the Australian and New Zealand Association for Health Professional Educators in Rotorua.
- In July 2012 Dr Anne Eastwood and the Participant will discuss *iNvestigate* with colleagues at the meeting of the General Practice Unit at Fairfield Hospital, Sydney.
- In September 2012 Dr Anne Eastwood will give a presentation about the *iNvestigate* Project at the General Practice Education and Training Convention in Melbourne.

---

*Dissemination activities*

Together with the Faculty of Medicine at the University of NSN, the TSANZ Education and Training Sub-Committee has developed an online resource for advanced trainees in respiratory medicine, composed of interactive case studies focusing on the rational use of investigations.

This is a specifically targeted component of the *iNvestigate* project, undertaken in collaboration with the Royal College of Pathologists of Australasia and funded by the Quality Use of Pathology Program of the Australian Government.

TSANZ is the first Specialist Society to be involved in the development of a section for advanced trainees. Other user groups include junior medical officers and General Practice registrars. Case studies will continue to be added over time.

Trainees can self-register to use the resource at: http://investigate.med.unsw.edu.au

(The site is free and users will also be able to access case studies in other sections)

More about *Investigate*
A preliminary report about the *iNvestigate* Project was submitted to the Medical Journal of Australia in April 2012; while the manuscript was rejected on the grounds that no evaluation data were available, this has led to plans to gather such data, see below.

At the suggestion of Dr Wendy Pryor, the Participant has opened discussions with the Medical Editor of *Australian Doctor* regarding dissemination of information about *iNvestigate* via that publication, and possibly collaborating to make it available for CPD credit for general practitioners.

**Software upgrade**

As documented in the progress report, the enhancement of the *iNvestigate* website that was planned for this Stage was completed by the beginning of November 2011. This allowed the creation of multiple user groups, significantly enhanced speed of loading of cases and improved the interface for case builders, and provided for the addition of image links in the clinical scenario and the commentary. In addition, data from the RANZCR website called *Inside Radiology* was incorporated into the *iNvestigate* website, to allow general information about imaging procedures to be displayed when users select these investigations.

Subsequently, in the light of the reasonable criticism that no evaluation data for *iNvestigate* were available, it became clear that further enhancement of the software was required to:

- allow a user feedback survey questionnaire to be appended to case studies
- enable extraction of survey data for analysis
- provide a facility for users to request a report of cases completed, in the form of a PDF document.

The specifications for this were developed in May and the work is now in progress, with version 4.0 of the software due to be deployed next month. The specification document was prepared by Mr Clayton Gilbert, the project supervisor within UNSW Medicine Computing Support, and can be provided separately to QUPP if required. The work is being undertaken by Ms Caroll Pinzon, the Senior Developer/Programmer who was involved in Stages 1 and 2 of the Project.

The software upgrade in turn required substantial rewriting of the User Guide for *iNvestigate*. The new version of the online help file is provided with this report.

**Other ongoing issues**

While developing cases, Dr Kate Webber has continued to identify issues in relation to availability of investigations for ordering within the *iNvestigate* environment and problems related to missing data in the RCPA Manual. As previously noted, we continue to take advantage of the flexible administrator interface for *iNvestigate* to work around these problems wherever possible.

Rakesh K. Kumar  
Department of Pathology, University of New South Wales, Sydney 2052  
18 June 2012
INVESTIGATE: HELP

NB: This PDF file has bookmarks to allow easy navigation!

DESIGN .................................................................................................................... 1
  Disclaimer ............................................................................................................ 2
  Project team ....................................................................................................... 2
  Acknowledgements ............................................................................................. 2

USING INVESTIGATE FOR THE FIRST TIME ...................................................... 3

WORKING THROUGH THE CASE STUDIES ....................................................... 4
  Selecting and viewing a case .............................................................................. 4
  Prioritising differential diagnoses ................................................................. 5
  Ordering investigations ..................................................................................... 6
    Finding the investigations you want .............................................................. 6
    Viewing test information .............................................................................. 8
    Submitting orders for investigations .......................................................... 10
  Viewing results .................................................................................................. 11
  Ordering more investigations ......................................................................... 12
  Comparing your approach .............................................................................. 13
  Finalising your diagnoses ............................................................................... 14
  Overview and commentary ............................................................................ 15

BUILDING A CASE ............................................................................................... 16
  What you need .................................................................................................. 16
  Getting started .................................................................................................. 16
  How to add text content .................................................................................. 17
  Writing the clinical scenario .......................................................................... 18
  Adding differential diagnoses ......................................................................... 19
Choosing relevant investigations .......................... 19
Inserting results of investigations .......................... 20
How to upload images: .......................................... 21
Adding the commentary ........................................... 23
DESIGN

iNvestigate is an interactive website designed for use by medical graduates, which focuses on the appropriate and cost-effective use of diagnostic investigations. It is intended for use by prevocational, general practitioner and specialist trainees.

This project was funded by the Australian Government under the Quality Use of Pathology Program.

iNvestigate uses data from the RCPA Manual website to provide detailed information about individual Pathology tests.

The Medicare Benefits Schedule is used as the data source for indicative costs of investigations. It is important to note that these do not necessarily reflect actual costs to the patient or the laboratory and do not include associated costs e.g. of anaesthesia or hospital admission.

In addition, iNvestigate uses data from the RANZCR Inside Radiology website to provide general information about diagnostic imaging.

You may interact with iNvestigate as a User or as a Case Builder. Help for both of these roles is provided in this file. Administrative functions are not described here.

How a User interacts with iNvestigate is explained in the diagram below. Simple instructions and help are provided on each page of the website.
Disclaimer

iNvestigate is a work in progress. Further relevant and instructive cases will continue to be added to the site, using the simple Case Builder interface which has been created for medical educators.

iNvestigate has been tested with Internet Explorer 8, Firefox 3.6+ and Safari 5+ but appears to work satisfactorily with most other browsers.

Project team

iNvestigate has been developed by a UNSW Medicine team comprising:

- Prof Rakesh Kumar (Professor of Pathology and project director)
- Dr Kate Webber (Medical Oncologist and case developer for all cases for Prevocational Trainees, as well as contributing to development of cases for other user groups)
- Mr Clayton Gilbert (project manager)
- Ms Caroll Pinzon (senior developer/programmer)
- Mr Kelvin Lu (Senior Developer/Programmer)
- Ms Shan Luo (developer/programmer)

Acknowledgements

We gratefully acknowledge funding by the Australian Government under the Quality Use of Pathology Program.

The development work has been greatly facilitated by the support of Mr Luc Betbeder-Matibet (Medicine IT Manager). We thank Mr Simon Winter (IT Coordinator for South Eastern Area Laboratory Services) for advice about the Common Investigations screen. Testing of early versions involved various colleagues and a group of senior UNSW medical students.

Case development for General Practice Registrars has been undertaken by Dr Anne Eastwood, Dr Geetha Kunjithapatham and Assoc Prof Rosa Canalese of GP Synergy, Sydney.

Case development for Advanced Trainees in Respiratory Medicine has been undertaken by members of the TSANZ Education and Training Subcommittee, namely Dr Ben Kwan, Dr Nick Wilsmore, Dr Jeremy Wrobel, Dr Belinda Miller and Assoc Prof Tara Mackenzie (Chair).

Collaboration with RCPA has been facilitated by Dr Wendy Pryor (Director, Education) who has also contributed to several other aspects of the project.

Access to the RANZCR Inside Radiology data has been facilitated by Ms Jane Grimm (Director, Quality Projects).

iNvestigate is based on a concept initially implemented by Prof Fred Dee of the University of Iowa. We thank Prof Dee for generously sharing his ideas, for providing the source material for the initial demonstration case from his LabCAPS site, and for testing the website at a late stage of development.
**USING iNVESTIGATE FOR THE FIRST TIME**

This is the Home page at [http://investigate.med.unsw.edu.au/](http://investigate.med.unsw.edu.au/)

You need to register to use iNvestigate. This is so that your completed cases and the state of your current case are saved when you log out (or are logged out after a period of inactivity) allowing you to continue from where you were when you return. To register, click on the link at the far right underneath the banner.

After you have successfully registered, you will receive email notification. If you wish, you can subsequently change your password from the "My account" page.
WORKING THROUGH THE CASE STUDIES

Selecting and viewing a case

When you have logged in, you will first be asked to select your user group for this particular session. There are separate sets of case studies appropriate to each user group, although all users have access to all available cases.

Selecting a group then takes you to the "Case Studies" page for that group. Thereafter, the 'workflow' should be self-evident from the tabs across the top. Tabs become progressively available (or unavailable) as you progress through a case.

Click on a case to select it.
You will then move to the next page of the website, which displays relevant history and physical findings. You can use the tabs at the top or arrows at the bottom of the page, as available, to progress through the case.

Using the back/forward buttons in your browser is not recommended, as these may yield unpredictable results.

Note that new cases will continue to be added to iNvestigate in the future.

Prioritising differential diagnoses

On the next page of the site you are presented with a list of 5-10 differential diagnoses. You can drag and drop to prioritise these. You must save this initial prioritisation before proceeding, although you can return to amend it at any time prior to finalising your test ordering. Note that if you do not use one or more of the possible diagnoses, these will not be available when you finalise your diagnoses towards the end of the case study.
Ordering investigations
This tab is the heart of iNvestigate and you should learn how to make best use of it.

Finding the investigations you want
When searching for tests, note that if the "Common" box at left is checked, as shown below, you will only see a limited list of common tests. If you uncheck the box, this will (after a short delay) reveal all of the available tests.
Another way of searching for a test is by section, which reveals the major groups of tests, as shown below.

A third way is to search by category, which is quicker if you know which laboratory/imaging service performs the type of test you are looking for.

If you know the name of the test, you can simply type part of the name, or the common abbreviation, into the "Name" search box at right.
Viewing test information

Remember to scroll down to view test information where available, as shown overleaf. This may include links to other relevant tests or to external web sites with more information. You should also note the Medicare Benefits Schedule indicative cost information. However, be aware that the costs displayed are the MBS reimbursements for diagnostic services, which do not necessarily reflect actual costs to the patient or the laboratory. Moreover, for procedural investigations, they do not include associated costs e.g. of anaesthesia or hospital admission.
Clinical Laboratory >> Chemical Pathology >> C-Reactive protein (CRP) - serum

**RCPI Information**

| Specimen: | 5 ml blood in plain tube. |
| Method: | Immunassay. |
| Reference Interval: | <5 mg/L |

**Application:**
Assessment of acute phase reaction in inflammatory, infective and neoplastic disorders; monitoring disease activity, particularly in inflammatory arthritis; monitoring patients after premature rupture of the membranes, for developing infection; and assessment of risk factors for myocardial infarction.

Marginally raised CRP, and values within the normal range, have been demonstrated to be an independent risk factor for coronary artery disease. However, the applicability of measuring serum CRP for screening in asymptomatic populations for coronary artery disease risk remains unclear.

**Interpretation:**
Elevation indicates acute phase response or active disease in chronic inflammatory disorders.

CRP is a more sensitive early indicator of an acute phase response than is the ESR. It also returns toward normal more rapidly with improvement or resolution of the disease process. The test is less sensitive than the ESR for some disorders eg, scleroderma, SLE.

In patients at risk for myocardial infarction, and without other causes of an acute phase response, the presence of slightly elevated or even high normal CRP indicates a greater risk of myocardial infarction. This use of CRP requires a special, high sensitivity assay. The use of high sensitivity CRP in clinical practice remains undecided.

See also: Erythrocyte sedimentation rate and Acute phase reactants.

**Reference:**

**MBS Information**

| Item Number: | 65500 |
| Schedule Fee: | $9.75 |
| Description: | Quantitation in serum, plasma, urine or other body fluid (except amniotic fluid), by any method except reagent tablet or reagent strip (with or without re在这个meter) of: acid phosphatase, alanine aminotransferase, albumin, alkaline phosphatase, ammonia, amylase, aspartate aminotransferase, bilirubin (total), bilirubin (direct), bilirubin (indirect), creatinine, creatinine kinase, creatinine, gamma glutamyl transferase, globulin, glucose, lactate dehydrogenase, lipase, magnesium, phosphorus, potassium, sodium, total protein, total cholesterol, triglyceride, urate or uric acid. |
**Submitting orders for investigations**

When you have identified a test you wish to order, click on the "Order test" box. This adds the selected investigation to the list of orders, and the test is highlighted in yellow. The indicative cost of the test is also added to the running tally at the right of the page.

When you have finished selecting tests you wish to order in this encounter, you can proceed to the next tab. Note that requests for the tests you have selected to order will only be submitted when you click the "Submit orders" button. Until you do so, you can remove selected tests or return to the test ordering screen to add investigations to this encounter. You are allowed a maximum of 5 test/review encounters.
**Viewing results**

You can review the results of the investigations you ordered (including in previous encounters if applicable) on this screen. Abnormal values are shown in **bold**. To review information about a test, click on the test name. Clicking a second time will collapse the display of information.

### Encounter 1

<table>
<thead>
<tr>
<th>Test</th>
<th>Reference Interval</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-Reactive protein (CRP) - serum</td>
<td>0 mg/L</td>
<td>$0.75</td>
</tr>
<tr>
<td>Coagulation studies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prothrombin time: 15 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activated partial thromboplastin time:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>29 seconds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$35.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duplex scanning, lower limb vein (Imaging/Nuclear Medicine)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVT involving the right posterior tibial vein extending into the distal popliteal vein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$183.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hematology

<table>
<thead>
<tr>
<th>Test</th>
<th>Result</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hb: 115-165 g/L</td>
<td></td>
<td>$17.65</td>
</tr>
<tr>
<td>MCV: 80-95 fl</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MCH: 27-32 pg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HCT: 0.41-0.47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RBC: 3.9-5.9 x 10^12/L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RBC: 11-15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WBC: 4.1-10.9 x 10^9/L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ordering more investigations

After you have reviewed the results of your first encounter, you will usually want to order additional investigations. If you return to the "Order tests" screen, those tests ordered in the previous encounter(s) will be highlighted in pale blue. Within a given case study in iNvestigate, individual investigations are deliberately not made available for ordering on more than one occasion.

If you proceed to the next tab you will be given the opportunity to return to ordering tests, or to finalise your test ordering. Only click the "Finalise" button if you have completed your test ordering and are ready to proceed.
When you have finished ordering and reviewing the results of investigations, you can proceed to the next tab to finalise your test ordering. You must do so after completing 5 test ordering encounters.

Comparing your approach

When you finalise your test ordering, you have the opportunity to compare your approach with that of an expert. This comparison includes the number of test encounters, the total indicative cost, the expert choices that you ordered, the expert choices that you did not order, and investigations you ordered that the expert did not.
You can click on any of the bars to expand the information, or click again to collapse the display.

Finalising your diagnoses

After you have reviewed all the investigation results, including those of the expert, you can move to the next tab and select your final diagnosis or diagnoses. Once again, you can drag and drop to do so. You need to click the “Save final diagnoses” button to proceed to the last tab.
Overview and commentary

On this page you are provided with a comparison table showing your initial prioritisation, your final diagnosis or diagnoses, and the expert's final diagnoses. The key features of the case are summarised.

Importantly, you are also provided with information about a useful diagnostic strategy for cases of this type.

Additional relevant information may be available e.g. related to management and the use of investigations in particular complications.

Your test ordering approach and that of the expert, as well as the results of investigations, remain available at the bottom of the screen, via expandable panel bars.

At this point, you have completed the case and can return to the first tab to select another case.
BUILDING A CASE

What you need
To build a case study, you should assemble the following:

[1] information about the patient's clinical history and relevant physical examination findings

[2] a list of plausible differential diagnoses

[3] a list of investigations that yielded abnormal results, with all of the relevant test data and images

[4] optionally, if full results are available for the patient, a list of all other investigative findings

[5] a list of investigations that will be nominated as likely to have been ordered by an expert

[6] information about the diagnostic strategy that is appropriate in such cases

[7] other relevant information e.g. relating to prognosis or management.

Getting started
When you log in as a Case Builder, you will see the "Case List" screen.

From this screen you can either build a new case by clicking on the "Build a new case" button, or click on a case in progress to continue building, or click on an existing case to amend/update the data.

Note that all Case Builders have access to all existing cases for editing, which allows co-operation between two or more individuals during the development of a new case.
Alternatively, to build a new case you can click on the “Build Cases” link, which brings up a welcome screen with a button.

Clicking on the "Build a new case" button takes you to the General Information screen, on which you enter information that users will be shown on the “Case Studies” page. This includes a title for the case, basic demographic information, the user group to which the case is allocated, and a very brief synopsis of the clinical presentation. Note that the "Synopsis" field is limited to just 50 characters.

How to add text content

In most text fields which allow you to enter information, you have access to standard word processing toolbars which permit formatting of text (choose font and make e.g. bold, italic, underlined, super/subscripted) and paragraph style (e.g. aligned/justified, numbered list) as well as insertion of tables, horizontal rulers etc.
Writing the clinical scenario

For the history, you can enter information about the presenting/main complaint(s) in the first text box and other relevant history in the second text box. If you wish to divide the latter into e.g. past medical history, social history, family history etc you can use text formatting to create subheadings.

**History:**

**Presenting complaints:**

An 82-year-old woman presented with a history of increasing breathlessness over a period of approximately 5 years. Over the past year she had noted increasing difficulty in climbing stairs and was now unable to do so at all. She was also finding it difficult to perform her normal activities at home, as she felt weak and tired “almost all the time”.

The patient had suffered from a chronic cough for “many years”. She also stated that she had recurrent episodes of “bronchitis” over approximately 20 years, with variable production of sputum, usually white but occasionally yellow or greenish in colour. At this presentation, her cough was productive of copious yellowish sputum.

**Other history:**

**Past History:**

She had an episode of pneumonia 3 years ago.

**Social History:**

The patient had been a smoker for over 30 years and smoked approximately 40 cigarettes per day.

**Physical examination:**

- Heart rate 108/min; Blood pressure 140/70 mm of mercury; Respiratory rate 25/min; Temperature 37.5 C.

**Other pertinent physical findings:**

Respiratory system:
Note that you must enter information in all three text boxes before you can save your work on this page and proceed to the next tab. Of course it is not necessary for this information to be complete or in final form (editing any or all content later is quite straightforward) but once you start work on this page you must not leave a text box blank and navigate away to another page, otherwise your work will be lost.

The clinical scenario may also include as many appropriate images as you wish to provide. For instructions on uploading images, see below.

**Adding differential diagnoses**

At least 5 differential diagnoses must be provided, although you can add up to another 5 differential diagnoses by clicking on the "Add new diagnoses" button at right. You then need to select at least one as the expert diagnosis, by checking the "Correct" box(es). Remember to save your work before moving to the next step – you will in any case be reminded to do so if you attempt to navigate away from the page without clicking the "Save" button.

**Choosing relevant investigations**

Providing results of investigations is done in two stages. Firstly you select those tests for which you wish to modify results – this will include all the investigations that yielded abnormal values, as well as the tests for which results were within the reference range but for you wish to modify the default normal normal value stored within iNvestigate. Secondly, for the list of selected tests, you insert abnormal test results and amend normal results if desired, then select those tests that are to be designated expert choices.
On the "Choose relevant tests" tab you can search for tests in the same way as in the User role i.e. by scrolling through the list of Common tests, using the drop-down lists, searching via the text box etc. On each selection screen, click the "Select tests/amend results" button to add to the list of tests for which you will insert results.

<table>
<thead>
<tr>
<th>Relevant tests</th>
<th>Test Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Common</td>
<td>1. Blood gases - arterial blood</td>
</tr>
<tr>
<td></td>
<td>2. C-Reactive protein (CRP) - serum</td>
</tr>
<tr>
<td></td>
<td>3. Coagulation studies</td>
</tr>
<tr>
<td></td>
<td>4. Erythrocyte sedimentation rate (ESR)</td>
</tr>
<tr>
<td></td>
<td>5. Measurement of respiratory function</td>
</tr>
<tr>
<td></td>
<td>6. X-ray, Chest</td>
</tr>
</tbody>
</table>

**Inserting results of investigations**

On this tab, you can edit the data for the investigations you selected. Use the text tools to make abnormal results **bold**. If you note that you have accidentally included some tests in this list, for which you do not wish to insert results, you can remove them by checking the "Remove" box and clicking the "Save" button.

On this screen you also identify those tests that were selected by the expert, simply by checking the "Expert" box. Note that you must select at least one test as an expert choice to be able to save the data on this page.
Test results may include as many appropriate images as you wish to provide. For instructions on uploading images, see the next section.

How to upload images:

There are 4 steps to uploading an image (1) click on the text that says "0 images attached" (self-evidently the number will not be zero if you have already attached one or more images) (2) click on the "Add image" button and browse your computer for the stored image that you wish to attach – if you accidentally select the wrong image at this stage you can cancel the operation by clicking on the link (3) click the "Upload" button and wait for a thumbnail of the image to appear in the panel at right (4) replace the filename with a caption for the image.

These steps are illustrated in the three following figures, which demonstrate adding images to results investigations. The same approach is used for the clinical scenario and the overview.

Note that you can remove an uploaded image by scrolling down in the right-hand panel and clicking on the "Remove" link.

Uploading images is useful not only for clinical photographs, diagnostic images and photomicrographs, but also for scanned reports with images or tabular data.
Measurement of respiratory function [Procedure-based >> Other]

Post-bronchodilator:
FEV₁ 8.60 litres (17% predicted)
FVC 2.79 litres (58% predicted)
FEV₁/FVC 22%
PEF 2.86 litres (35% predicted)
TLC 7.66 litres (121% predicted)

X-ray, Chest [Imaging/Nuclear Medicine >> Diagnostic Imaging]

Hyperinflated lung fields, with loss of pulmonary vascular markings and flattening of both domes of the diaphragm, consistent with emphysema.

Total

Expert costs: $114.80
Adding the commentary

This final step is a critically important part of building an effective case. As shown on the next page, there are potentially 3 components of the commentary, each of which serves a different educational purpose.

Firstly, the "Summary of this case" text box is useful for listing key findings to ensure that the user has not missed something significant, and for providing an overview of (each of) the main diseases. It sets the stage for the review of diagnostic strategy.

Secondly, the "Diagnostic strategy" text box provides an expert view of the approach to this type of clinical problem. While not intended to be an exhaustive discussion of every possible differential diagnosis, it should explain the logic underlying the expert's initial prioritisation, the initial choice of investigations, and the basis for choosing further investigations as results become known.

Thirdly, the "Other comments" text box provides space for discussion of issues related to management, including additional investigations that might be relevant in guiding management of such a patient.

Note that you must enter text in the first two boxes to be able to save your work on this page.
Please send feedback about this help file to r.kumar@unsw.edu.au