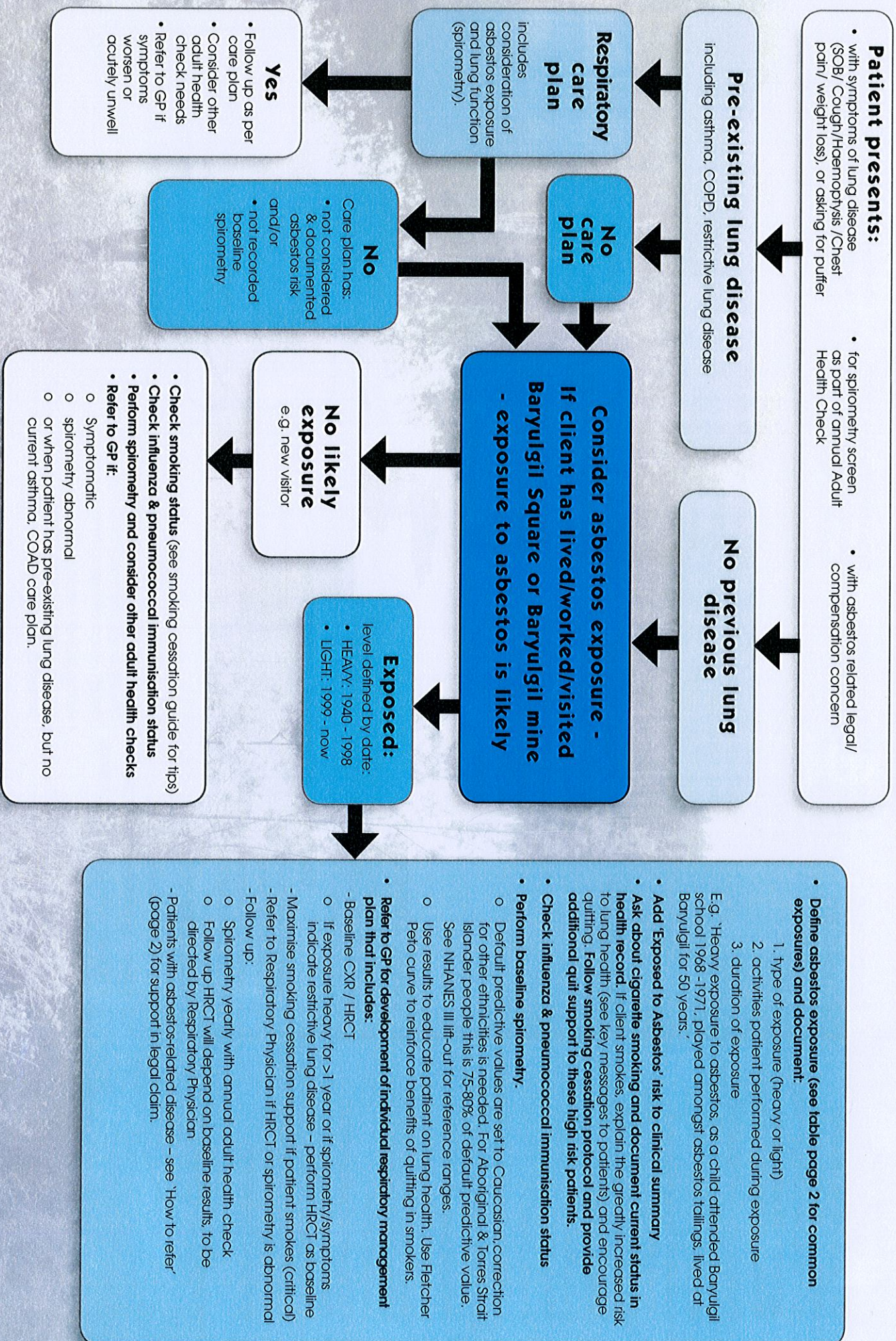


RESPIRATORY HEALTH MANAGEMENT FLOW CHART BULGARR NGARU, CAMS AND ARMAJUN CLINICS



Key messages to patients:

- Give reassurance, asbestos-related disease takes many years to develop & most people exposed to asbestos never develop asbestos-related disease.
- The risk of developing asbestos lung disease increases with length and intensity of exposure.
- If exposed to asbestos and current smoker, the risk of lung disease is hugely increased and more than just exposure to asbestos or smoking.
- Best action to protect from asbestos is:
 - o not to smoke
 - o prevent future asbestos exposure
- Quitting helps all aspects of health.
- Avoid respiratory infections, keep up to date with influenza and pneumococcal vaccines, seek treatment promptly when infections occur.
- Clients with asbestos-related disease who have legal/compensation concerns should be referred to Scott Monaghan CEO Bulgarr Ngaru Medical Aboriginal Corporation.

Respiratory Physician

Bulgarr Ngaru

Dr Pradeen Mudholka visits Bulgarr Ngaru from his base in Coff's Harbour.

Create paper referral and give to Reception who will fax to:

Dr Pradeen Mudholka

Suite 2, 18 - 20 Scarba St
COFFS HARBOUR, 2450

Phone: 02 6651 3139

Fax: 02 6650 0193

How to refer for:

CAMS

Dr Sri Mahadev visits CAMS from his base in Royal North Shore Hospital Sydney.

Create electronic referral and forward to CAMS Chronic Nurse Coordinator who coordinates the monthly respiratory clinic.

Dr Sri Mahadev

Phone: 02 9926 5804

Fax: 02 9926 6699

Armajun Clinic

Dr Gary Baker is based in Armadale. No visiting service.

Create referral and forward to Armajun clinic reception, or fax directly to:

Dr Gary Baker

'Owiscot' 129 Markham St
Armidale NSW 2350

Phone: (02) 6771 1309

Fax: (02) 6771 1439

(Refer to reception if transport is an issue.)

CXR/HRCT *

Clarence Valley Imaging:

Create electronic request, print and give to Reception who can assist with booking.

Direct ph: 6604 2400

Fax: (02) 6643 2306

Address:

137 Fitzroy Street,
Grafton NSW 2460

North Coast Radiology:

Create electronic request, print and give to patient or Fax.

Direct ph: 6662 3346

Fax: 66625077

Address:

133 - 145 Centre St.,
(ALDI Complex)
Casino NSW 2470

Inverell Diagnostic Imaging:

Give radiology request to patient

Direct ph: (02) 6722 4248

Fax: (02) 6722 3970

Address:

35 Otho St,
Inverell NSW 2360

Legal concerns

Bulgarr Ngaru offers support to patients with asbestos-related disease who wish to explore legal action/options. Please communicate with Scott Monaghan CEO (02) 6644 3500 or email: SMonaghan@bmmac.com.au

Common asbestos exposures

People who lived, worked or visited Baryulgil until mining and milling operations ceased in 1979, are considered to have experienced significant exposure to asbestos. Living at Baryulgil since 1980 is considered light exposure.

Examples of asbestos exposure:

- Ex-miner / worked in mill
- Lived at or visited Baryulgil
- Played amongst or used tailings from mine
- Washed clothes of others exposed to asbestos
- Used old recycled asbestos bags e.g. as curtains, carpet underlay (many bags were recycled from South Africa asbestos mines)
- Remodelling / restoration of houses containing asbestos material

* **Remember** - all patients exposed to asbestos or who have lived, worked, visited Baryulgil - add '**Exposed to asbestos**' to clinical notes on CXR or HRCT request.

* Clients registered with Dust Diseases Board, must have CXR or HRCT copied to DDB.

Dust Diseases Board (DDB)

Take referrals of people with an occupation asbestos exposure/ eligible for workers compensation.

Contact details:
Level 2, 82 Elizabeth Street,
Sydney NSW 2000.
Phone: (02) 8223 6600
Toll Free: 1800 550 027
Fax: (02) 8223 6699

SMOKING CESSATION

Screening

Who and when to screen?

- **At least annually**, ask **everyone 15 years and older** e.g. with routine adult health check or child health check.
- **Under 15 years** – if presents with smoking-related illness (e.g. worsening asthma) or smoking suspected for other reasons.
- **Ask all pregnant women** at the first antenatal visit and at each visit during pregnancy if smoking.

What to ask?

1. Ask about current **smoking status**: do you smoke?
2. If the answer is yes, then ask about **readiness to change**: are you interested in cutting down or quitting?
3. Find out if they are **addicted to nicotine** – answering yes to ANY of the following indicates the person is addicted:
 - Do you smoke within half an hour of waking up in the morning?
 - Do you smoke more than 10 cigarettes a day?
 - When you don't smoke, do you: get cravings, feel really grumpy or stressed, have poor sleep?

Management

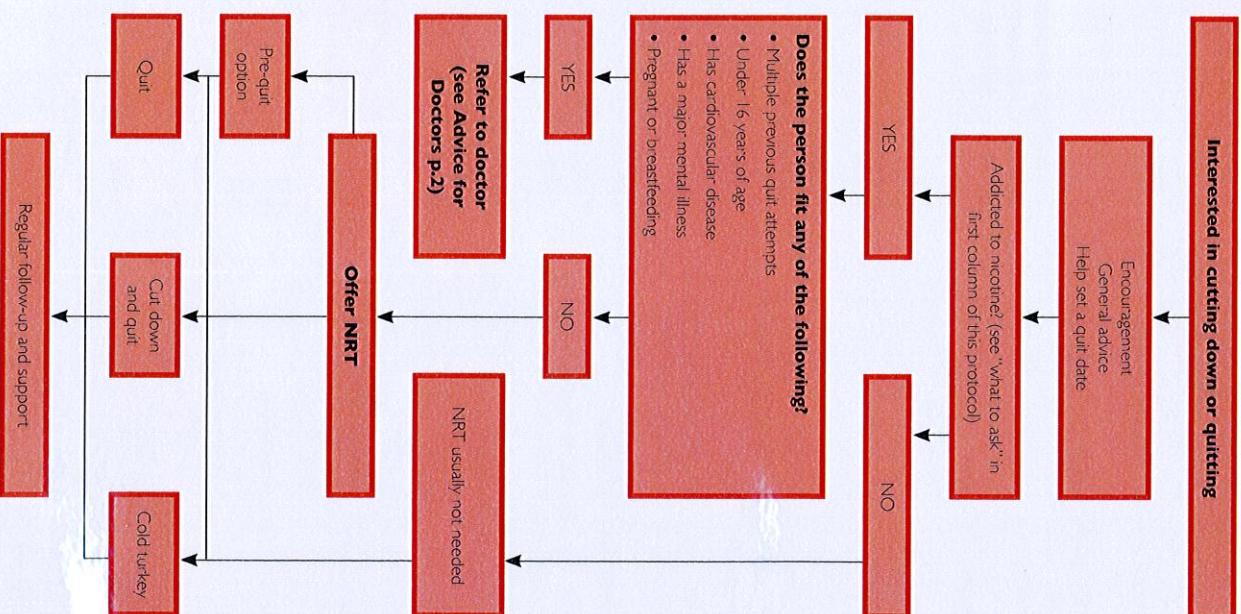
A. Not interested in cutting down or quitting:

- a) Provide advice about health effects of smoking.
- b) Let them know if they change their mind, to come back to the clinic – there are lots of ways the clinic mob can help them to quit smoking.
- c) A smoker may change their mind about quitting – so remember to ask them at each visit to the clinic.

B. Interested in cutting down or quitting:

- a) Find out what the person thinks is good and bad about smoking.
- b) Focus on the benefits of quitting e.g. health effects, saving money, no passive smoke for children and family.
- c) Talk about things that make it hard for them to quit.
- d) Help them decide on a quit date, then work out with them how they will reach that date.
- e) Work out with them their best management option – See flow chart next column.

NOTE: The combination of nicotine replacement therapy (NRT) with support is usually the most effective way to quit smoking.



SMOKING CESSATION

Cut down and quit – this involves gradually cutting down the number of cigarettes smoked each day until the person has stopped smoking. Offer assistance with setting a quit date and planning the cut-down schedule – with or without NRT.

Quitting Cold Turkey – some people will prefer to pick a quit day and just stop smoking. This is more likely to be successful for people who are not addicted and are very motivated.

Regular counselling and support

- At each visit, give the person plenty of time to talk, discuss problems including slip ups, provide tips on avoiding / managing these, give plenty of encouragement.
- Offer support from local "tobacco champion" or other key person in your clinic.
- Offer other forms of counselling and or group support which are available in your local area.
- If the person has access to a telephone and is interested, Qutline offers six free return calls. (Phone: 137 848).

Advice for people chewing tobacco

Chewing tobacco does not carry the same risks to health as smoking; however, it is associated with increased risk of mouth and throat cancer. Advise anyone who chews tobacco to stop. Consider using nicotine gum, starting low and increasing according to need.

Gunja and Tobacco

The mixing of tobacco and gunja is common practice. People may be reluctant to discuss their use of gunja, but it is important to encourage them to be open about it, as it will impact on their efforts to quit tobacco smoking.

NICOTINE REPLACEMENT THERAPY (NRT)

Senior Aboriginal Health Workers and Registered Nurses can start treatment with NRT

REFER TO DOCTOR FIRST if the client:

- Is pregnant or breastfeeding.
- Is less than 16 years of age.

- Has cardiovascular disease (previous heart attack, stroke, angina, etc).
- Has a major mental illness.

STARTING NRT

Encourage nicotine patches as first line for all addicted smokers who are interested in cutting down or quitting. Nicotine gum and combination NRT are also useful for some people – see Box 1: Troubleshooting on page 2.

Start treatment with **15mg / 16hr patches applied once daily.**

Smoking < 20 cigs / day: start patches around same time as planned quit day.

Smoking > 20 cigs / day: **Pre-quit option** will double their chance of success. Advise person to start patches 2 weeks before their planned quit date (i.e. they keep smoking for the first 2 weeks they are wearing patches), stop smoking on the quit date.

Continue patches for 4 weeks after quitting. If the person feels ready at 4 weeks, advise them to stop the patches (i.e. no need to reduce patch dose / strength first before stopping). Still quit but NOT ready to stop patches at 4 weeks, continue patches, review at least 2 weekly and aim to stop patches at 12 weeks max.

BOX 1: TIPS FOR WEARING PATCHES

- Put a new patch on each day, on clean, dry skin.
- Don't put the patch on hairy skin e.g. chest in men.
- Put each new patch on a different part of the skin to avoid your skin getting irritated.
- Remove patch before going to sleep at night.
- Keep out of reach of children – as soon as you take off patch, fold in half, wrap in paper and put it safely in a rubbish bin.

TABLE 1: TROUBLESHOOTING WITH NRT

Problem	Possible solutions
Morning cravings – i.e. waking up with strong urge for cigarette	Check patch technique / use. Try Combination NRT i.e. add nicotine gum, so person is wearing a daily patch and using nicotine gum when needed. See Table 2 for doses.
Using patch daily but still having daytime cravings	
Sleep disturbances / bad dreams	Make sure patch is applied in the morning and removed before bed. Try changing from patches to nicotine gum alone (see table 2).
Patch not staying on	Check technique (see Box 1 on page 1). Try sticking patch on with tape or adhesive dressing.
Patch causing skin irritation	Check technique (See Box 1 on page 1). Reassure person that mild irritation is normal, and skin may look a little red for up to a day after removing patch. If irritation is more severe, consider changing to nicotine gum.

TABLE 2: NICOTINE GUM – ALONE OR COMBINATION NRT

Number of cigarettes per day	Strength of gum	Maximum dose using gum alone	Maximum dose using gum in combination NRT
10 - 20 cigarettes	2mg gum	Up to 20 pieces per day	Up to 6 pieces per day
More than 20 cigarettes	4mg gum	Up to 10 pieces per day	Up to 3 pieces per day

SMOKING CESSATION

BOX 2: MANAGING SLIP-UPS

- Most people who try to quit smoking will need a number of attempts before they are finally successful – so prepare for this and avoid telling them off or punishing them when they have a smoke again.
- When a person who has quit does start smoking again, calling it a “slip up” helps remind them it is only a short-term set-back, not a defeat → encourage them to stay on track, remind them the goal is to stay quit in the long term, and provide positive feedback about the fact that they are giving it a go.
- Review relapse prevention strategies.
- Remember slip-ups are most likely in the first few weeks after quitting, so this is the time when they will need the most support (see Follow Up section below).

ADVICE FOR DOCTORS

All clients who are willing to cut down or quit should be referred to the doctor if:

- Pregnant or breastfeeding.
- Less than 16 years of age.
- Has cardiovascular disease (previous heart attack, stroke, angina, etc).
- Has a major mental illness.
- Requesting medicine other than NRT to support quit effort.

Pregnant or breastfeeding

- a) Varenicline (ADEC category B3) is **not recommended** for use in pregnancy or for women who are breastfeeding
- b) **NRT can used in pregnancy and when breastfeeding.**

- Nicotine gum delivers intermittent doses of nicotine and should be used as first line rather than patches.
- Nicotine passes into breast milk but nicotine as NRT is preferable to cigarettes – always recommend continuation of breastfeeding, and if feasible, use gum AFTER baby has had a feed.

Under 16 years of age

- With young person's permission, engage parent / guardian in quit efforts.
- Avoid pharmacotherapy other than NRT.
- NRT is not recommended for children under 12 years. For children aged 12 - 16 years, intermittent NRT using gum may be preferable to patches to avoid excess dosing with nicotine.

Cardiovascular disease

- Avoid NRT in people with unstable cardiovascular conditions. This includes clients with recent MI, unstable angina, recent stroke and within 12 weeks of cardiac surgery. Strongly encourage all non-pharmacological strategies for quitting.

Major mental illness

- Smoking rates amongst clients with mental illness are high and every effort should be made to identify and support clients to quit.
- Stable clients who are able to provide informed consent may benefit from NRT.
- Seek advice from a psychiatrist involved in the client's care before prescribing NRT in those with unstable mental illness.
- Varenicline is not recommended – see below.

Repeated quit attempts without success

- Review strategies for quitting, previous NRT technique / use, stressors and barriers to quitting.
- Consider **varenicline** – either alone or in combination with NRT (latter has greater chance of success).

Varenicline (Champix®)

- Varenicline increases a person's chance of quitting but there are a few things to think about before prescribing:
- Varenicline has been associated with psychiatric symptoms including depression and suicide. These adverse events have generally occurred with pre-existing mental illness or in association with a precipitating event. Hence:

- Avoid use in clients with current or previous history of depression or increased suicide risk.
- Monitor closely for mood changes during treatment and warn clients to attend promptly if they experience any mood change, suicidal thoughts, or other new symptoms. Encourage family involvement.
- The commonest side-effect is nausea – warn client, and advise taking the tablet with food.
- See product information for further detail including dosing schedule. PBS authority allows one course per year.
- NOTE: Dose reduction is required in renal failure – discuss with nephrologist before prescribing.

Follow-up

People not interested in cutting down or quitting

A smoker may change their mind about quitting – ask them about their smoking and interest in cutting down / quitting at each visit to the clinic.

People who have chosen to quit

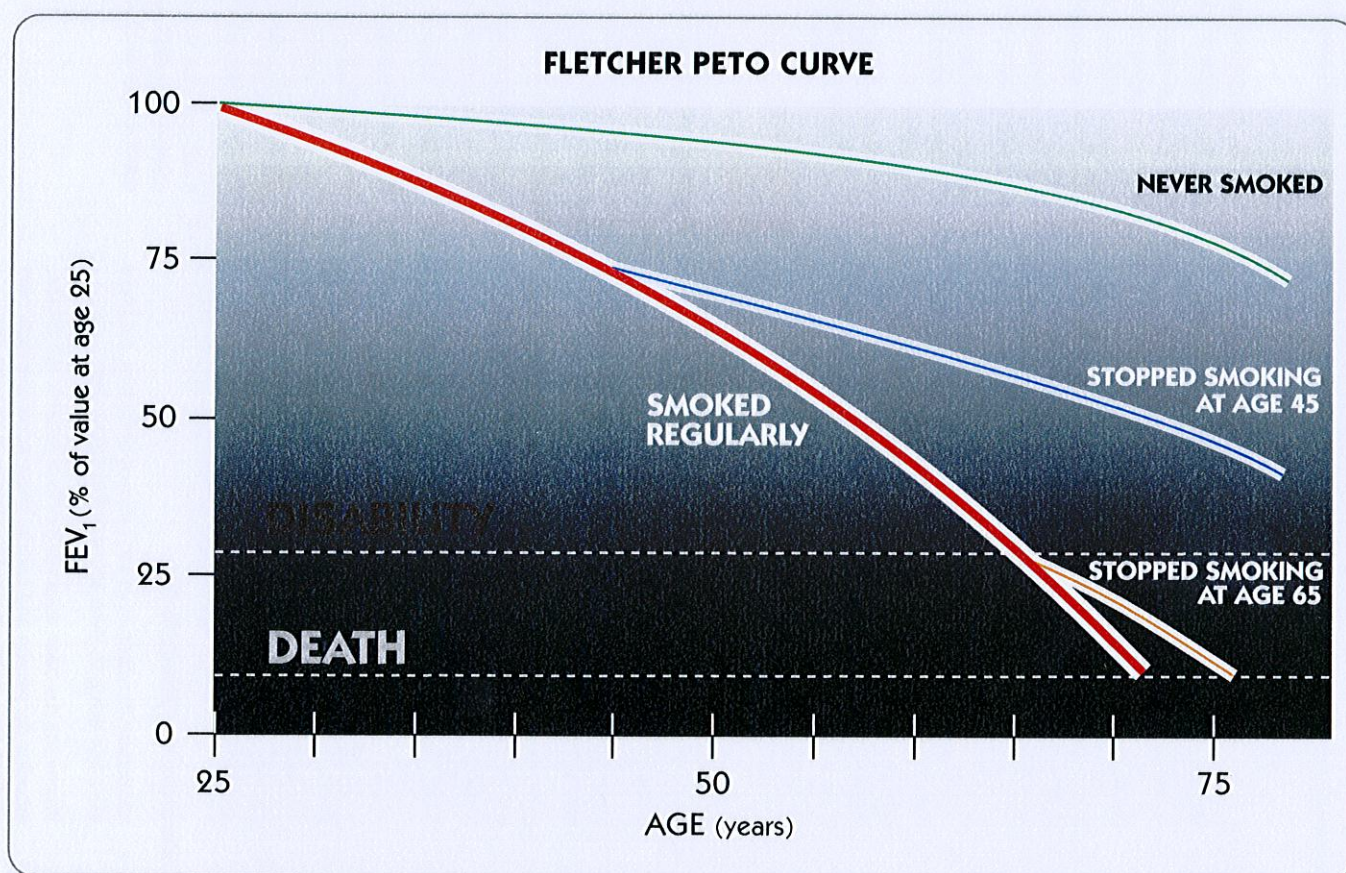
1. Actively recall clients for follow-up – weekly for the first 4 weeks, then less frequently and depending on progress.
2. See Box 2: “Managing Slip-ups”.
3. At each follow-up visit:
 - congratulate, affirm, review progress and problems, give relapse advice, encourage use of support services.
 - Ask about slip-ups.
 - Check side effects if on NRT or varenicline.
4. If not quit after 4 weeks, try other approaches – e.g. combination NRT, extra supports. If still having trouble quitting, refer to doctor.

EFFECT OF SMOKING ON LUNG HEALTH

This clinic offers spirometry testing to check lung health in patients as part of their yearly adult health check.

Your GP may also ask for this test at other times.

One of the measures in a spirometry test is the forced expired volume in 1 second – also called FEV1 and it tells us how open or narrow the airways in your lungs are. The FEV1 falls a little as we grow older, that's normal, but in people who smoke it can drop faster and at a younger age.



The Fletcher Peto graph explained:

GREEN line:

is normal and shows that the FEV1 slowly drops lower as we age.

BLUE line:

shows that quitting smoking at any age improves your chances of leading a long life. Quitting helps your lungs to work better for longer and cuts down your risk of developing cancer, heart attack, stroke, and kidney disease.

RED line:

shows smoking can make the FEV1 drop lower and faster and can cause chronic lung disease, disability and early death. How fast this happens is different for each smoker and depends on how much they smoke.

Our staff can help you quit - talk to them today!



training

Instructions: EasyOne Spirometer + EasyWare Software

Two equipment components: EasyOne spirometer & laptop/pc (EasyWare software)

Laptop

Select 'Spirometry Testing' icon

Select 'EasyWare 2011'

EasyOne Spirometer

Start of Day: perform calibration check

Calibration Check Procedure

- disconnect spirometer from USB cable attaching spirometer to laptop/pc
- connect spirometer to 3L calibrating syringe
- turn-on spirometer by holding down ON/OFF button
- using the → key, scroll through MAIN options to '**Calibration Check**'
- select '**Calibration Check**' using the Enter key

Calibration Check
Attach spirette to syringe with adapter
Done

- Enter

Testing – setting baseline avoid flow
Calibration Check
Pull then push syringe

- When you have completed a single pull and push the EasyOne screen will display

Calibration check passed/failed
Exp ____%
Insp ____%

- If cal check has passed, then spirometer is valid for patient testing
- If cal check fails, then repeat cal check procedure by selecting RETRY

Patient Testing Procedure

a) Preparing the EasyOne Spirometer for a patient test

- Open **EasyWare** software on laptop/pc
- Attach **EasyOne** to laptop/pc via usb connector
- If EasyOne is:
 - ON: spirometer database will automatically be downloaded and displayed to laptop/pc on-screen display
 - OFF: **EasyOne** spirometer must be ON to download and refresh laptop/pc on-screen display

- When **EasyOne** is ON and connected to laptop/pc, the following will be displayed on the **EasyOne** screen:

PC Interface active
PC interface mode
Baudrate 57600

- **EasyOne** is now ready for patient tests

b) Preparing for a patient test

- Enter patient data into **EasyWare**
- Select **Edit** (drop-down list) or use green pen & paper icon
- Select **New Patient**

Name: SURNAME FIRST NAME
ID: not mandatory. May be medical record number if available.
Birth Date: dd/mm/yyyy
Ht:
Gender:
Ethnic: Aboriginal Australian = OTHER
Tech ID: enter your initials
Wt:
Asthma: select asthma history from drop-down list
Smoker: select smoking history from drop-down list

- When completed, select **OK**
- A yellow icon labeled 'Patient Data' will appear on-screen. A test can now be performed.
- Select yellow **EasyOne** icon when ready to perform the test
- An 'On-Line Test' screen will appear on the laptop/pc
- At the same time the **EasyOne** screen will now display a MAIN menu

Perform Test
View Results
Print Results
Configuration
Edit Database

- Select **Perform Test**
- **EasyOne** Screen will display

Select Test
Recall previous or perform new test
NEW RECALL QUICK

- When **EasyOne** is attached to laptop/pc select **RECALL**

Search Test
Search: Last Test

- Enter
- This will now display the patient record that you have just set-up in **EasyWare** – crosscheck that the correct patient data has been selected.
- Enter
- Test Selection will now be displayed

FVC (Expiratory)
FVL (In – Expiratory)
SVC
MVV

- Select **FVC (Expiratory)** by using ENTER

Baseline Setting
Block spirette until prompted to blast out
NEXT

- Hold the spirometer still whilst the unit zeroes

Testing: setting baseline
Testing: blast out

- Subject performs test
- As subject is blowing into the spirometer
- **Easyware** Display: flow-volume curve, volume-time curve, numerical results
- **EasyOne** Display

NEXT DATA QUIT

- Select **NEXT** to perform the next blow

Testing: blast out

- Continue until 3 technically acceptable curves obtained, if subject is able. Average number of blows is between 5-8 attempts to obtain satisfactory technique.

c) To end testing session:

- **EasyOne** will display the following selection:

ADD PRNT DATA POST

- **Do not** select any of these options, as the testing session will be ended via the **EasyWare**
- **EasyWare**: select solid button near bottom of data-display screen, this will:
 - o Close the on-line test screen
 - o Automatically download of test data from **EasyOne** to **EasyWare**
 - o Patient Data icon will now change to FVC test

Once the testing session has been ended via **EasyWare**, the **EasyOne** screen will display:

PC Interface Active
PC Interface mode
Baudrate 57600

d) Reviewing the Results & Preparing the Report

- On completing a patient test the results should be reviewed and prepared for reporting.
- This is done using **EasyWare**.

EasyWare

- Double-click on the patient test entry
- The View Test Results Screen will appear
- Select '**Advanced View**'
- Enter your initials in '**Reviewer Name**'. This will allow you to select the correct curves and numerical results for reporting and to also enter any operator notes about the session.
- To select the correct curves for reporting:
- Click-on the **TRIAL** line to view the curves individually
- Click-on the **RANK** line for each trial to select or deselect a curve. When an individual Trial is selected the following options appear:

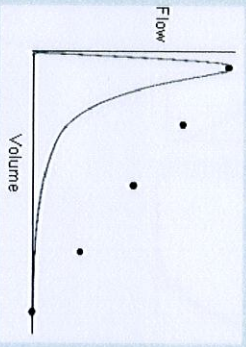
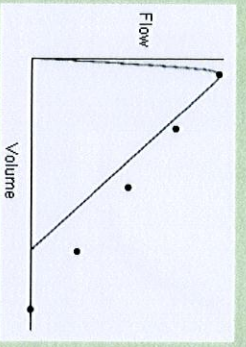
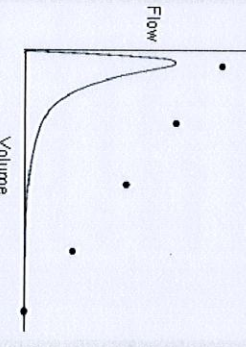
make it highest ranked
make it accepted
make it accepted and highest ranked
make it not accepted
restore original EasyOne trial ranking

- The most commonly used options are:
 - o make it accepted (good technique curves)
 - o make it not accepted
- From all the curves obtained during the testing session, select the ones that are to be reported (the best technique) and choose no more than 3 curves
 - o **make it accepted**
- All remaining curves that are not good technique, select
 - o **make it not accepted**
- Once the curve/result review has been completed, select the solid button near bottom of data-display screen, this will:
 - o Close the results screen and return you to the main **EasyWare** patient testing screen

e) Printing Results

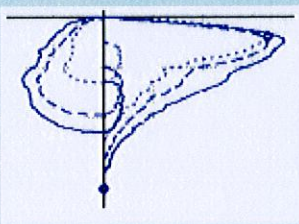
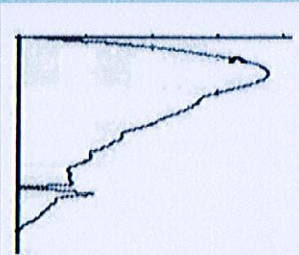
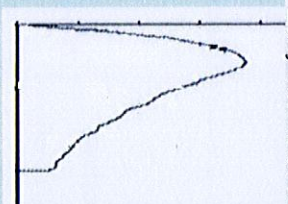
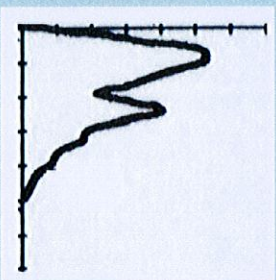
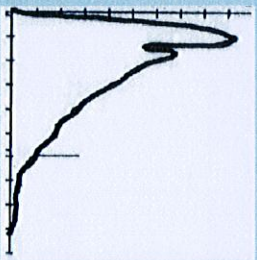
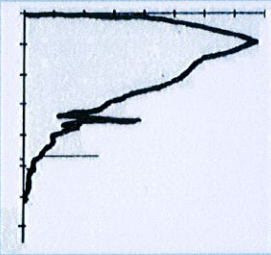
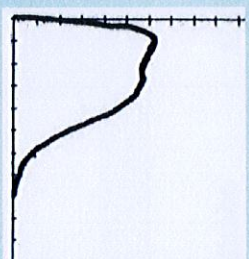
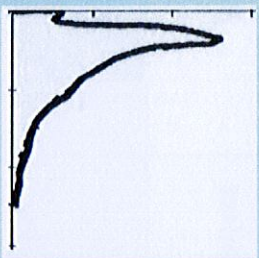
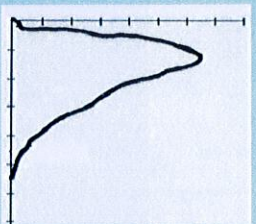
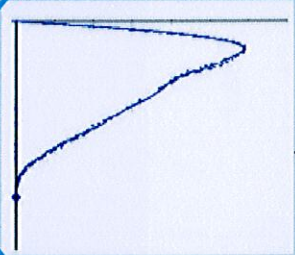
- To print results:
- Select either File, Print or the blue printer icon
- When session is fully completed:
- Turn-off the **EasyOne**
- Close **EasyWare**

Spirometry Results: Interpretation Reference Guide

	Curve Shape	Ventilatory Defect	Ratio	FEV ₁	FVC
Obstructive		Airflow Limitation Airway Narrowing	Reduced ($<75\%$ measured value) ($<$ the LLN)	Reduced ($<80\%$ predicted) ($<$ the LLN)	N \rightarrow Reduced ($<80\%$ predicted) ($<$ the LLN)
Restrictive (suggestive of)		Loss of volume No airflow limitation	N \rightarrow High ($>75\%$ measured value)	Reduced ($<80\%$ predicted) ($<$ the LLN)	Reduced ($<80\%$ predicted) ($<$ the LLN)
Mixed		Airflow Limitation Loss of Volume	Reduced ($<75\%$ measured value) ($<$ the LLN)	Reduced ($<80\%$ predicted) ($<$ the LLN)	Reduced ($<80\%$ predicted) ($<$ the LLN)

NB: This chart is intended to be used as a reference guide only. Formal medical interpretation and diagnosis requires referral to a medical practitioner (GP or respiratory specialist) and/or respiratory laboratory for full lung function assessment.

Technical Acceptability Reference Chart: Common Expiratory Technique Problems



Inspiration: *Remember* - good technique starts with a full inspiration to TLC (total lung capacity). If TLC is not attained then the resulting volumes will be underestimated, no matter how good the expiratory technique.

NHANES III REFERENCE VALUES

FEMALE

Female FEV₁

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Ht, cm																	
150	2.37	2.70	2.87	2.81	2.74	2.66	2.57	2.46	2.35	2.23	2.10	1.97	1.82	1.66	1.49	1.31	1.12
152	2.44	2.77	2.94	2.88	2.81	2.73	2.63	2.53	2.42	2.30	2.17	2.04	1.89	1.73	1.56	1.38	1.19
154	2.51	2.84	3.01	2.95	2.88	2.80	2.70	2.60	2.49	2.37	2.24	2.11	1.96	1.80	1.63	1.45	1.26
156	2.58	2.91	3.08	3.02	2.95	2.87	2.78	2.68	2.57	2.45	2.32	2.18	2.03	1.87	1.70	1.52	1.33
158	2.65	2.98	3.15	3.09	3.02	2.94	2.85	2.75	2.64	2.52	2.39	2.25	2.10	1.94	1.77	1.59	1.41
160	2.73	3.05	3.23	3.16	3.09	3.01	2.92	2.82	2.71	2.59	2.46	2.32	2.17	2.01	1.85	1.67	1.48
162	2.80	3.13	3.30	3.24	3.17	3.09	3.00	2.90	2.78	2.66	2.54	2.40	2.25	2.09	1.92	1.74	1.55
164	2.87	3.20	3.38	3.31	3.24	3.16	3.07	2.97	2.86	2.74	2.61	2.47	2.32	2.16	1.99	1.82	1.63
166	2.95	3.28	3.45	3.39	3.32	3.24	3.15	3.05	2.94	2.82	2.69	2.55	2.40	2.24	2.07	1.89	1.70
168	3.03	3.35	3.53	3.47	3.40	3.31	3.22	3.12	3.01	2.89	2.76	2.62	2.47	2.32	2.15	1.97	1.78
170	3.11	3.43	3.61	3.54	3.47	3.39	3.30	3.20	3.09	2.97	2.84	2.70	2.55	2.39	2.23	2.05	1.86
172	3.18	3.51	3.68	3.62	3.55	3.47	3.38	3.28	3.17	3.05	2.92	2.78	2.63	2.47	2.30	2.13	1.94
174	3.26	3.59	3.76	3.70	3.63	3.55	3.46	3.36	3.25	3.13	3.00	2.86	2.71	2.55	2.38	2.21	2.02
176	3.34	3.67	3.84	3.78	3.71	3.63	3.54	3.44	3.33	3.21	3.08	2.94	2.79	2.63	2.46	2.29	2.10
178	3.43	3.75	3.93	3.86	3.79	3.71	3.62	3.52	3.41	3.29	3.16	3.02	2.87	2.71	2.55	2.37	2.18
180	3.51	3.83	4.01	3.95	3.88	3.79	3.70	3.60	3.49	3.37	3.24	3.10	2.95	2.80	2.63	2.45	2.26
182	3.59	3.92	4.09	4.03	3.96	3.88	3.79	3.69	3.58	3.46	3.33	3.19	3.04	2.88	2.71	2.53	2.34
184	3.67	4.00	4.18	4.11	4.04	3.96	3.87	3.77	3.66	3.54	3.41	3.27	3.12	2.96	2.79	2.62	2.43
186	3.76	4.09	4.26	4.20	4.13	4.05	3.96	3.86	3.74	3.63	3.50	3.36	3.21	3.05	2.88	2.70	2.51
188	3.85	4.17	4.35	4.28	4.21	4.13	4.04	3.94	3.83	3.71	3.58	3.44	3.29	3.13	2.97	2.79	2.60
190	3.93	4.26	4.43	4.37	4.30	4.22	4.13	4.03	3.92	3.80	3.67	3.53	3.38	3.22	3.05	2.87	2.69
192	4.02	4.35	4.52	4.46	4.39	4.31	4.22	4.12	4.01	3.89	3.76	3.62	3.47	3.31	3.14	2.96	2.77
194	4.11	4.44	4.61	4.55	4.48	4.40	4.31	4.20	4.09	3.97	3.84	3.71	3.56	3.40	3.23	3.05	2.86
196	4.20	4.53	4.70	4.64	4.57	4.49	4.39	4.29	4.18	4.06	3.93	3.80	3.65	3.49	3.32	3.14	2.95
198	4.29	4.62	4.79	4.73	4.66	4.58	4.49	4.38	4.27	4.15	4.03	3.89	3.74	3.58	3.41	3.23	3.04
200	4.38	4.71	4.88	4.82	4.75	4.67	4.58	4.48	4.37	4.25	4.12	3.98	3.83	3.67	3.50	3.32	3.14
202	4.47	4.80	4.97	4.91	4.84	4.76	4.67	4.57	4.46	4.34	4.21	4.07	3.92	3.76	3.59	3.42	3.23
204	4.57	4.89	5.07	5.01	4.93	4.85	4.76	4.66	4.55	4.43	4.30	4.16	4.01	3.86	3.69	3.51	3.32
206	4.66	4.99	5.16	5.10	5.03	4.95	4.86	4.76	4.65	4.53	4.40	4.26	4.11	3.95	3.78	3.60	3.42
208	4.76	5.08	5.26	5.20	5.12	5.04	4.95	4.85	4.74	4.62	4.49	4.35	4.20	4.04	3.88	3.70	3.51
210	4.85	5.18	5.35	5.29	5.22	5.14	5.05	4.95	4.84	4.72	4.59	4.45	4.30	4.14	3.97	3.79	3.61

Female FVC

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Ht, cm																	
150	2.72	3.01	3.20	3.21	3.19	3.16	3.11	3.05	2.96	2.85	2.72	2.58	2.41	2.23	2.03	1.81	1.57
152	2.81	3.10	3.29	3.30	3.28	3.25	3.20	3.13	3.05	2.94	2.81	2.67	2.50	2.32	2.12	1.90	1.66
154	2.90	3.19	3.38	3.39	3.37	3.34	3.29	3.23	3.14	3.03	2.90	2.76	2.59	2.41	2.21	1.99	1.75
156	2.99	3.28	3.47	3.48	3.47	3.44	3.39	3.32	3.23	3.12	3.00	2.86	2.69	2.50	2.30	2.08	1.84
158	3.08	3.38	3.56	3.57	3.56	3.53	3.48	3.41	3.32	3.22	3.09	2.94	2.78	2.60	2.39	2.17	1.93
160	3.18	3.47	3.66	3.67	3.65	3.62	3.57	3.50	3.42	3.31	3.18	3.04	2.87	2.69	2.49	2.27	2.03
162	3.27	3.57	3.75	3.76	3.75	3.72	3.67	3.60	3.51	3.40	3.28	3.13	2.97	2.79	2.58	2.36	2.12
164	3.37	3.66	3.85	3.86	3.85	3.82	3.77	3.70	3.61	3.50	3.38	3.23	3.07	2.88	2.68	2.46	2.22
166	3.47	3.76	3.95	3.96	3.94	3.91	3.86	3.79	3.71	3.60	3.47	3.33	3.16	2.98	2.78	2.56	2.32
168	3.56	3.86	4.05	4.05	4.04	4.01	3.96	3.89	3.81	3.70	3.57	3.43	3.26	3.08	2.88	2.65	2.41
170	3.66	3.96	4.15	4.15	4.14	4.11	4.06	3.99	3.91	3.80	3.67	3.53	3.36	3.18	2.98	2.76	2.51
172	3.77	4.06	4.25	4.26	4.24	4.21	4.16	4.09	4.01	3.90	3.77	3.63	3.46	3.28	3.08	2.86	2.62
174	3.87	4.16	4.35	4.36	4.35	4.32	4.27	4.20	4.11	4.00	3.88	3.73	3.57	3.38	3.18	2.96	2.72
176	3.97	4.27	4.45	4.46	4.45	4.42	4.37	4.30	4.21	4.11	3.98	3.83	3.67	3.49	3.28	3.06	2.82
178	4.08	4.37	4.56	4.57	4.56	4.52	4.47	4.41	4.32	4.21	4.08	3.94	3.78	3.59	3.39	3.17	2.93
180	4.18	4.48	4.67	4.67	4.66	4.63	4.58	4.51	4.42	4.32	4.19	4.05	3.88	3.70	3.50	3.27	3.03
182	4.29	4.59	4.77	4.78	4.77	4.74	4.69	4.62	4.53	4.42	4.30	4.15	3.99	3.81	3.60	3.38	3.14
184	4.40	4.69	4.88	4.89	4.88	4.85	4.80	4.73	4.64	4.53	4.41	4.26	4.10	3.91	3.71	3.49	3.25
186	4.51	4.80	4.99	5.00	4.99	4.96	4.91	4.84	4.75	4.64	4.52	4.37	4.21	4.02	3.82	3.60	3.36
188	4.62	4.92	5.10	5.11	5.10	5.07	5.02	4.95	4.86	4.75	4.63	4.48	4.32	4.13	3.93	3.71	3.47
190	4.73	5.03	5.21	5.22	5.21	5.18	5.13	5.06	4.97	4.87	4.74	4.59	4.43	4.25	4.04	3.82	3.58
192	4.84	5.14	5.33	5.33	5.32	5.29	5.24	5.17	5.09	4.98	4.85	4.71	4.54	4.36	4.16	3.93	3.69
194	4.96	5.25	5.44	5.45	5.44	5.41	5.36	5.29	5.20	5.09	4.97	4.82	4.66	4.47	4.27	4.05	3.81
196	5.07	5.37	5.56	5.56	5.55	5.52	5.47	5.40	5.32	5.21	5.08	4.94	4.77	4.59	4.39	4.16	3.92
198	5.19	5.49	5.67	5.68	5.67	5.64	5.59	5.52	5.43	5.33	5.20	5.05	4.89	4.71	4.50	4.28	4.04
200	5.31	5.61	5.79	5.80	5.79	5.76	5.71	5.64	5.55	5.44	5.32	5.17	5.01	4.82	4.62	4.40	4.16
202	5.43	5.72	5.91	5.92	5.91	5.88	5.83	5.76	5.67	5.56	5.44	5.29	5.13	4.94	4.74	4.52	4.28
204	5.55	5.84	6.03	6.04	6.03	6.00	5.95	5.88	5.79	5.68	5.56	5.41	5.25	5.06	4.86	4.64	4.40
206	5.67	5.97	6.15	6.16	6.15	6.12	6.07	6.00	5.91	5.80	5.68	5.53	5.37	5.18	4.98	4.76	4.52
208	5.79	6.09	6.27	6.28	6.27	6.24	6.19	6.12	6.03	5.93	5.80	5.66	5.49	5.31	5.10	4.88	4.64
210	5.92	6.21	6.40	6.41	6.39	6.36	6.31	6.25	6.16	6.05	5.92	5.78	5.61	5.43	5.23	5.01	4.77

Female FEV₁ / FVC

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
All Hts	88.7	87.6	86.6	85.5	84.4	83.4	82.3	81.2	80.2	79.1	78.1	77.0	75.9	74.9	73.8	72.7	71.7

NHANES III REFERENCE VALUES

MALE

Male

FEV₁

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Ht, cm																	
150	2.46	2.82	3.40	3.29	3.18	3.06	2.93	2.79	2.64	2.49	2.32	2.15	1.97	1.78	1.58	1.38	1.16
152	2.55	2.90	3.48	3.38	3.27	3.14	3.01	2.88	2.73	2.57	2.41	2.24	2.06	1.87	1.67	1.46	1.24
154	2.64	2.99	3.57	3.46	3.35	3.23	3.10	2.96	2.82	2.66	2.50	2.32	2.14	1.95	1.75	1.55	1.33
156	2.72	3.08	3.66	3.55	3.44	3.32	3.19	3.05	2.90	2.75	2.58	2.41	2.23	2.04	1.84	1.63	1.42
158	2.81	3.17	3.74	3.64	3.53	3.41	3.28	3.14	2.99	2.84	2.67	2.50	2.32	2.13	1.93	1.72	1.51
160	2.90	3.26	3.83	3.73	3.62	3.50	3.37	3.23	3.08	2.93	2.76	2.59	2.41	2.22	2.02	1.81	1.60
162	2.99	3.35	3.92	3.82	3.71	3.59	3.46	3.32	3.17	3.02	2.85	2.68	2.50	2.31	2.11	1.90	1.69
164	3.08	3.44	4.02	3.91	3.80	3.68	3.55	3.41	3.26	3.11	2.94	2.77	2.59	2.40	2.20	2.00	1.78
166	3.18	3.53	4.11	4.01	3.89	3.77	3.64	3.50	3.36	3.20	3.04	2.86	2.68	2.49	2.30	2.09	1.87
168	3.27	3.63	4.20	4.10	3.99	3.87	3.74	3.60	3.45	3.30	3.13	2.96	2.78	2.59	2.39	2.18	1.97
170	3.37	3.72	4.30	4.19	4.08	3.96	3.83	3.69	3.55	3.39	3.23	3.05	2.87	2.68	2.48	2.28	2.06
172	3.46	3.82	4.39	4.29	4.18	4.06	3.93	3.79	3.64	3.49	3.32	3.15	2.97	2.78	2.58	2.37	2.16
174	3.56	3.91	4.49	4.39	4.28	4.16	4.03	3.89	3.74	3.58	3.42	3.25	3.07	2.88	2.68	2.47	2.26
176	3.66	4.01	4.58	4.49	4.37	4.25	4.12	3.99	3.84	3.68	3.52	3.35	3.17	2.98	2.78	2.57	2.35
178	3.76	4.11	4.68	4.59	4.47	4.35	4.22	4.09	3.94	3.78	3.62	3.45	3.27	3.08	2.88	2.67	2.45
180	3.86	4.21	4.79	4.69	4.58	4.45	4.32	4.19	4.04	3.88	3.72	3.55	3.37	3.18	2.98	2.77	2.56
182	3.96	4.32	4.89	4.79	4.68	4.56	4.43	4.29	4.14	3.99	3.82	3.65	3.47	3.28	3.08	2.87	2.66
184	4.06	4.42	5.00	4.89	4.78	4.66	4.53	4.39	4.25	4.09	3.93	3.75	3.57	3.38	3.18	2.98	2.76
186	4.17	4.52	5.10	5.00	4.89	4.76	4.63	4.50	4.35	4.19	4.03	3.86	3.68	3.49	3.29	3.08	2.87
188	4.27	4.63	5.21	5.10	4.99	4.87	4.74	4.60	4.45	4.30	4.14	3.96	3.78	3.59	3.39	3.19	2.97
190	4.38	4.74	5.31	5.21	5.10	4.98	4.85	4.71	4.56	4.41	4.24	4.07	3.89	3.70	3.50	3.29	3.08
192	4.49	4.84	5.42	5.32	5.20	5.08	4.95	4.82	4.67	4.51	4.35	4.18	4.00	3.81	3.61	3.40	3.18
194	4.60	4.95	5.53	5.43	5.31	5.19	5.06	4.92	4.78	4.62	4.46	4.29	4.10	3.91	3.72	3.51	3.29
196	4.71	5.06	5.64	5.54	5.42	5.30	5.17	5.03	4.89	4.73	4.57	4.40	4.21	4.02	3.83	3.62	3.40
198	4.82	5.17	5.75	5.65	5.53	5.41	5.28	5.15	5.00	4.84	4.68	4.51	4.33	4.14	3.94	3.73	3.51
200	4.93	5.29	5.86	5.76	5.65	5.53	5.40	5.26	5.11	4.96	4.79	4.62	4.44	4.25	4.05	3.84	3.63
202	5.04	5.40	5.98	5.87	5.76	5.64	5.51	5.37	5.22	5.07	4.91	4.73	4.55	4.36	4.16	3.96	3.74
204	5.16	5.51	6.09	5.99	5.87	5.75	5.62	5.49	5.34	5.18	5.02	4.85	4.67	4.48	4.28	4.07	3.85
206	5.27	5.63	6.21	6.10	5.99	5.87	5.74	5.60	5.45	5.30	5.14	4.96	4.78	4.59	4.39	4.19	3.97
208	5.39	5.75	6.32	6.22	6.11	5.99	5.86	5.72	5.57	5.42	5.25	5.08	4.90	4.71	4.51	4.30	4.09
210	5.51	5.86	6.44	6.34	6.23	6.10	5.97	5.84	5.69	5.53	5.37	5.20	5.02	4.83	4.63	4.42	4.20

Male

FVC

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
Ht, cm																	
150	2.91	3.15	3.91	3.85	3.78	3.69	3.60	3.49	3.36	3.22	3.07	2.91	2.73	2.54	2.33	2.11	1.88
152	3.02	3.27	4.02	3.96	3.89	3.81	3.71	3.60	3.47	3.34	3.18	3.02	2.84	2.65	2.44	2.22	1.99
154	3.13	3.38	4.13	4.08	4.00	3.92	3.82	3.71	3.59	3.45	3.30	3.13	2.95	2.76	2.56	2.34	2.11
156	3.25	3.50	4.25	4.19	4.12	4.04	3.94	3.83	3.70	3.56	3.41	3.25	3.07	2.88	2.67	2.45	2.22
158	3.37	3.61	4.37	4.31	4.24	4.15	4.06	3.94	3.82	3.68	3.53	3.37	3.19	3.00	2.79	2.57	2.34
160	3.49	3.73	4.48	4.43	4.36	4.27	4.17	4.06	3.94	3.80	3.65	3.48	3.31	3.11	2.91	2.69	2.46
162	3.61	3.85	4.60	4.55	4.48	4.39	4.29	4.18	4.06	3.92	3.77	3.60	3.43	3.23	3.03	2.81	2.58
164	3.73	3.97	4.78	4.67	4.60	4.51	4.42	4.30	4.18	4.04	3.89	3.73	3.55	3.36	3.15	2.93	2.70
166	3.85	4.10	4.85	4.79	4.72	4.64	4.54	4.43	4.30	4.17	4.01	3.85	3.67	3.48	3.27	3.05	2.82
168	3.97	4.22	4.97	4.92	4.85	4.76	4.66	4.55	4.43	4.29	4.14	3.97	3.79	3.60	3.40	3.18	2.95
170	4.10	4.35	5.10	5.04	4.97	4.89	4.79	4.68	4.55	4.42	4.26	4.10	3.92	3.73	3.52	3.31	3.07
172	4.23	4.47	5.23	5.17	5.10	5.01	4.92	4.81	4.68	4.54	4.39	4.23	4.05	3.86	3.65	3.43	3.20
174	4.36	4.60	5.36	5.30	5.23	5.14	5.05	4.93	4.81	4.67	4.52	4.36	4.18	3.99	3.78	3.56	3.33
176	4.49	4.73	5.49	5.43	5.36	5.27	5.18	5.07	4.94	4.80	4.65	4.49	4.31	4.12	3.91	3.69	3.46
178	4.62	4.87	5.62	5.56	5.49	5.41	5.31	5.20	5.07	4.93	4.78	4.62	4.44	4.26	4.04	3.82	3.59
180	4.75	5.00	5.75	5.69	5.62	5.54	5.44	5.33	5.21	5.07	4.92	4.75	4.57	4.38	4.19	3.96	3.73
182	4.89	5.13	5.89	5.83	5.76	5.67	5.58	5.47	5.34	5.20	5.05	4.89	4.71	4.52	4.31	4.09	3.86
184	5.02	5.27	6.02	5.97	5.90	5.81	5.71	5.60	5.48	5.34	5.19	5.02	4.84	4.65	4.45	4.23	4.00
186	5.16	5.41	6.16	6.10	6.03	5.95	5.85	5.74	5.62	5.48	5.33	5.16	4.98	4.79	4.59	4.37	4.13
188	5.30	5.55	6.30	6.24	6.17	6.09	5.99	5.88	5.76	5.62	5.47	5.30	5.12	4.93	4.73	4.51	4.27
190	5.44	5.69	6.44	6.38	6.31	6.23	6.13	6.02	5.90	5.76	5.61	5.44	5.26	5.07	4.87	4.65	4.42
192	5.59	5.83	6.58	6.53	6.46	6.37	6.27	6.16	6.04	5.90	5.75	5.58	5.41	5.21	5.01	4.79	4.56
194	5.73	5.98	6.73	6.67	6.60	6.52	6.42	6.31	6.18	6.04	5.89	5.73	5.55	5.36	5.15	4.93	4.70
196	5.87	6.12	6.87	6.82	6.75	6.66	6.56	6.45	6.33	6.19	6.04	5.87	5.69	5.50	5.30	5.08	4.85
198	6.02	6.27	7.02	6.96	6.89	6.81	6.71	6.60	6.47	6.34	6.19	6.02	5.84	5.65	5.44	5.23	4.99
200	6.17	6.42	7.17	7.11	7.04	6.96	6.86	6.75	6.62	6.48	6.33	6.17	5.99	5.80	5.59	5.37	5.14
202	6.32	6.57	7.32	7.26	7.19	7.11	7.01	6.90	6.77	6.63	6.48	6.32	6.14	5.95	5.74	5.52	5.29
204	6.47	6.72	7.47	7.41	7.34	7.26	7.16	7.05	6.92	6.79	6.63	6.47	6.29	6.10	5.89	5.68	5.44
206	6.62	6.87	7.62	7.57	7.49	7.41	7.31	7.20	7.08	6.94	6.79	6.62	6.44	6.25	6.05	5.83	5.60
208	6.78	7.02	7.78	7.72	7.65	7.56	7.47	7.36	7.23	7.09	6.94	6.78	6.60	6.41	6.20	5.98	5.75
210	6.93	7.18	7.93	7.88	7.80	7.72	7.62	7.51	7.39	7.25	7.10	6.93	6.75	6.56	6.36	6.14	5.91

Male

FEV₁ / FVC

Age	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
All Hts	86.0	85.0	83.9	82.9	81.9	80.8	79.8	78.8	77.7	76.7	75.7	74.8	73.6	72.6	71.5	70.5	69.5