

A Qualitative Audit of Spirometry Services

in Gateshead CCG

Report compiled from information provided by Gateshead CCG

Sue Hart, Respiratory Programme Lead, AHSN-NENC

March 2017

Contents	Page
Background	3
Aim	3
Process	3
Results	4
Limitations of results	5
Discussion	5
- Reason for testing and type of test performed	5
- Test performance (calibration and reproducibility)	5
- Interpretation of spirometry results	6
- Recommendations based on test observations	6
- Healthcare professional training	7
- Patient preparation	7
- Maintenance and cleaning of equipment	7
Recommendations	8
References	8

A Qualitative Audit of Spirometry Services in Gateshead CCG

November 2016

Background

Spirometry is an accurate, objective and reproducible measurement of lung volume and flow rate however it is a difficult test to perform and patients require significant guidance from a trained operator if the test is to be performed to an acceptable standard. High quality, properly interpreted spirometry is fundamental to making a correct respiratory diagnosis. Poorly performed spirometry can result in incorrect diagnosis, leading to inappropriate management of the condition and inappropriate use of resources.

In order to inform the development options to ensure delivery of a quality assured diagnostic spirometry service, the Academic Health Science Network – North East & North Cumbria (AHSN NENC) was asked to conduct a qualitative audit of spirometry standards in Gateshead CCG where there is no current access to quality assured spirometry and very few primary care based, appropriately qualified practitioners.

Aim

To determine whether routine spirometry performed on respiratory patients in primary care achieves nationally recommended standards, as determined by the Association of Respiratory Technology and Physiology (ARTP).

Process

Five GP surgeries were selected to participate in the audit; practice selection aimed to capture variation between practices based upon patient list size, prevalence and COPD hospital admission rates. The combined COPD register of the five participating practices included approximately 1130 patients.

The audit was conducted in three parts:

1. Practice pharmacists collected information on the spirometry of all patients conducted within a three-month period between July 1st and September 30th 2015, transferred data from clinical records into a project data collection sheet for each practice and submitted copies of the original spirometry tracings
2. Two ARTP trained specialist nurses then assessed the quality standard of the information, collating accuracy and reproducibility
3. Each practice was asked to complete a short questionnaire on staff training, patient preparation and cleaning and maintenance of equipment

Results

Table 1. Results of the assessment of 201 spirometry tracings from the five participating practices.

REASON FOR TESTING		
	No. Of Patients	% Of Patients
Annual Review	74	37%
Diagnosis	60	30%
Unspecified	67	33%
TYPE OF TEST		
Pre-bronchodilator	40	20%
Post-bronchodilator	12	6%
Pre & Post-bronchodilator	52	26%
Unspecified	97	48%
Annual Review (Pre-bronchodilator)	47	64%
TEST PERFORMANCE		
Calibration checks recorded	70	35%
Evidence of reproducibility & satisfactory technique	98	49%
INTERPRETATION OF SPIROMETRY TESTING		
Spirometry consistent with stated diagnosis	71	35%
FEV1/VC ratio considered	74	37%
RECOMMENDATIONS		
Tracings for which specific recommendations were made	129	64%

Table 2. Questionnaire responses; evaluating staff training, patient preparation and cleaning and maintenance of equipment.

GENERAL INFORMATION		
Technicians Role	Practice Nurse x 4	HCA x 1
	YES	NO / UNKNOWN
ARTP Recognised Training	1	4
PATIENT PREPARATION		
Does your practice have a spirometry contraindications checklist?	5	0
Is the list of pre-test instructions appropriate?	1	4
Do you always measure the patient's height prior to conducting spirometry?	4	1
MAINTENANCE AND CLEANING OF EQUIPMENT		
Has your spirometer been serviced within the last 12 months?	2	3
Has your calibration syringe been calibrated within the last 12 months?	2	3
Do you maintain a record of your spirometer calibration?	5	0

Do you have a specific Infection Prevention and Control Policy for your spirometer?	3	2
Do you maintain a record of date, time and process of your spirometer infection control procedures?	1	4
Do you have antibacterial / viral filters available for use if required?	1	4

Limitations of Results

1. Comments could only be made where tracings have been submitted for review, therefore data submitted by pharmacists without tracings has not been commented upon
2. Some tracings have been submitted but not all data was complete, therefore these tracings have been analysed as far as possible. For this reason some figures numbers may not appear to add up
3. Where data appears to have been incorrectly entered, there is no way of knowing whether the mistakes were made on transfer from the printout to the clinical system or from the clinical system to the audit spreadsheet

Discussion

“Improving the Quality of Diagnostic Spirometry in Adults”¹ was published by NHS England in 2016, providing a competency assessment framework and a national register for certified professionals. This provides the system through which healthcare professionals undertaking and / or interpreting diagnostic spirometry will be assessed and certified as competent. Both the spirometry tracings and the questionnaire responses were assessed in line with the ARTP recommendations, which underpin this document.

1. Reason for testing and type of test performed
 - One third of tests did not specify the reason for testing; of those remaining a greater number were performed during annual review of an already diagnosed condition, while 60 (30%) tests were performed for diagnostic purposes.
 - There are two factors to consider:
 - Annual review spirometry should always be performed post-bronchodilator and should never be performed pre-bronchodilator. Diagnostic spirometry may require both pre and post-bronchodilator spirometry, but will always require a post-bronchodilator test
 - 47 (64%) of the annual review tests were performed pre-bronchodilator.
 - Pre and post-bronchodilator spirometry appears to be performed at random, without adherence to recommendations
2. Test performance (calibration and reproducibility)
 - Calibration of the spirometer should be verified prior to each clinic/session or after every 10th patient (whichever comes first).
 - Dates for calibration were not visible at all on tracings from two surgeries, however at least one of the practices uses a spirometer programmed to prevent usage unless calibration has been performed. This means that the figure of 70 (35%) presented in the results table is an under-estimate

- One practice shows the same calibration date for 93% of tracings, which would suggest that calibration has not been performed
- Reproducibility criteria are met when there is no more than 100mls ideally (or 150mls in the occasional highly variable patient) between each blow¹. A minimum of three blows should be performed.
 - Reasons for non-reproducibility include:
 - The number of blows was not visible
 - Variability between tests of up to 35%
 - Slow start to the blow
 - Abrupt end to the blow
 - Exhalation does not continue until a plateau is reached

3. Interpretation of spirometry results

- Three important points must be considered:
 - Interpretation should never be attempted on non-reproducible spirometry.
 - FEV1/VC Ratio should be used in interpretation where the Vital Capacity (VC) is greater than Forced Vital Capacity (FVC)
 - The diagnosis data was not always included in the information provided for interpretation (therefore the totals may not add up)

Examples of mis-interpretation include:

- Several examples of normal spirometry performed at COPD annual review
- Several examples of restrictive spirometry performed at COPD annual review
- One patient where no diagnosis made despite reversibility of 370mls (aged 39)
- One patient where no diagnosis was made despite reversibility of 1130mls

4. Recommendations based on test observations

The interpreters had to assume that data had been accurately transferred from patient records to the project data collection sheet sent to them, however there were many examples of inconsistent data transfer. Where the mistakes were made (i.e. from spirometry tracing to clinical record, or from clinical record to the project data collection sheet) has not possible to determine within the limitations of Information Governance on this project.

Examples where specific recommendations were made based upon the data transfer from patient records to the project data collection sheet include:

- Incorrect data entry; ensure use of the best figures irrespective of which blow they are from.
- Ensure FEV1 & FVC recorded under incorrect headings
- Ensure the correct figures and conclusions are documented
- 21 incorrect data entries came from one practice alone
- Always perform and record the VC

Examples of specific recommendations made based upon the observation of spirometry tracings include:

- Suggest referral for chest X-Ray in two patients
- Review the patient history and re-consider the diagnosis
- Record serial peak flow monitoring
- Repeat spirometry testing

5. HCP training

Only one HCP (20%) has completed formal spirometry training; the remainder has undergone no recognised training or assessment,

6. Patient preparation

Only one practice submitted an acceptable list of per-test instructions. Other practices either submitted an unacceptable list or did not submit a list at all. Examples of unacceptability include:

- Incomplete instructions
- Instructions relating only to pre-bronchodilator testing
- One list advised patients to omit short-acting and long-acting bronchodilators for 24 hours prior to the test
- One practice has pre-test instructions available on the spirometer, which is not helpful in preparing the patient ahead of their appointment

It is essential to accurately measure the patient's height prior to each test, and not rely on patient self reported measurements; this is because predicted values use height as one of the contributing factors. If height is incorrect, then interpretation of results against predicted values will be incorrect. One HCP (20%) does not measure patient's height.

7. Maintenance and cleaning of equipment

- Spirometers and calibration syringes are precision machines; they must be serviced and scientifically calibrated at least once per year. This is in addition to daily verification, previously discussed under point 2.
- 60% of the equipment is neither serviced nor calibrated, therefore the results of any tests performed cannot be guaranteed to be accurate.

- There is no standard policy or procedure in place to address infection prevention and control, and records of cleaning procedures are not kept in 4 (80%) of the practices. In addition, there is evidence of a lack of understanding of how to clean the component parts of the spirometer.
- 4 (80%) of practices do not have antibacterial / viral filters available for use when required.

Recommendations

The major conclusion drawn from this audit is that routine spirometry performed on respiratory patients in primary care in Gateshead does not remotely achieve nationally recommended standards, as recently updated.

1. Measures urgently need to be put in place to provide appropriate training and assessment of competency for any HCP who performs and / or interprets diagnostic spirometry.
2. Measures should also be put into place to provide appropriate training and assessment of competency for any HCP who performs and / or interprets annual spirometry.
3. Standardisation of Infection Prevention and Control policies across all practices in the CCG should be considered.
4. Standardisation of maintenance and calibration policies across all practices in the CCG should be considered.

In summary, it should be recognised that well conducted spirometry in primary care leads to improved, accurate diagnosis and management of patients, which in turn may lead to financial savings and improved outcomes. Conversely, poorly performed spirometry is worse than merely being a box ticking exercise it can be dangerously misleading.

References

¹ Improving the Quality of Diagnostic Spirometry in Adults

[https://www.brit-thoracic.org.uk/document-library/delivery-of-respiratory-care/spirometry/improving-the-quality-of-diagnostic-spirometry-\(2016\)/](https://www.brit-thoracic.org.uk/document-library/delivery-of-respiratory-care/spirometry/improving-the-quality-of-diagnostic-spirometry-(2016)/)

² A guide to performing quality assured diagnostic spirometry

www.pcc-cic.org.uk/sites/default/files/articles/attachments/spirometry