Session S20 Spirometry

196: Microbiological contamination of spirometers in general practices.
Hancock KL, Schermer TR, Holton C, Crockett AJ
The University of Adelaide, Australia

Aim: This exploratory study assessed the cleaning procedures and microbiological contamination of spirometers taken from a sample of South Australian general practices.

Method: 16 spirometers were swabbed in their "ready to use" state. Swabs were taken from the turbine, mesh, mouthpiece tube or flow head depending on the type of spirometer, and shipped in transport medium to the laboratory and processed using standard methods. Details of the spirometers, their use and cleaning routines were obtained via questionnaire.

Results: Eight of the practices (50%) reported having a protocol in place for spirometer cleaning. Three practices used spirometers that had disposable flow heads. The remaining thirteen practices used disposable cardboard mouth pieces with seven using one way valved mouthpieces. Three spirometers carried potentially pathogenic micro-organisms. Pseudomonas spp. were cultured from two spirometers and a pseudomonas like microorganism (Alcaligenes sp.) from another. Two were turbine spirometers and one a pneumotachograph. All three had been in use for less than three years, all three practices had written cleaning protocols in place and all stated that they were using a recommended detergent to clean the spirometers. All three practices reported a lower cleaning frequency than recommended by the manufactuer.

Conclusion: The potential for spirometers to be reservoirs of micro-organisms stresses the need for stricter attention to hygiene measures. Until further research clarifies the risk for general practice patients it is strongly recommended that general practices implement and adhere to a strict protocol for spirometry cleaning following the manufacturers' guidelines, consider use of appropriate barrier filters or use a spirometer with disposable flow heads.

Conflict of interest and funding: nil

Corresponding author: Dr Kerry Hancock **Email:** khancock@health.on.net

120: Validity of the spirometric technique. Experience from primary care

Hidalgo A, Quintano JÁ, Prieto JI, Pavón C, Farouk M, Fernández M
UGC Lucena I, Córdoba, Spain

Aim: The use of spirometry in Primary Healthcare (PHC) is essential for proper screening of COPD and improving its diagnosis. However, it is known that this technique is rarely realized at PHC.

Method: Study Design:
Screening (active case finding), multicenter, multidisciplinary study.
Study Population:
Patients attending 5 PHC Centres of South Cordoba Health District, Andalusian Health Service.
Sample:
The screening applied randomly the questionnaire GOLD "Could be COPD" on patients over 40 years, smokers with respiratory symptoms who attended over 6 months our PHC Centres for any reason.
Variables:
Questionnaire GOLD "Could be COPD", which considers possible COPD when the patient answers YES to 3 or more of the 5 questions. Patients with positive GOLD were invited to realize Forced Spirometry.

Results: According to the results of the Questionnaire GOLD "Could be COPD", of 463 participants only 139 (30%) were identified as possible COPD. Of the 139 possible COPD patients, spirometry was realized on 126 patients. Spirometry technique was not valid in 32 (52.2%) cases, with equal gender distribution. The validity of Spirometry technique was similar between obstructive and non-obstructive or normal patterns (Mean 0.27 and 0.28 respectively). Invalid techniques were associated with the technician (Nurse) who realized it. ANOVA test showed statistical significant difference ($p < 0.01$) between technicians (Nurses). Significant linear relationship was found between the validity of the spirometry technique and the technician (Nurse) who realized it.

Conclusion: Poor practice of the spirometry technique was observed. Of 5 technicians (Nurse) only 1 (20%) realized invalid spirometries in 69% of the cases. Training is needed for technicians responsible for the implementation of spirometry at PHC.

Conflict of interest and funding: No

Corresponding author: Dr Antonio Hidalgo **Email:** ahidalgor1@yahoo.es

169: Lung age: an update

Newbury W, Lorimer M, Newbury J, Adams R, Crockett A
University of Adelaide, Adelaide, Australia

Aim: To determine if the Morris lung age equations from data gathered in the 1960s are relevant for current-day populations.

Method: Study 1: Paired t-tests compared newly-developed Australian Lung Age (LA) equations (Newbury) with Morris LA equations using an independent workplace dataset (males only) Study 2: The 2 equations from Study 1(Newbury, Morris) and a further 4 developed from published predictive equations for FEV_1 from the USA, England, Europe and Australia were compared by regression analysis using a large independent dataset of randomly-selected community dwelling adults. (North West Adelaide Health Study (NWAHS)). Study 3: Further comparisons of 3 lung age equations from Study 2 (Morris, NHANES III and Newbury) with FEV_1/FVC lung age equations ('Harbor lung age equations'), used the same independent dataset.

Results: Study 1: Differences between mean Morris LA and mean Newbury LA were approximately 20 years, with Morris under predicting LA in both healthy never smokers and current smokers compared with actual age. Study 2: Regression analysis confirmed significant differences between the 2 oldest and the 4 newest equations. Study 3: Preliminary analysis shows the FEV_1/FVC LA equation results in greater variance in all subgroups (smokers/healthy never smokers) than the equations based on FEV_1 alone.

Conclusion: LA estimates differ with each equation used, apparently due to date of raw data collection, reflecting both cohort and period effects. International guidelines recommend updating predictive equations every 10 years. Our results support the use of recently-developed equations that are relevant to the population being studied. We hypothesise that more recently developed LA equations might have greater clinical utility for smoking cessation quit attempts.

Conflict of interest and funding: No conflict of interest. Australian government PhD scholarship and travel grant.

Corresponding author: Mrs Wendy Newbury **Email:** wendy.newbury@adelaide.edu.au

---

116: Accuracy and precision of desktop spirometers in general practices.

Schermer TR, Verweij EH, Cretier R, Pellegrino A, Crockett AJ, Poels PJ
Department of Primary & Community Care, Radboud University Nijmegen Medical Centre, Nijmegen, the Netherlands

Aim: To establish accuracy and precision of desktop spirometers that are routinely used in general practices.

Method: We evaluated a random sample of 50 spirometers from Dutch general practices by testing them on a certified waveform generator using eight standard American Thoracic Society waveforms to determine accuracy and precision. Details about brand and type of spirometer, year of purchase, frequency of use, cleaning and calibration were inquired with a study-specific questionnaire.

Results: 39 devices (80%) were turbine spirometers, 8 (16%) were pneumotachographs, and 1 (2%) was a volume displacement spirometer. Mean age of the spirometers was 4.3 (SD 3.7) years. Average deviation from the waveform generator reference values (accuracy) was 25 (95%CI 12, 39) mL for FEV1 and 27 (10, 45) mL for FVC, but some devices showed substantial deviations. FEV1 deviations were larger for pneumotachographs than for turbine spirometers ($p<0.0031$), but FVC deviations did not differ between the two types of spirometers. In the subset of turbine spirometers no association between age and device performance was observed.

Conclusion: On average, desktop spirometers in general practices slightly overestimated FEV1 and FVC values, but some devices showed substantial deviations. General practices should pay more attention to calibration of their spirometer.

Conflict of interest and funding: Conflict of interest: none. Funding: Radboud University Nijmegen Medical Centre and the Netherlands Organisation for Health Research and Development.

Corresponding author: Assoc Prof Tjard Schermer **Email:** t.schermer@elg.umcn.nl

240: Microspirometry to preselect candidates for full spirometry when diagnosing COPD in general practice

Schermer TR, van den Bemt L, Denis J, Grootens-Stekelenburg J, Poels PJ
Radboud University Nijmegen Medical Centre, Department of Primary and Community Care

Aim: Diagnosing COPD requires post-bronchodilator (BD) spirometry. Point-of-care microspirometry testing by the GP during routine consultations may be an efficient way to preselect candidates for full diagnostic spirometry. Aim of this study was to determine the negative predictive value (NPV) of microspirometry relative to a full diagnostic spirometry test in subjects in whom GPs suspect COPD.

Method: Cross-sectional study in which the order of a microspirometry test (by Piko-6, Ferraris) and a diagnostic spirometry test was randomised. Study subjects were (ex-)smokers aged ≥50 years referred for spirometry by their GP because of respiratory symptoms that suggest underlying COPD. Positive microspirometry was defined as pre-BD FEV1/FEV6<0.73, positive diagnostic spirometry as post-BD FEV1/FVC<0.70. Alternatively, positive diagnostic spirometry was defined as post-BD FEV1/FVC < lower limit of normal (LLN). Subject recruitment and all spirometry tests took place in a primary care diagnostic centre.

Results: Preliminary analysis of the first 87 (of the required 102) subjects showed that the prevalence of airflow obstruction based on full diagnostic spirometry was 47.0% (for post-BD FEV1/FVC<0.70) and 33.3% (for FEV1/FVC<LLN), respectively. The majority of subjects were males (59%), 45% current smokers, mean age was 62.2 [SD 6.5] years, mean post-BD FEV1 % predicted was 82.1 [SD 17]. NPV was 95.3% (95% confidence interval: 90.9-99.7) for both definitions of positive diagnostic spirometry.

Conclusion: Preliminary analyses suggest that microspirometry has a high negative predictive value for the presence of airflow obstruction as established by full diagnostic spirometry. Use of microspirometry by GPs may be a valid and efficient approach to preselect candidates for further spirometry testing when diagnosing COPD in general practice.

Conflict of interest and funding: No conflicts of interest, funding by Boehringer Ingelheim, the Netherlands

Corresponding author: Dr Tjard Schermer **Email:** t.schermer@elg.umcn.nl

242: Impact of spirometry training on test quality in Dutch general practices. Preliminary results

Schermer T, Rauws J, Grootens J, Pepels F, Denis J, Smeele I
Radboud University Nijmegen Medical Centre, Department of Primary and Community Care

Aim: Quality of spirometry in general practices is not always sufficient. In 2009 a spirometry course was developed and has now been implemented on a nationwide scale by the COPD & Asthma General Practice Advisory Group to improve spirometry test execution and interpretation in general practice. In this study we evaluate the impact of this so called 'CASPIR spirometry course' on the quality of spirometry tests.

Method: Before-after comparison of routine spirometry tests taken from the databases of two groups of practices: 15 that participated in the CASPIR course (5 modules for GPs and practice nurses, including e-learning and plenary teaching by a GP, pulmonologist and lung function (LF) technician; practise-teaching in a LF laboratory; assembling and assessment of a spirometry portfolio), and 15 that developed their own local spirometry quality improvement program (teaching of practice nurses by a LF technician; performing supervised spirometry tests in a LF laboratory). Random samples of 20 tests are taken before, and 20 tests after the CASPIR course or spirometry improvement program has been completed. Using ERS/ATS quality criteria, all tests are assessed by three LF technicians who are blinded for the origin and timing of tests.

Results: Preliminary analysis of tests from 6 practices (total of 207 tests) and after assessment by two LF technicians showed that the proportion of adequate tests increased from 76.5% to 82.2% in three 'CASPIR course' practices and from 55.6% to 72.1% in three 'local improvement program' practices.

Conclusion: Both approaches may lead to improved spirometry test quality in general practices. Final results of the study will be available in April 2012.

Conflict of interest and funding: No conflicts of interest, funding by the Dutch COPD & Asthma General Practice Advisory Group (CAHAG)

Corresponding author: Dr Tjard Schermer **Email:** t.schermer@elg.umcn.nl

335: Does owning a spirometer improve COPD care?

Barnes KM, Mountford J, Morris S, Meaker R, Koczan P, Parker M, Gungor G, Hudson R, Roberts CM
NECLES HIEC, Queen Mary University London

Aim: This study explored the association between Practice ownership of a spirometer and care quality indicators of validated COPD diagnosis, admissions and prevalence.

Method: Airways Nurses were deployed to 42 Practices in Waltham Forest to work with Practice staff. Availability of spirometers, numbers of registered COPD cases with diagnosis confirmed by spirometry, prevalence rates compared to Eastern Region Public Health Observatory estimates and 12 month unscheduled COPD admission rates were all recorded. Statistical analyses were performed to explore correlations between spirometer ownership and quality care measures.

Results: 36% of Practices (n= 15) had desktop spirometers, 38% (n=16) had handhelds, and 26% (n= 11) no spirometer. 19 percent of registered patients did not have their COPD diagnosis confirmed by spirometry with no statistical difference between practices with desktop (18%), hand held (16%) or no spirometer (18%). There was however a huge range between practices (0% and 97% patients not having spirometry confirmed diagnosis).The mean difference between estimated and recorded prevalence of COPD was 1.23 (desktop), 2.13 (handheld) and 2.16 (no spirometer), with no statistical difference between practice type. COPD admission rate for 2010/2011 was 35% for Practices with desktop spirometers and 31% for both Practices with handheld and no spirometers.

Conclusion: Owning a spirometer or a higher quality spirometer is not associated with improvement in quality of care indicators. Within all groups of practice there was very wide variation in these quality care indicators suggesting that targeted clinical support for practices is required and not simply new equipment.

Conflict of interest and funding: Airways nurses performing audits were non- promotional private nurses funded through a collaboration with Boehringer Ingelheim.

Corresponding author: Professor Michael Roberts **Email:** c.m.roberts@qmul.ac.uk

130: Free Respiratory Evaluation and Smoke-exposure reduction by primary Health cAre Integrated gRoups Eritrea study
Ghezai B, Henrichsen SH, Østrem A, Department of primary care, University of Oslo

Research question: 1. What is the prevalence and burden of COPD in a rural area in Eritrea? 2. Is it feasible and acceptable to reduce the main contributory factors such as tobacco smoke and exposure to biomass fuel use? 3. How could the effectiveness and cost benefit of reducing the main contributory factors be measured? 4. Do educating health workers on sprometry and COPD make a change on detecting, treating, and preventing COPD?

Background: Tobacco smoking has traditionally been the main factor responsible for the development of chronic obstructiv lung disease (COPD). Many peple, however, are still unaware of the damage caused by indoor pollution particularly in sub Saharan Africa, which disproportionally affects women and children. Biomass fuel use has been shown to be an independent risk factor for COPD. There is scarcely data on the prevalence of COPD and its risk factors in sub Saharan Africa.

Possible methodology: The main objective of this survey is to conduct a population-based cross-sectional epidemiological study on the prevalence of COPD and its risk factors in resource-poor rural settings in Eritrea among 300 men and 300 women above the age of 20. Direct exposure to biomass smoke will be measured. Furthermore a qualitetive survey will be conducted, concerning cooking traditions, type of fuel used, characteristics of the house and where the family members spend their time.

Questions to discuss: 1. How best can the research questions be answered? 2. What would be the best way involving local health workers? 3. Biomass smoke exposure starts at early age, would this have an impact on early onset of COPD?

Conflict of interest and funding: None Funded with unrestricted grant from Lunger i Praksis.

Corresponding author: Dr Beraki Ghezai **Email:** ghezaibr@online.no

---

150: ACATIB (Asthma and COPD Assessment Tools In Balearic Islands)
Roman M, García M, Gorreto L, Urendez A

Research question: May an educative intervention in doctors and nurses improve asthma and COPD follow up in the asthma and COPD population?

Background: The measure of disease control and quality of life in asthma and COPD, have proven to be important tools in assessing disease severity and prognosis. There are questionnaires that collect this information uniformly and promote better outcomes. The latest GINA review recommends asthma management based on symptoms control.One of the best validated tools is the Asthma Control Test. Both MRC and CAT questionnaire have been recently introduced by GOLD as one of the main dimmensions for COPD clasification. Thought these tools are included in the primary care clinical registers, the ignorance and a lack of training on their proper use, causes a clear underuse among doctors and nurses. The Balearic Society of Family Medicine has developed an education program to encourage their use in primary care practice

Possible methodology: After measuring the current use of these tools among primary care nurses and doctors, we will develop an educative program based on a bread crumbs strategy. The program will begin by traning the respiratory experts from each one of the primary care practices in Baleares. They will be incentivated to train theis colleagues in the primary care centre in a predeterminated period. We will finally measure the attitude and behaviour changes by observing the use of the tools 6 months after the implementation

Questions to discuss: 1 which is the best metodology to run such an educative project
2 which is the best way to incentivate primary care professionals to develop the project

Conflict of interest and funding: Funded by a resticted grant from GSK Spain

Corresponding author: Dr Miguel Roman-Rodriguez **Email:** miguelroman@ibsalut.caib.es