

European guidelines for quality assurance in cervical cancer screening: recommendations for cytology laboratories*

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The quality of a cervical cytology laboratory depends on adequate handling and staining of the samples, screening and interpretation of the slides and reporting of the results. These guidelines give an overview of procedures recommended in Europe to manage the balance between best patient care possible, laboratory quality assurance and cost effectiveness and will be published as a chapter 4 in the European Guidelines for Quality Assurance in Cervical Cancer Screening. The laboratory guidelines include protocols for personnel and organisation, material requirements, handling and analysing cervical samples, recording of results, quality management and communication. The section on quality management is comprehensive and includes protocols for all aspects of internal and external quality assurance. The guidelines are extensively referenced and as far as possible the recommendations are evidence-based.

Keywords: Cervical cancer screening, European guidelines, quality assurance, cervical cytology, cytology laboratories

Introduction

From 2002 to January 2006 representatives of European countries met several times in order to establish quality guidelines for cytology laboratories involved in screening for cervical cancer. The first meetings demonstrated a wide range of practice due to legal, cultural, and financial differences within European countries. Intensive and constructive meetings of representatives of thirteen countries led to the following guidelines, which are going to be published as Chapter 4 in the *European Guidelines on Quality*

Assurance in Cervical Cancer Screening.¹ We believe these guidelines create a generally acceptable basis for a uniform standard of cervical cancer screening cytology within Europe.

The microscopic examination and interpretation of histological and cytological specimens is a subjective procedure, highly dependent on the skills and experience of the investigator and the time spent on examination of the cell/sample.^{2, 3, 4} Inter- and intra-observer variation and the high variance in percentages of correct diagnoses described in the literature are the logical consequence.^{5, 6, 7}

The aim of optimal quality assurance is for the best possible patient care. With respect to cervical screening this means a balance between manageable control of costs and low false test result rates. Beyond correct sampling of the cervix the quality of the test depends on subsequent steps: adequate handling and staining of the sample, screening and interpretation of the slide and reporting of the results as well as the final step of assuring accuracy.

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Personnel and organisation

General

The laboratory should be staffed by well trained personnel headed by a medical professional. The cytology laboratory (or group of collaborating cytology laboratories) should process sufficient tests to be able to maintain adequate expertise. There is insufficient evidence based on data to make a definitive statement about the number of smears necessary for this purpose, but it is the professional opinion of the authors, that at least 15 000 tests per year should be processed in a laboratory participating in organised screening.

The position of each employee in the pathology laboratory should be recorded in an organisational document to allow performance at all levels to be monitored.

Requirements for cytotechnologists

Cytotechnologist. In cervical cancer screening the main task of cytotechnologists is the primary screening of cervical smears of women without specific symptoms. To reach the goal of correctly identifying precursor lesions, administrative tasks, technical laboratory tasks, monitoring of follow-up results and activities related to quality assurance and archiving slides and results are included in the working process of cytotechnologists. Their work is done under supervision as will be described in subsequent sections.

- Administrative tasks include contact with patients, smear takers, general practitioners (GPs), gynaecologists, other laboratories and hospitals. Cytotechnologists must respect patient confidentiality and must be trained in country-specific legal requirements.
- Technical laboratory tasks include handling specimens, carrying out relevant laboratory techniques and performing prescribed health- and safety procedures.
- Participation in continuing education, feedback sessions,⁸ and quality control programmes is mandatory for all cytotechnologists.

Principles and practices should be learned prior to taking part in the routine work of the laboratory. The educational basis for (licensed) cytotechnologists differs within the European countries (for examples see Table 1).

Senior cytotechnologist. The senior cytotechnologist will usually be responsible for internal quality control of all steps within the screening process, including administration, staining and microscopic cytodiagnosis, and should be familiar with external quality protocols. A minimum of five years experience in gynaecological cytology is usually required.

Specific tasks of the senior cytotechnologists may be:

- Daily management of the cytopathology laboratory, including personnel affairs and staff appraisal.
- Direction of laboratory technicians in sample preparation.
- Assistance and supervision of lower level cytotechnologists in the performance of analytical procedures and tests.
- Communication with the cytopathologist to whom they are responsible.
- Management of periodical circulation and discussion of special cases among cytotechnologists, and between cytotechnologists and cytopathologists.
- Timely forwarding of cytology reports to the regional or national cancer screening registry according to current directives.
- Assistance in the maintenance of supplies, equipment, and instruments, and in the day to day function of the laboratory.
- Assistance of scientists in the same programme area.

Step-wise screening and review of slides with abnormalities initially identified by cytotechnologists may be done by the senior cytotechnologist responsible for the management of the laboratory or by other cytotechnologists with similar experience and training in gynaecological cytology.

In the UK senior cytotechnologists may take an Advanced Specialist Diploma in Cervical Cytology, which qualifies them to report cervical cytology slides, including signing out abnormal cases, under the overall responsibility of the cytopathologist leading the laboratory.⁹

Requirements for other technical laboratory personnel.

Technical laboratory personnel must be educated and experienced in accordance with their function. Technical personnel must be able:

- to handle relevant laboratory techniques according to guidelines and procedure descriptions,
- to perform prescribed health- and safety procedures,

Table 1. Examples of minimal educational requirements for screeners working in gynaecological cytology

Country	General education required	Specific education/training required	Exams/certificates required	
Austria	Grammar school	Academy for medico-technical laboratory service, 3 years including an 40–60 hours course in cytology, with exam	Training within the laboratory without time limit, local courses	Leaving certificate of the Academy for medico-technical laboratory service
Belgium ³⁸	Not specified	No schools for long-term training	Training within the laboratory without time limit	Certificate not obligatory
Bulgaria ³⁹	Grammar school	Study of biology		Not specified
Czech Republic ⁴⁰	Not specified	School for gynaecological cytology 1 year		Exam in gynecological cytology
Denmark	Not specified	Laboratory school, 3.5 years	Educational programme within the hospital (specific for each region), local courses	QUATE-exam, voluntary
France	Not specified	Private school for cytology 1 year	Specific training within the laboratory	Certificate not obligatory
Germany ⁴¹	Not specified	School for cytology, 2 years	Additional training within a certified laboratory for at least one year	Voluntary certificate
United Kingdom	General certificate of education (4 o-level equivalent)	2 year training, includes NHSCSP course	In-house training, logbook, min 5000 slides screened.	NHSCSP Certificate of Competence in Cervical Cytology
Italy	Grammar school	College of health care profession including a course in cytology	Specific training within the laboratory	Thesis (laurea preve)
The Netherlands	Grammar school	Laboratory school, 4 years (medium or high-level)	Specific training within a certified laboratory for at least one year	Certificate not obligatory

- to take part in specific quality control programmes.

Requirements for a cytopathologist. The cytopathologist is responsible for the final assessment of cervical samples. Specific tasks of the cytopathologist with respect to cervical cytology are:

- Assessment and authorisation of all cases referred to the clinician for further follow up or treatment.
- Resolving discrepancies between the diagnoses of cytotechnologists, if those diagnoses would lead to different recommendations to the requesting physician.
- Review and intra-laboratory discussion of cases showing serious discrepancy between the cytological- and histological follow-up.⁸
- Communication with gynaecologists and other sample takers with respect to specific cases. Communication includes a periodical report to smear takers with respect to the quality aspects of the samples.
- Communication and education of cytotechnologists with respect to difficult cases and cases with discrepant cyto-histological results.
- Guidance and support for adequate (continuing) education of cytotechnologists and junior medical staff.
- Participation in quality assurance programmes including preparation of an annual report concerning the outcomes of the cytological and histological follow-up examinations.¹⁰

Requirements for administrative personnel. Secretarial and administrative employees:

- should be educated in relevant medical terminology.
- should be able to work with current word processors and with automated database systems.
- must respect patient confidentiality.

Final responsibility. Final responsibility is dependent on national legal regulations. In general, medical specialists additionally certified for cytopathology are responsible for the management of the laboratory.

Material requirements

Buildings, rooms and furniture

Buildings, rooms and furniture must comply with regional and federal legal requirements. Proper working conditions require that:

- the laboratory is located, constructed and equipped in such way that all functions can be properly performed within agreed safety standards. All areas should be well lit, well ventilated, quiet and spacious;
- the screening room as well as the sample-preparation room and the secretarial room should be separated;
- the specimen preparation area must be equipped with effective exhaust systems and approved biohazard hoods, together with adequate counter space and sinks;
- there must be adequate storage containers for flammable and poisonous chemicals;
- cytotechnologists should have comfortable chairs with adequate back support and ample desk space to permit microscopic examination and record keeping;
- adequate measures should be taken to prevent repetitive motion injuries and other injuries due to ergonomic problems.

Guidelines for procedures in case of emergencies must be known by all personnel and safety manuals must be easily available.

Laboratory and office equipment. For cervical screening cytology the Papanicolaou stain, original or modified, is recommended.^{11, 12}

- The equipment needed depends on whether staining is automated or manual. After staining, cytological material should present well-stained

chromatin, differential cytoplasmic counterstaining and cytoplasmic transparency.¹³

High-quality binocular microscope should be available for all screening staff and should be regularly serviced, including a check of its technical set up, including adequacy of the stage and objectives.

- For conventional cytology 4×, 10× and 40× objectives are essential. 4/5× objectives should be present to allow convenient marking of the cells of interest.¹³
- For liquid based cytology (LBC) an additional 20× objective is required.

Screening personnel should enter their cytological results onto a computerized system to allow quality assessment.

Relevant textbooks and journals should be easily available and accessible.

Handling and analysis of cervical samples

Laboratory preparation

All laboratory procedures should be registered and allocated to an appropriate member of staff (see also section 2). All personnel should be familiar with safety guidelines and procedures in case of emergency.

- When delivered, all specimens (slides or vials) should be accompanied by a request form giving as a minimum the patient's identification data, data of the physician in charge and clinical information including the appearance of the cervix, method of contraception and stage of menstrual cycle.
- Any irregularities concerning the clinical data sheet and/or the cytological specimen should be recorded and resolved if possible in communication with the person sending the test.
- After verification of correct correlation of the sample and the corresponding request form both should be labelled with a unique identification number.
- Prior to the assessment of the sample the patient's screening history should be retrieved from the local laboratory files and/or screening data base and be available to the cytotechnologist.
- Spray-fixed smears should be soaked in ethanol or water before the staining procedure.
- Liquid based specimens should be processed according to the manufacturer's instructions.
- The slides should be stained according to a standard Papanicolaou protocol (including control of staining,).

- The samples should have a cover-slip which aims to cover all the cellular material (usually 50 by 24 mm) and labelling should be checked before the slide is screened.

Assessment of the sample: stepwise screening

Initial assessment. Primary screening is performed by cytotechnologists.

- Slides should be placed in the mechanical stage holder of the microscope with the label always on the same side.¹³
- In conventional slides the cover-slipped area should be screened completely, in horizontal or vertical directions using overlapping screening-patterns. In liquid based specimens the entire area within the circle should be screened. Microscope process control systems equipped with electronic marking capability may be helpful in quality assessment.¹⁴
- Unusual and/or abnormal cells should be marked with a pen manually or computer-guided.
- Repeat samples should be compared with the sample on which the recommendation was given.
- The results should be reported according to a national standard classification system. A statement about the quality of the cervical sample should be included. In case of unsatisfactory samples a repeat test should be advised.
- Conclusion and recommendations including those for repeat smears and referral for gynaecological, colposcopic or histological examinations should be given in concordance with guidelines, see chapter 5 & 6 of the European guidelines.¹
- Reports must show the identity of the cytotechnologist/cytopathologist responsible for the conclusion and recommendation.

Samples qualifying for a second screening assessment. The following cases should be rescreened by a second person:

- Samples with inadequate/unsatisfactory quality.
- Samples with any cellular abnormalities leading to a specific recommendation.
- Samples with previous recommendations for repeat or referral for gynaecological, colposcopic and histological examinations.
- Other high risk samples according to clinical information or patient history:
 - first normal cytology after abnormal cytology or histology,

- samples of clinically suspect cases (abnormal discharge, postmenopausal bleeding, abnormal or suspicious cervix),
- negative samples prior to a sample classified as abnormal and initiating further clinical treatment (maximum five years),
- samples of postmenopausal women with atrophic, difficult to classify, probably abnormal cells with an advice for a repeat sample after short term oestrogen treatment.
- Quality control related slides.

According to national regulations these procedures may be done either by one cytotechnologist and/or one cytopathologist or two cytotechnologists (e.g. The Netherlands). Where all negative and inadequate slides are subjected to rapid rescreening or pre-screening targeted rescreening may be avoided.¹⁵

Workload requirements – primary screening. A reasonable maximum workload in terms of number of slides per day to be screened should be established within the laboratory, depending on the method of sample preparation (conventional cytology or liquid based). Additional work done by the cytotechnologist including staining, quality control procedures and other activities should be taken in account. Within Europe maximum official workload limits are given for slides to be screened by cytotechnologists per day and vary between 25 and 80 cases.¹⁶ Some countries give a maximum workload per hour, e.g. in Germany (maximum 10 cases per hour).

It is advised:

- to screen not more than 2 hours without a break,
- that primary screening does not exceed six hours per day.

A record of primary screening assessments of individual cytotechnologists and the final signed results should be kept and be retrievable for quality control purposes.

Archiving. The laboratory staff is responsible for proper administration and archiving of request forms, samples and written and/or computerized reports. Procedures must comply with national legislation, including that relating to patients' data security.

Request form: The request forms or electronic equivalent should be stored for a minimum of three months.

Samples: All slides must be stored for a minimum of 10 years in adequate conditions for preservation. This is important for patient management as well as quality control.

Reports: The storage of written or computerized reports is primarily dependent on national regulations. It is recommended that the reports should be stored for a minimum of 10 years. It is a great advantage to keep a coded record of cytology results for future reference, even if results and slides are no longer available.

Archived Pap smears and histological blocks of cervical tissue constitute a very important source for bio-bank research. The European Union is currently promoting systems allowing high-quality research using stored human biological material (<http://www.cancerbiobank.org/>).

Recording of results

Laboratory information system

There must be an adequate record keeping system, preferably computerized. It must be accurate and easily accessible to all laboratory personnel.

The record system should include at least:

- patient identification data,
- name and address of the laboratory,
- laboratory id-number,
- date of arrival of the smear in the laboratory,
- indication for examination: screening, follow-up, clinical indication,
- type of examination: cytological, histological, virological,
- the results of the laboratory examination in accordance with the current standard classification system (see below) and data format, including a judgement of the adequacy of the preparation,
- advice for repeat sample or referral,
- date of the final report,
- name of the person or persons who evaluated the sample.

The European guidelines recommend that cytology results should be reported using a nationally agreed terminology that is at least translatable into the Bethesda system, see Chapter 3, Annex 2.¹

Further requirements are that the information system should

- link multiple test results for the same patient,
- provide easy access to details about previous cervical cytology and histology of the patient,
- provide a mechanism for ascertaining and recording clinical outcome after cytology tests, including colposcopy findings, biopsies, reasons for biopsies not being taken,

- be able to provide the data necessary for evaluation of the population screening programme. All or a selection of the recorded data mentioned above must be forwarded to the national or regional cancer screening register according to current directives and held at the screening centre for their own evaluation.

Authorisation of results. Every report must be checked for inconsistencies before authorisation and may then be manually or electronically authorised.

Dependent on national legal requirements, the cytological reports may be signed either by cytotechnicians or cytopathologists in charge.

Laboratory response time. All efforts should be directed to report results of the screening within 10 working days counted from specimen arrival within the laboratory. If a locally agreed time limit cannot be met, the referring doctor of the smear should be informed.

Quality management

A variety of concepts in quality management (quality assurance) have been developed as active prevention programmes. Generic models (total quality management) like the model established by the European Foundation for Quality Management differ from those based on implementation of international norms/standards.¹⁷ A proper quality management programme will help to ensure optimal patients care and minimize the risk of liability claims.¹⁶

Internal quality management

Laboratory quality management (pre-analytical quality management). A person within the laboratory should be designated who, in addition to daily work in cervical screening, is trained in collecting and managing documents, process descriptions and manuals and is either a trained quality manager or is able to communicate with trained quality managers. Handbooks with practical guidance appear helpful.¹⁸

General management documents should include:

- overview of the screening laboratory,
- description of personnel organisation (including levels of competence and responsibilities of each person, lines of communication, infrastructure),
- structure of management documents.

Process-network should include

- customer definition,

- management processes,
- core processes,
- processes of improvement and resources.

Detailed process description should include:

- step-wise slide screening protocols,
- description of personnel responsible for specific processes,
- methods of detecting and minimizing errors (check-lists).

All staff involved in the working process must be informed, and the protocols should be checked yearly and adjusted according to continuing medical education of all personnel.

Analytical quality management (cytology). Accuracy of screening must be monitored with previously agreed protocols for defining and dealing with genuine poor performance so that laboratory morale is maintained and expectations are not too high. Measurements of screening accuracy should also take account of variations in accuracy of the final report, which must also be monitored. Methods used for quality assessment should increase dialogue within the laboratory and improve individual screening accuracy.

There are three main methodologies for internal quality control of cytology:

1. methods based on rescreening of slides,
2. methods based on monitoring screening detection and reporting rates,
3. methods based on correlation of cytology with clinical / histological outcome.

Internal quality control based on rescreening of slides

Multiple screening includes prospective and retrospective variants. Internal quality control of cytology screening largely depends on rescreening slides initially screened as negative or inadequate. Procedures may be designed to detect potential false negatives before final results are reported in which case they have the potential to improve patient care as well as individual and laboratory accuracy. Procedures may also be designed to monitor accuracy of screening, either by measuring sensitivity and specificity of screening against the final result or by monitoring detection rates of cytological abnormalities.

The following rescreening procedures are proposed as contributing to the sensitivity of cytological screening or to general quality control:

- rapid reviewing of smears initially reported as negative or inadequate,

- rapid preview/prescreening of all smears,
- random rescreening (full rescreening of a 10% random sample of smears reported as negative or unsatisfactory),
- targeted rescreening of specific patient groups,
- seeding abnormal cases into the screening pools,
- seeding abnormal cases into the rescreening pools,
- retrospective rescreening of negative cervical cytology specimens from patients with a current high grade abnormality: targeted reviewing,
- automated rescreening of smears initially reported as negative.

Rapid review (RR). consists of re-screening quickly, for 30 to 120 seconds, all slides that are originally reported as within normal limits or as inadequate in order to identify those that might contain missed abnormalities. Those suspect smears are subsequently fully checked by an experienced cytotechnologist or cytopathologist who determines the final report.

- Rapid or partial reviewing of all smears has been introduced in the United Kingdom as an alternative and appears to be a useful quality control standard.¹⁹
- In a recent study of published data on rapid reviewing of cervical smears, evidence was established that RR of all negative preparations results in the detection of more additional abnormalities in comparison to fully rescreening only ten percent of the negative workload.^{20, 21}

Rapid preview/prescreening (RP) of all smears RP is defined as partial microscopic inspection of a slide during a limited duration (maximum 120 seconds) before full routine examination.

- The essential difference between rapid prescreening and rapid reviewing is that in RP all slides are submitted to a quick partial scanning by a cytotechnologist, while, in rapid review only slides initially indicated as negative or inadequate are reviewed.²²
- The organisational advantage of RP is that it rapidly identifies most of the abnormal cases.
- The accuracy of rapid prescreening to pick up cytological lesions, relative to full routine screening can be easily computed.
- The process is not influenced by previous markings on the slide.
- Rapid prescreening shows considerable promise as a quality control process, with a sensitivity gain comparable to that of rapid reviewing, and superior to that of 10% full rescreening.²²

Random rescreening of a random fraction of smears reported as negative

- Random rescreening is widely practiced in the United States and suggested by some European countries.²³ CLIA '88 regulations specify that at least 10% of samples interpreted as negative have to be re-screened by a cytopathologist or a qualified supervisory cytotechnologist.
- Its value in detecting false-negative diagnoses has been criticised for its lack of efficiency and statistical power.^{24, 25}

Targeted rescreening of specific patient groups selects smears from patients known to be at higher risk of having cytological abnormalities, and is done by a senior cytothechnologist or cytopathologist.

The smears selected for targeted rescreening may be:

- history of abnormal bleeding/spotting, e.g. intermenstrual, post coital, post menopausal,
- history of recurrent cervical/vaginal infections,
- previous abnormal smears,
- abnormal cervix appearance on colposcopy.

Targeted screening is not standardised and its ability to detect additional lesions has not been compared to other methods such as random or rapid rescreening or prescreening. Nevertheless, thought to be a good quality management method, it is practised in several European laboratories.

Automated rescreening. The potential benefit includes reduction of false-negative rates²⁶ yet is an expensive approach for quality assurance.²⁷

Internal quality control based on screening detection and reporting rates

Monitoring primary screening detection rates. Accuracy of primary screening may be monitored without formal slide review procedures by measuring the percentages of the main types of cytological findings (high-grade, low-grade, inadequate, undetermined, negative) detected by individual screeners in comparison with the laboratory as a whole and local or national standards.²⁸

Monitoring pathologists' reporting rates. Pathologists' reporting rates for low-grade, high-grade and inadequate results form a useful guide to performance, which is important when the final pathologists' results are used as the outcome measure for primary screening performance.

Internal quality control based on correlation with clinical / histological outcome

Correlation of cytology with clinical outcome forms an important aspect of quality assurance and requires systems to be in place for ascertaining results of biopsies, colposcopy findings and other events.

Cyto-clinical correlation. Contact with clinicians and access to cancer registry data is essential.

- Laboratories should establish a mechanism to ensure follow-up of patients with cytology suggesting high-grade intraepithelial lesions and invasive carcinoma.
- Cyto-histological correlation is a major tool in internal education for both cytology and histology. The laboratory must have a clearly defined policy regarding the methods used for cyto-histological correlation.
- The laboratory should compare all abnormal cytology reports with subsequent histopathology, if available, and determine the causes of any discrepancy.
- The correlation process should be documented in the laboratory quality assurance programme.
- Positive predictive value for high-grade cytology provides a measure of accuracy of cytology reporting.

Cyto-virological correlation. If HPV testing can be used as a triaging test for patients with diagnosis of atypical squamous cells of undetermined significance (ASC-US) HPV positivity should be found in 30%, at least.

Audit of interval cancers. Rescreening of smears from patients with negative or low-grade test results less than 3–5 years before the diagnosis of invasive cancer forms an important part of quality control but should be taken in the context of all components of the screening history, including cytological screening errors, sampling errors, non-compliance with follow-up recommendations, incomplete treatment and whether or not the cancer was screen-detected. A link between the cancer registry and the cytology laboratory is a pre-requisite. Review of previous slides in women with invasive cancer should be carried out as near as possible in the context of the routine screening process. This means that slides should be re-screened alongside negative and / or positive controls and the labels concealed. More than one cytopathologists / cytotechnologist should review the slides, preferably

three. Review diagnoses should distinguish obvious false negative interpretations from cytological features recognised as being at risk for being potential false negatives, such as few, small or pale abnormal cells.^{29,30}

Internal continuing education

Encouraging communication and discussion of difficult cases between cytotechnologists and/or cytopathologists has a high impact on individual knowledge. Additionally,

- there should be a good supply of up-to-date cytology textbooks.
- the laboratory should have a subscription or online access to one or more of the cytology journals.
- cytotechnologists and cytopathologists should participate in regular meetings on review cases.
- performance evaluations should be used to identify those with deficiencies in knowledge and skills who would benefit from a more directed educational programme.

External quality management

External continuing education. Although not mandatory under most regulations, external ongoing education should be an important component of any quality assurance programme. Ongoing education is a requirement for proficiency in cytology. This requirement can be fulfilled by

- attending workshops and symposia,
- regional inter-laboratory slide review sessions,
- participation in proficiency testing,
- teaching cytotechnology students, pathology residents and fellows,
- independent study contributions to laboratory handbooks or work in committees of the relevant medical societies.

Inter-laboratory slide review sessions have been shown to increase reproducibility of cytology interpretation between participating laboratories.³¹

Additionally, the ability of all persons involved in the screening process to work actively on their continuing education should be encouraged by the laboratory manager. Membership of regional, national or international societies for cytology should be seen as part of external continuing education. Cooperation with dedicated cytotechnologists from other labs improves motivation. Excellent motivation

of many cytotechnologists is documented by their willingness to take voluntary proficiency tests. Therefore, staff should be given time away from their routine duties to allow them to take advantage of these procedures.

External quality control of screening skills

Proficiency testing is mandated in some but not all member states of the European Union. Proficiency testing, accreditation and recertification do not always go hand in hand.

- The International Academy of Cytology offers both proficiency testing and recertification based on continuing education credits which are dependent on continued practice in cytology and in continuing education events (<http://www.cytology-iac.org>).
- The European Federation of Cytology Societies EFCS offers the EFCS aptitude test (QUATE test), which is based on the proficiency testing system in the UK and widely accepted by Denmark and Italy (<http://www.cytology-efcs.org>).
- Voluntary proficiency tests should be designed to be educational, but procedures should be agreed beforehand for managing persistent poor performance.
- External quality assurance via test cases may take the form of regular examination of 'test' cases, either as glass slides or electronic images, with assessment of individual performance on a voluntary basis.²³
- Test slides should be designed to mimic normal practice and the diagnoses should be agreed in advance by a central panel or, where relevant, confirmed by histology.

External quality assurance (EQA) may also take the form of monitoring staining procedures, laboratory and personal reporting rates for high-grade and low-grade cytological abnormalities and comparing results with national standards.¹⁰ In the UK, a technical EQA scheme for staining techniques was established and reporting rates of all cytology laboratories are published annually and are used to provide achievable ranges for reporting cytological abnormalities.^{15, 32}

Accreditation of the laboratory unit

Based on predefined standards, an external organisation checks³³ and finally certifies the quality of the

institution under investigation. Standards are documented agreements containing technical specifications or other precise criteria to be used consistently as rules or guidelines and definitions of characteristics, to ensure that materials, products, processes and services are fit for their purpose.

- External standards have to be distinguished from internal standards. While internal standards are a must for any quality management, the value of external standards is still under discussion.^{34, 35, 36} In Australia, standards for gynaecological cytology are set up by the National Pathology Accreditation Advisory Board.¹⁶
- A variety of international/national accreditation agencies offer certification via external audits for laboratories. These private organisations have to be accredited by ministries of the different countries. *The International Organisation for Standardization (ISO)* is a worldwide non-governmental federation of national standards bodies from more than 140 countries, one from each country (<http://www.iso.ch/>). ISO's work results in international agreements that are published as International Standards.³⁴

Accreditation of the cytology laboratory is still voluntary in the majority of member states of the European Union. The Clinical Pathology Accreditation (UK) Ltd complies with the international standards ISO 17011 & ISO 9001: 2000. Where histopathology and cytology departments are combined in the same institution separate submissions from cytology laboratories will be not allowed in future (<http://www.cpa-uk.co.uk>). Other countries have developed or are developing national or local accreditation programmes for cytology laboratories either established or in progress.³⁷

- In the case of accreditation a minimum size of the cytology unit appears worthwhile. At least four persons should be involved in the screening process. There should be a minimum throughput of 15 000 gynaecological slides per year.
- Re-certification should take place three years after the first accreditation, then every five years.

Responsibilities for quality control

The laboratory manager is responsible for the quality system and for the approval of working-guidelines and procedures. See also Chapter 3.6.¹

Communication

Other laboratories

Laboratories should make relevant clinical information and follow-up data available to other laboratories taking part in the cervical screening programme.

General practitioners, gynaecologists and other sample takers

Sample takers should be informed annually about their percentage of less than satisfactory or unsatisfactory cell samples versus the mean percentage of the country/region/laboratory.

Sample takers must provide the essential information using the standard request form.

Gynaecologists should make relevant clinical information and follow-up data available to laboratories taking part in the cervical screening programme.

In certain areas, if a gynaecologist takes the smear, copies of the cervical smear results are sent to the woman's GP according to local inter-professional agreements.

Health authorities

Cytological and histological records must be sent at regular intervals to the regional or national screening- or cancer registry that is responsible for the monitoring of screening programmes. This condition should be mandatory and include all records irrespective of indication for the examination, status of the woman, the smear taker or the laboratory. Laboratories should receive reports with the results of process- and impact evaluation of screening.

The screening register can also provide specific and general statistics to participating laboratories.

Patients

Depending on regional or national legal practice informing the woman of the result of the smear is the responsibility of the sample taker or the laboratory.

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