

Nuclear medicine: guidelines for the provision of a clinical service.

REPORT OF A WORKING GROUP OF THE ROYAL COLLEGE OF PHYSICIANS NUCLEAR MEDICINE COMMITTEE

This report has been approved by the Nuclear Medicine Committee, the Council of the Royal College of Physicians (March 1997) and the British Nuclear Medicine Society.

Introduction

Purpose of this report

There are no published guidelines on notional sessional commitments for consultants in nuclear medicine. Individual consultants have approached the Royal College of Physicians Nuclear Medicine Committee (RCP NMC) indicating they would find such guidelines useful in negotiations with management – for example when negotiating for supporting staff, which currently many lack, and when requesting additional sessions, often in competition with larger specialties. Guidelines are also needed by management to assist them in making provision for medical cover – particularly in a new specialty – or when taking decisions about centralising a hitherto dispersed service.

In making recommendations concerning the quantification of consultant time for nuclear medicine specialists, this report does not include discussion of the benefits for centralising departments – this is an important but separate issue. The purpose of this document is to give professional guidance on levels of consultant time required for the provision of a safe and effective clinical service.

While producing this guidance, the working group has been mindful of the limited resources within the NHS and has been conservative in its assessment of the level of need for medical cover.

Definition of nuclear medicine

The World Health Organisation has defined nuclear medicine as: *that specialty which embraces all applications of radioactive materials in diagnosis or treatment or in medical research, with the exception of the use of sealed radiation sources in radiotherapy*¹.

The broad range of nuclear medicine procedures includes treatment of many different disease states in both adults and children. Examples of common diagnostic procedures include ventilation-perfusion

imaging for pulmonary embolism, bone scanning in benign and malignant disease, myocardial perfusion studies in ischaemic heart disease, and renal investigations in a variety of conditions (assessment of renal transplant, assessment of obstructed kidney). The most common therapeutic procedure is the use of radioiodine in the treatment of thyrotoxicosis; others include treatment in thyroid cancer, alleviating bone pain in malignancy, and the treatment of polycythaemia.

The unique ability to study physiological and pathological processes by non-invasive methods means that nuclear medicine procedures are used extensively for research. This research includes the use of established techniques in the assessment of new drugs or procedures (for instance, gated blood pool scanning is used to assess the cardiotoxicity of new drugs in oncology), and also the development of new radiopharmaceuticals and procedures for assessment and therapy in specific disease processes (examples include cerebral blood flow studies and receptor, antibody or peptide imaging). Positron emission tomography (PET) scanning has been used in research for a number of years and is now making the transition into clinical practice in oncology, cardiology and neurology.

Responsibilities of the nuclear medicine specialist

Nuclear medicine specialists are responsible for the provision of the clinical services outlined above. Their duties include the selection, supervision and reporting of diagnostic investigations, assessing patients for therapy and providing appropriate follow up, audit, research and teaching. As heads of departments, many consultants have managerial roles and are also budget holders. However, there are unique legal responsibilities for those practising nuclear medicine, with certification required for all diagnostic, therapeutic and research procedures.

The precise range of responsibilities of a nuclear medicine consultant varies due to a number of factors such as the size and type of hospital served and the hospital's commitment to teaching and research. Another important factor is the degree of centralisation of the nuclear medicine services. In some hospitals all nuclear medicine procedures are directed

from one specialist department, whereas in others, individual specialists, radiologists, radiotherapists or clinicians are responsible for individual areas, either for the hospital service as a whole or for their own individual patients. For administrative, financial and legal reasons, there is a trend to centralise nuclear medicine services – this trend is being seen in the UK and already exists in most of Europe, Australasia and North America².

Training

Nuclear medicine is a recognised specialty in the UK and in Europe. Specialty training is supervised by the Royal College of Physicians Joint Committee of Higher Medical Training via the Specialist Advisory Committee in Nuclear Medicine. A European Directorate (30 October 1989) from the Council of Europe confers to nuclear medicine the status of an independent specialty.

Method

A working group of the RCP NMC was appointed to make recommendations on adequate consultant staffing levels for nuclear medicine departments. The working group, one of whom had been nominated by the British Nuclear Medicine Society (BNMS), comprised four members: an academic professor, two consultants from teaching hospitals and a consultant from a district general hospital.

The working group considered several ways of assessing workload, and ultimately used a system of identifying nominal time for a number of different consultant responsibilities, weighting these for different departmental models. The total time identified was then compared with sessional time in several known departments, including those thought to be adequately staffed and those perceived to be understaffed. The modelling was refined until the theoretical and practical models approximated – this in fact proved much easier than anticipated.

The contribution of specialist trainees to the provision of service was considered, but was excluded as many departments do not have trainees; in those that do, their numbers are small and their service commitment is balanced by the additional commitment to their training by the consultant. Time was estimated for general teaching and training duties.

The final assessment has been endorsed by the RCP and the BNMS.

Results

Status of nuclear medicine in the UK

The most up-to-date survey of nuclear medicine practice in the UK was published recently². There appear to be 235 sites undertaking procedures in

nuclear medicine, the total number of procedures performed being approximately 490,000 in 1993 compared with 430,000 in 1989. There are wide variations in staffing levels, with only 22% of departments having medical cover of half-time equivalent or better, with 30% of departments having less than one consultant session per week. An annual growth rate of 7% was noted in imaging procedures.

In the European Community, in terms of instrumentation (gamma cameras) per million inhabitants, Belgium leads with 22, Germany follows with 21, Italy has the median number with 10 and the UK is listed last with only 5 instruments per million population³. The UK lies 9th of 11 countries in the number of studies per head of population and 10th of 11 for studies per camera⁴. Whilst diagnostic procedures in nuclear medicine in the USA correspond to 5.6 per bed per annum, an equivalent figure for the UK is significantly less by at least a factor of 10. In 1988/9 the estimated annual rate of all nuclear cardiology procedures was 0.7 per thousand population in the UK. This compares with 4 per thousand in the USA over the same time period. A Council Statement from the British Cardiac Society on manpower and the need for cardiac services sets a target of approximately 2.6 nuclear cardiology investigations per thousand population per year, which once achieved, would accord with the European average⁵.

Thus it is clear that there is an unfulfilled demand for nuclear medicine services in the UK, insufficient medical staffing levels and a significant number of regions in the country where nuclear medicine is practised with only a minimal, if not absent, medical cover. This is in clear breach of national legislation or guidance notes^{6–8}, and together with the high level of public concern about radiation, poses a serious risk of nuclear medicine services becoming a matter for media debate.

Medical staffing for nuclear medicine

Tables 1a and b give the minimum requirements for consultant staffing levels, in terms of workload, for five types of hospitals, ranging from a small district general hospital to a large teaching hospital: Table 1a outlines the daily workload, and Table 1b the weekly workload. Both tables present a varied case mix ranging from 1,500 investigations per annum in a small DGH to up to 10,000 or more investigations per annum in large teaching hospitals.

One of the assumptions made by the working group is one of a notional half-day (NHD) to be equivalent to 3.5 hours. It is also assumed that cover is given by a trained consultant in nuclear medicine, and that such cover will be provided during study and annual leave. In allocating time, consideration has been given to *fixed* commitments such as those undertaken on a regular basis, eg special procedures, outpatient clinics, interdisciplinary meetings, teaching, ward rounds and

Table 1a. Daily workload estimate of a nuclear medicine consultant for five types of hospitals

	Small DGH: 1 camera 1,500 investigations mixed minutes	Medium DGH: 2 cameras 2,400 investigations + <i>in vitro</i> + therapy minutes	Large DGH: 2 cameras 5,000 investigations + <i>in vitro</i> + therapy minutes	Small TH: 2 cameras 5,000 investigations + <i>in vitro</i> + therapy minutes	Large TH: 3 cameras 7,000 - 10,000 investigations + <i>in vitro</i> + therapy minutes
Clinical reporting	60	90	150	150	180
Clinical vetting, discussion of referrals	30	30	90	90	90
Clinical interaction with patients	30	30	60	60	90
Administration	30	60	90	120	140
Audit	10	15	30	30	45
Committee work	10	20	30	45	75
Training and teaching	15	30	45	60	75
CME	10	20	20	20	30
Staff meetings	10	20	20	30	60
ARSAC	5	10	20	30	30
Off-site duties	15	15	15	30	40
<i>In vitro</i>	–	15	15	30	60
Therapy	–	90	120	120	150

TH: Teaching hospital

Note: In all cases these figures assume cover by a trained consultant in nuclear medicine. It is also assumed that such cover will be provided during study and annual leave.

No consideration has been given above for the new requirements which are a consequence of the Calman proposals, on-call duties, cover for leave of other staff and multi-sited organisations.

management, and *flexible* commitments, such as immediacy and continuity of care, administrative work, teaching and training. No specific consideration has been given to local circumstances such as multi-sited organisations which would entail greater time commitment in view of considerable wastage in travelling between sites, the new requirements which are a

consequence of the Calman proposals, and cover for leave of other staff. On-call duties have not been considered, although they may represent a time commitment for the larger hospital environments. The appropriate mix between fixed and flexible sessions per week has not been considered on the assumption that this should usually represent an equal mix.

Table 1b. Weekly workload estimate of a nuclear medicine consultant for five types of hospitals

	Small DGH: 1 camera 1,500 investigations mixed sessions	Medium DGH: 2 cameras 2,400 investigations + <i>in vitro</i> + therapy sessions	Large DGH: 2 cameras 5,000 investigations + <i>in vitro</i> + therapy sessions	Small TH: 2 cameras 5,000 investigations + <i>in vitro</i> + therapy sessions	Large TH: 3 cameras 7,000 – 10,000 investigations + <i>in vitro</i> + therapy sessions
TOTAL	5 + nuclear medicine cover	8–9 + nuclear medicine cover	17 + nuclear medicine cover	19 + nuclear medicine cover	25–30 + nuclear medicine cover

TH: Teaching hospital

Note: In all cases these figures assume cover by a trained consultant in nuclear medicine. It is also assumed that such cover will be provided during study and annual leave.

No consideration has been given above for the new requirements which are a consequence of the Calman proposals, on-call duties, cover for leave of other staff and multi-sited organisations.

APPENDIX

Standards of delivery of a nuclear medicine service

The British Nuclear Medicine Society offers purchasers of nuclear medicine services the following policy statement on standards for the safe practice of Nuclear Medicine⁹.

* = Statutory requirement

A Medical standards

- *1 The clinical nuclear medicine service shall be delivered under the responsibility of one or more clinicians holding the relevant ARSAC certificates for that site.
- 2 The number of dedicated consultant sessions shall be appropriate for the workload.
- 3 Consultants responsible for the delivery of the clinical nuclear medicine service shall be trained to an appropriate standard, usually that defined by the specialist professional body.
- 4 Medical reports shall be the responsibility of one or more consultants with appropriate experience and training. A medical opinion can only be given by a medically qualified individual.
- 5 Adequate arrangements for consultant cover shall be in place at all times.
- 6 Adequate provision for study leave and/or continuing education for clinical staff shall be identified in *Terms and Conditions of Service*.

B Scientific and technical standards

- *1 Scientific and technical support shall be provided through dedicated medical physicists and technologists in accordance with the recommendations of the IPEM, BNMS, HSG(95)3 and relevant current legislation. Such staff shall be trained to an appropriate standard as defined by the appropriate professional bodies.
- *2 The services of a *radiation protection adviser* shall be available for the provision of advice on relevant current legislation and other radiation protection matters.
- *3 A *radiation protection supervisor* shall be appointed by the provider unit.
- 4 Adequate provision for study leave and/or continuing education for scientific and technical staff shall be identified in *Terms and Conditions of Service*.

C Organisational standards

- 1 The nuclear medicine service shall be managed by a suitable person with the organisational and administrative authority to deliver a safe service.
- *2 Radiopharmaceuticals shall be made available through qualified staff in an approved environment. Written procedures for the preparation, dispensing, and administration of such agents shall be accessible and reviewed at regular intervals.
- 3 UK licensed products shall be used except when written authorisation on an individual patient basis is provided by the clinician holding the relevant ARSAC certificate.
- *4 The provider site shall hold a certificate of registration for the keeping and use of radioactive materials and be appropriately authorised to accumulate and dispose of radioactive waste in accordance with relevant current legislation, unless exempt from so doing.
- *5 Procedures shall be in place to ensure that the transport of radioactive materials meets relevant current legislation.
- *6 Measures to monitor and control the radiation exposure of patients, staff and members of the public must satisfy the requirements of relevant current legislation.
- 7 The policies, procedures and delivery of the service shall be subject to organisational audit at agreed intervals.
- 8 All investigations or therapies shall be performed only on receipt of forms signed by a medical practitioner, and these forms shall be made available by the provider unit.
- 9 Audit standards for the delivery of the service shall be agreed to include the range of services to be supplied, interval between request and appointment and other quality measures.
- 10 An adequate staff mix for the safe delivery of the service and appropriate patient care shall be in place.
- 11 Services shall be provided in an environment which is conducive to good patient care, with particular emphasis on cleanliness, timeliness, pleasant attitude and appearance of staff. Patient

privacy, dignity and ethnic origin shall be respected.

- *12 All research procedures shall be performed in accordance with the terms of the Local Research Ethics Committee and the ARSAC certificate specific to that project.

D Equipment and facilities

- 1 The service shall be delivered through safe equipment that meets current accepted standards of performance.
- 2 Performance of equipment, in particular gamma cameras and dose calibrators, shall be assessed at suitable intervals. Records shall be maintained and be available on request.
- 3 Radiation monitoring, imaging, counting and data processing facilities appropriate to the level of service shall be available.

E Glossary

ARSAC: Administration of Radioactive Substances Advisory Committee of the DoH set up under the Medicines (Administration of Radioactive Substances) Regulations 1978 (SI 1978 No 1006) and the Medicines (Radioactive Substances) Order 1978 (SI No 1004).

BNMS: British Nuclear Medicine Society.

IPEM: Institute of Physics and Engineering in Medicine.

HSG(95)3: NHS Executive Health Service Guideline entitled *Health Service Use of Ionising Radiations*, issued January 1995.

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- 2 Elliott AT, Elliott FM, Shields RA. UK Nuclear Medicine Survey, 1992-1993. *Nuclear Medicine Communication* 1996;**17**:3-7.
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- 5 British Cardiac Society. *Council Statement on the demand and need for cardiac services and the development of a waiting list: strategy for cardiac disease*. London: BCS, 1994.
- 6 *The medicines (administration of radioactive substances) Regulations 1978*. London: HMSO, 1978.
- 7 *Notes for guidance on the administration of radioactive substances to persons for the purpose of diagnosis, treatment or research*. London: HMSO, 1988.
- 8 *The ionising radiation (protection of persons undergoing medical examination or treatment) Regulations 1988*. London: HMSO, 1988.
- 9 British Nuclear Medicine Society. Nuclear Medicine Standards for Purchasers and Trusts. *Nuclear Medicine Communication* 1997;**18**:592-3.

This report will shortly be available as a booklet from the Publications Unit of the Royal College of Physicians of London.

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