

**REPORT OF THE
SECRETARY OF HUMAN RESOURCES ON**

**The Study Of The Needs
Of X-ray Technicians
And Their Practice**

**TO THE GOVERNOR AND
THE GENERAL ASSEMBLY OF VIRGINIA**



HOUSE DOCUMENT NO. 31

**COMMONWEALTH OF VIRGINIA
RICHMOND
1989**



COMMONWEALTH of VIRGINIA

Office of the Governor

Richmond 23219

Eva S. Teig
Secretary of Health and Human Resources

January, 1989

To: TO THE GOVERNOR AND MEMBERS OF THE GENERAL ASSEMBLY

In January of this year, House Joint Resolution 82 requested that a study be done of X-Ray Technicians and their practice. This study was to encompass all aspects of the use of X-rays in the healing arts having an impact on the safety of the operator or the consumer, including safety of the machinery, competence of the personnel, and the need, if any, for further regulation.

The findings and recommendations of the Task Force on X-Ray Technicians and Their Practice are reported herein. In addition to the Task Force members, representatives of many professional organizations participated in the Task Force meetings and contributed to the final conclusions.

The proposals recommended by this Task Force will further the knowledge base upon which decisions on regulation of X-ray personnel will be determined in the future.

We will be pleased to discuss this report with you and to assist you in any way possible.

Sincerely,

Eva S. Teig

Eva S. Teig

HOUSE JOINT RESOLUTION NO. 82

Offered January 25, 1988

Requesting the Secretary of Human Resources to study the needs of X-ray technicians and their practice.

Patron—Marshall

Referred to the Committee on Health, Welfare and Institutions

WHEREAS, the delivery of quality health care services is dependent upon the expertise of varied health care professionals, technicians, and aides; and

WHEREAS, many physicians, podiatrists, chiropractors, dentists and veterinarians employ technicians or aides to perform tests, including the administration of X-rays; and

WHEREAS, X-rays are a source of ionizing radiation which is potentially dangerous as a possible cause of cancer and genetic damage and can result in death; and

WHEREAS, the need to protect the public and employees from unnecessary and dangerous exposure is acute; and

WHEREAS, radiation safety is equally a concern of the Department of Health and the Department of Health Regulatory Boards; and

WHEREAS, it has been recommended that the Secretary of Human Resources appoint a special task force, including representatives from the Department of Health and the Department of Health Regulatory Boards, to study and recommend (i) criteria and standards by which the competence of X-ray aides and technicians may be judged, (ii) such other problems related to the safe operation of X-ray equipment and (iii) approaches to increase public safety for implementation thereof by the Department of Health and the Department of Health Regulatory Boards; now, therefore, be it

RESOLVED by the House of Delegates, the Senate concurring, That the Secretary of Human Resources is requested to appoint a special task force to study the needs of X-ray technicians and their practice. The task force shall include representatives of the Department of Health and the Department of Health Regulatory Boards and it shall:

1. Study and recommend criteria and standards by which the competence of X-ray technicians and aides may be judged; and

2. Study further such other problems related to the safe operation of X-ray equipment; and

3. Recommend approaches to increase public safety for implementation by the Department of Health and the Department of Health Regulatory Boards.

The special task force shall report its findings and recommendations by December 1, 1988, to the Governor and General Assembly as provided in the procedures of the Division of Legislative Automated Systems for processing legislative documents.

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Date: _____

Date: _____

Clerk of the House of Delegates

Clerk of the Senate

ACKNOWLEDGMENTS

The Task Force is indebted to Dr. Robert Cherry, Research Assistant, Department of Health Professions, for his assistance in this project; and to Vickie L. O'Dell, Information Systems Specialist, Department of Health, for her assistance in the preparation of this report and the minutes of each meeting.

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ON
X-RAY TECHNICIANS AND THEIR PRACTICE

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EXECUTIVE SUMMARY

X-rays were discovered in 1895 and by mid-1896 the harmful effects of these rays on skin were beginning to be noted (Glasstone, 1967). Initially, the use of X-rays was restricted to trained scientists doing research on or with X-rays; however, as knowledge about the beneficial uses of these rays in medical diagnosis and therapy grew, the number of those operating X-ray machinery also grew. By 1986, there were 3,329 X-ray tubes being used by the medical professions in Virginia.

The discussion of qualifications of X-ray machine operators has been ongoing in the Virginia Radiation Advisory Board meetings since, at least, 1979. House Joint Resolution 12 (1986), House Document 24 (1987), House Bill 91 (1987) and House Joint Resolution 82 (1988) all addressed the efficient and safe use of X-rays. The charge of the Task Force reported upon herein included investigating the safety of X-ray machinery; the competence of X-ray personnel; the implementation of any further regulation and the impact of such regulation.

Difficulty was encountered because, at this time, each profession using X-ray technology has a different method for insuring safety and efficiency. The literature does not yet contain adequate data on such topics as methods of monitoring public safety relevant to X-ray use, harm to the public when X-ray personnel are not regulated, or cost to the consumer when X-ray personnel are regulated. Also, the relationship between safe and efficient use of X-ray machinery and the amount and type of training received was perceived as a key issue.

In the Commonwealth of Virginia, the Board of Veterinary Medicine regulations specify extensive minimum requirements for facilities, equipment and safe operation of X-ray equipment with extensive educational and testing requirements, including clinical training. The Virginia Board of Dentistry regulations specify satisfactory completion of a Board-administered examination or satisfactory completion of a course and/or examination in radiation safety from an approved institution or organization. In contrast, the Virginia Board of Medicine has no regulations dealing specifically with the regulation of X-ray equipment operators. Licensed physicians are responsible for the X-ray personnel under their supervision even though the X-rays taken in the private offices of medical doctors or chiropractors may involve relatively large and/or vulnerable areas of the body and therefore persons taking X-rays in those settings are most in need of proper training to insure patient safety.

In discussions concerning the various types of regulation, the Task Force strongly favored certification over either registration or licensure. Certification is defined in the Code of Virginia as a form of regulation recognizing persons who have met certain educational and experience standards to engage in an

occupation. Although one may practice the occupation without certification, only those who are certified may use the occupational title.

In addition, the Task Force recommends that 1) each discipline employing personnel to operate X-ray machinery complete a study of their own rules and regulations to determine adequacy in protecting the public from harm, no later than December 1989 for review by the 1990 General Assembly; 2) the Board of Medicine complete an evaluation and recommendations of methods for public protection to be practiced by licensed practitioners and by the allied health personnel under their supervision, no later than December 1989 for review by the 1990 General Assembly; and 3) the Council on Health Professions examine the methods by which safety is monitored, accumulate data on the harm to the public when no regulation takes place, and accumulate data on costs to the consumer when regulation takes place, no later than December 1989 for review by the 1990 General Assembly.

INTRODUCTION

In 1979, a Subcommittee of the Virginia Radiation Advisory Board began to discuss qualifications of X-ray machine operators. This Subcommittee prepared a recommendation calling for the Board of Health and the Governor to propose legislation mandating the credentialing or licensing of X-ray machine operators and their supervisors. The Virginia Radiation Advisory Board approved the recommendation in 1979 and reaffirmed it in 1983. In 1985, the Virginia Department of Health Professions began to study the need for licensure of radiologic technologists and the Radiation Advisory Board addressed the six criteria established by the Department of Health Professions for licensure of a profession.

The Virginia General Assembly directed the Department of Health Professions to study the need to regulate X-ray technicians, a broader issue than the licensure of radiologic technologists, through House Joint Resolution 12 (HJR 12) in 1986. The Council on Health Professions expanded the ongoing study of radiologic technologists to encompass the concerns of HJR 12 and produced House Document 24 (HD 24), "The Need for the Regulation of X-ray Technicians." In this report, "registration of X-ray technicians is recommended and it is further recommended that a Task Force be set up to determine what training or educational standards might be required for registration." In January, 1988, the Virginia General Assembly passed House Joint Resolution 82 (HJR 82) requesting that the Secretary of Human Resources study the needs of X-ray technicians and their practice. HJR 82, in effect, established the Task Force recommended in HD 24 and reported upon in this document.

In August 1988, Secretary of Health and Human Resources, Eva S. Teig, appointed a Task Force to implement HJR 82. The Task Force was chaired by Maston T. Jacks, Esquire, Deputy Secretary of Health and Human Resources and was comprised of the following members: Dr. Lee S. Anthony, Sr., Radiation Advisory Board; Dr. Carl W. Armstrong, Director, Division of Health Hazards, Department of Health; Dr. G. Edward Calvert, Board of Medicine; Mr. George T. Drumwright, Jr., Board of Health; Ms. Nancy J. Grandis, Council on Health Professions; Mr. Reginald N. Jones, Esquire, Board of Medicine; Dr. Sanford L. Lefcoe, Board of Dentistry; and Dr. John A. Mayo, Board of Veterinary Medicine. Meetings were held in the summer and fall of 1988.

Participation by the Virginia Departments of Health and Health Professions was required since each has authority to regulate some aspect of this issue. The Radiation Control Act, Title 32.1, Chapter 6, Article 8, Section 32.1-227 through 32.1-238 of the Code of Virginia (1950), as amended, requires the Board of Health to establish a program to provide for the orderly regulation of radiation. Section 32.1-12 confers authority for Rules and Regulations on members of the Board of Health. The Act also directs the Board to "promulgate regulations providing for

licenses to use, manufacture, produce, transfer, receive, acquire, own or possess quantities of, or devices or equipment utilizing, by-product, source, special nuclear, or other radioactive material occurring naturally or produced artificially; registration of the possession of a source of ionizing radiation and of information with respect thereto; and regulation of by-product, source and special nuclear material."

Title 54, Chapter 29, of the Code of Virginia (1950), as amended, provides for the unification and coordination of the "administrative, enforcement, education, and legislative activities of the several health regulatory boards", including the Boards of Medicine, Optometry, Dentistry, and Veterinary Medicine within the Department of Health Professions. The Council of Health Professions (CHP), consisting of one member from each board and four members from the State at large, is charged with the responsibility for evaluating "each health care profession and occupation in the Commonwealth not regulated by other provisions of this title to consider whether each such profession or occupation should be regulated and the degree of regulation to be imposed. Whenever the Council determines that the public interest requires that a health care profession or occupation which is not regulated by law should be regulated, the Council shall recommend for approval by the General Assembly next convened a regulatory system necessary to conduct the degree of regulation required" (Sec. 54-955.1, paragraph B).

The charge of the Task Force on X-ray Technicians and Their Practice included investigating:

1. Safety of X-ray machinery;
2. Competence of X-ray personnel;
3. Implementation of any further regulation and the impact of such regulation.

The work of the Task Force was initiated with an overview of HD 24 which addressed the same issues, and was continued with presentations made by the Virginia Department of Health, the Department of Health Professions, and professional groups having an interest in the proceedings.

The findings, conclusions and recommendations of this Task Force are included in this report.

BACKGROUND

The discovery of X-rays by the German physicist, W. C. Roentgen, occurred in late 1895. By the middle of 1896 harmful effects of these rays on skin were being noticed by experimenting physicists and radiologists (Glasstone, 1967). Over the next twenty years, scientists investigated overexposure to radiation, but it was not until the early 1920's that radiologists in this country and the United Kingdom began to make recommendations for the safe use of X-rays. Initially the use of X-rays was restricted to trained scientists doing research on or with X-rays. As knowledge about the beneficial uses of X-rays in both medical diagnosis and therapy grew, the number of those operating X-ray machinery also grew. By 1986, there were 3,329 X-ray tubes being used by the medical professions in the Commonwealth of Virginia.

The regulation of operators of X-ray machinery has been discussed on the federal level since at least 1970. The positive and negative aspects of regulation have been addressed by the U.S. Department of Health, Education, and Welfare (HEW); the U.S. Bureau of Radiological Health Issues; and the U.S. Congress. It has been generally accepted that some risk of harm to the public exists in cases of equipment failure, poor operating procedures, and/or improperly trained operators. In 1983, the U.S. Department of Health and Human Services (HHS) prepared and published proposed standards of accreditation and certification and began work to develop a consensus model for the states. In December, 1985, Part 75, "Standards for the Accreditation of Educational Programs for, and the Credentialing of Radiologic Personnel", was added to Subchapter F of Title 42 of the Code of Federal Regulations.

The major issues addressed by the Task Force on X-ray Technicians and Their Practice can be organized into three categories: machinery safety; the adequacy of training required of those who operate X-ray machinery and of their supervisors; and the relationships among the different types of regulation, the reduction of risk of harm to the public, and cost-effectiveness.

The issues concerning machinery safety were most recently addressed in Virginia by the work of the Council on Health Professions as they prepared House Document 24 (1987). The machinery-related recommendations of HD 24 and the model regulations developed by the Conference of Radiation Control Program Directors in 1984 were incorporated into the most recent revision of the Radiation Protection Regulations (Commonwealth of Virginia, 1988). The X-ray Protection Program in Virginia is detailed later in this report.

The amount and type of training required in order to use X-ray machinery safely and efficiently is a matter of great debate. Initially, all training in radiologic technology was

on-the-job training. Hospital-based schools providing a year of classwork and a year of clinical training were followed by more formal training done in one, two, or four year formats developed by colleges and universities (National Academy of Science, 1988).

Today in Virginia, those who take X-rays may be trained in a college setting or may rely on on-the-job training given by the supervising professional (physician, dentist, etc.) with whom they work. The adequacy of on-the-job training depends heavily upon the knowledge, skill, and teaching ability of the supervising professional whose formal education is more likely to have covered X-ray interpretation than the proper techniques for taking X-rays. Compounding the issue is the growing number of settings in which X-ray services are provided. The X-ray technician working for a veterinarian needs skills and knowledge differing from those of a dental hygienist or one who does only mammograms. Equally compelling is the idea that there should be some minimum criteria for training that would insure safety and efficacy, regardless of the type of X-ray being taken. Another significant contention is that the X-rays taken in medical doctors' and chiropractors' private offices may involve relatively large and/or vulnerable areas of the body and therefore persons taking X-rays in those settings are most in need of proper training to insure patient safety.

There appears to be no hard data as evidence that improved quality or quantity of training is related to increased safety for the consumer (National Academy of Science, 1988), although this is frequently accepted as self-evident. In the Supplementary Information to the "Standards for Accreditation of Educational Programs for, and the Credentialing of Radiologic Personnel" (Federal Register, December 12, 1985) is a quote from the American Hospital Association's comments stating, "There is no demonstrable link between certification on the one hand, and the quality and safety of patient services on the other." On the other side of the issue is the fact that evidence of harm to consumers from poorly trained X-ray technicians is extremely difficult to gather because the harm from excess radiation may not be evident for years. Likewise the harm from a misdiagnosis or a delayed diagnosis may never be catalogued.

Balanced against the desire for increased quality and safety in the taking of X-rays is the question of ultimate cost to the consumer. The National Academy of Science report "Allied Health Services: Avoiding Crises" (1988) concluded that "the literature shows with some consistency that costs (prices) of health services and products (eyeglasses, dentures) are higher in states with more stringent regulation" (Begun, 1981; Gaumer, 1984). The opposite point of view contends that increased quality of X-ray work will reduce the cost of services because time, personnel and equipment will be used more efficiently.

REGULATION OF X-RAY PRODUCING MACHINERY IN VIRGINIA

The Bureau of Radiological Health within the Virginia Department of Health (VDH) regulates all machinery which produces X-rays, including industrial X-ray machines, analytical X-ray diffraction equipment, linear accelerators, and X-ray machines used in the healing arts. The Bureau employs five (5) Radiation Safety Specialists, three of whom have the responsibility for conducting X-ray inspections and investigating serious violations. Two Radiation Safety Specialists work out of the Central Office. The Bureau has had a registration program for all X-ray machines since 1960. The Radiation Protection Regulations provide for the inspections of all diagnostic machines by Bureau personnel and/or qualified private inspectors. The revised Regulations, effective on July 6, 1988, expanded the X-ray protection program to include certification of all X-ray machines used in the healing arts, including radiation therapy machines and CT scanners. The current Regulations have incorporated the latest version of model regulations developed by the Conference of Radiation Control Program Directors. The Regulations also require that a list of X-ray operators be maintained at each facility.

House Document 24, (Commonwealth of Virginia, 1987) identified several areas of concern in the X-ray protection program. Since the publication of that document, the Department of Health has attempted to more fully address each of the concerns.

1. **Concern:** The Department of Health's procedures and practices do not result in universal registration of X-ray equipment.

Action: Installers of X-ray equipment report each installation to the State. The State then sends a registration form to the facility. By developing a database of X-ray facilities and inspection status, the Bureau of Radiological Health has been able to track unreturned registration forms and inspection reports.

2. **Concern:** Health practitioners do not always understand Department of Health requirements that equipment be registered and operators fully instructed in safe use of the equipment.

Action: House Bill 91 (Commonwealth of Virginia, 1987) required the Health Board to inform registrants of the date for compliance with the inspection schedule. With this information is sent a statement of registration, inspection, and certification requirements. In addition, the Bureau is developing a booklet describing the requirements of the X-ray protection program.

3. **Concern:** The system of "qualified experts" who act as the Health Department's primary mechanism for monitoring X-ray equipment is imperfectly understood and may require

review. The roles and functions of these experts, the standards and procedures for their qualification, and their responsibilities as well as those of equipment manufacturers, assemblers, and registrants need to be clearly delineated and widely disseminated to all affected parties.

Action: House Bill 91 (Commonwealth of Virginia, 1987) required the Department of Health to set criteria for qualification as a private inspector and to publish a list of such inspectors. This list is continually revised and distributed to new registrants and those facilities having equipment overdue for an inspection. HB 91 also required the Department of Health to establish forms for the periodic Radiation Inspection Report. This form delineates what constitutes a minimum survey by the private inspector. These forms have been in use since September, 1988. Copies of the Regulations will be provided to all installers, while the booklet will inform the registrant of his responsibilities.

4. **Concern:** The Department of Health issues no publicly visible evidence (decal, registration permit or certificate, etc.) of compliance with equipment safety standards of safe operation.

Action: House Bill 91 (Commonwealth of Virginia, 1987) required the Board of Health to set standards for certification of X-ray machines and to issue a certificate when the inspection data indicates that the machine meets the Board's standards. A copy of this certificate shall be displayed by the registrant in a conspicuous place in close proximity to the X-ray machine. If the certification is denied, the machine shall not be used for treatment, evaluation, or diagnosis of patients, whether human or animal, until the standards of the Board have been met.

5. **Concern:** The Department of Health's procedures should be strengthened for independent surveys of X-ray equipment conducted by Department staff investigators and for investigation of serious problems identified by "qualified experts".

Action: The Bureau of Radiological Health is now placing emphasis on investigating serious violations. Serious violations are usually detected during routine inspections by private inspectors. Whenever a serious violation is reported, personnel from the Bureau of Radiological Health contact the registrant to explain the regulation being violated and the appropriate corrective measures required. The registrant is given a specific amount of time in which to effect corrective measures and an appointment is made for Bureau personnel to visit the site for verification of the correction. Only after Bureau personnel have visited the site and verified the needed corrective measures is the registrant approved for certification.

OPERATOR QUALIFICATIONS

Two of the major questions under consideration in this study are what constitutes the minimum qualifications needed to be an X-ray operator and how might these qualification be verified. The Task Force encountered many educated opinions on these questions covering a wide spectrum of approaches to competency.

At the second meeting of the Task Force, October 17, 1988, all interested parties were invited to present a statement of the position held by their respective organizations on the issue of regulation of X-ray operators. The following positions were presented:

Board of Dentistry (currently requires satisfactory completion [by a person not otherwise licensed by the Board of Dentistry] of a Board-administered examination; or satisfactory completion of a course and/or examination in radiation safety from an approved institution or organization.) (HD 24, 1987)

Board of Medicine (currently has no regulations; licensed physicians accept responsibility for X-ray technicians or aides under their supervision.) **Recommends** some form of regulation regarding safety, which may be personnel credentialing other than licensure. (HD 24, 1987)

Board of Veterinary Medicine (currently has extensive minimum requirements for facilities, equipment, and safe operation of X-ray equipment. Extensive educational and testing requirements, including clinical training.) Has recently defined the use by a DVM of an uncertified operator to operate X-ray equipment as unprofessional conduct. (HD 24, 1987)

School of Dental Hygiene/Dental Assisting, Old Dominion University (ODU), **Recommends** practical, clinical training and testing in addition to written didactic testing for all who will be taking radiographs. (Ms. Nancy Webb, Associate Professor)

Virginia Society of Radiologic Technologists (VSRT) **Recommends** that the requirement for competence "in the safe use of radiology equipment" in the Radiation Protection Regulations of the Commonwealth be defined and emphasized and that all X-ray personnel, both part time and full time, be included in any credentialing required by the State in order to prevent untrained persons from actually taking X-rays. The VSRT also recommends that any regulation mandated require some form of credentialing in order to take X-rays, not require credentialing in order to provide or preserve titles alone. (Ms. Joanne Greathouse, Ms. Jane Carpenter, Ms. Pat Compton)

Radiation Advisory Board **Recommends** that some form of credentialing/licensure be instituted for medical radiographers and their supervisors. The Board also recommends that

credentialing should include initial and continuing training for radiographers and their supervisors. (Dr. Lee Anthony, Sr.)

The Virginia Hospital Association supports the implementation of increased inspections of X-ray machinery and **recommends** that the results of that increase be determined before more State regulation is attempted. "Evidence seems to suggest that the problem of untrained workers is limited to small medical offices and does not involve hospitals. Representatives for radiologic technologists believe that hospitals are hiring competent, well trained and well educated medication radiation workers. It would seem prudent to design state regulation to fit the problem. It would be inappropriate to impose a professional regulatory process on hospitals where no public harm has been identified and where institutional licensure, certification and Joint Commission on Accreditation of Healthcare Organization requirements adequately address the issue of evaluation of the competency of X-ray department staff." (Ms. Katy Webb)

The Virginia Veterinary Medicine Association **Recommends** no change in the regulations that concern veterinary technicians. (Dr. Steve Lickey)

The Medical Society of Virginia **Recommends** that this issue be tabled until the Medical Society and the Board of Medicine have prepared formal statements. (Dr. Read McGehee)

The Virginia Dental Association **Recommends** no change in the present regulations as they apply to the practice of dentistry. (Mrs. Pat Watkins)

The Virginia Chapter of the American College of Radiology **Supports** appropriate methods to insure competence of X-ray operators, i.e. proper training of personnel. (Dr. Ronald F. Calkins)

The Virginia Chapter of the Health Physics Society **supports** some form of control or competence insurance for all X-ray operators, including X-ray technologists and their supervisors. The amount of training required should be on a sliding scale related to the degree of application needed. State approved course work, standards, and guidelines for determining competence on a continuing basis were also suggested. (Dr. Dean Broga)

The Mid-Atlantic Chapter of the American Association of Physicists in Medicine **Supports** licensure and certification. "Specifically, radiologic technologists should be certified by a national registry after completion of an accredited educational program. In addition, we encourage the State of Virginia to provide licensure for certified technologists [in the various sub-specialty areas] based upon review of educational and certification credentials." (Dr. Thomas Fearon)

OPTIONS CONSIDERED BY THE TASK FORCE

1. Recommend no changes in current level of regulation. This option would require no outlay of State funds, allow additional time for the issues to be studied, and address none of the health and safety concerns presented during the Task Force meetings and previous State studies of this issue carried out over the past 10 years.
2. Recommend mandatory, nonrestrictive registration of operators. Registration means a method of regulation whereby any practitioner of a profession or occupation may be required to submit information concerning the location, nature, and operation of his practice. This option could be implemented using a database similar to the VDH database of X-ray machines and would require funding and at least one additional FTE in the Health Department. Registrants would not be required to demonstrate education or competence; however, X-ray operators found to be in violation of existing regulations might be subject to loss of registration. Enforcement might be accomplished through the Health Department in the same manner as the enforcement of the X-ray machine registration regulation, i.e. the public or private inspectors of machinery would ask to see and note the presence of the registration document at the time of the machinery inspection.
3. Recommend certification of all operators of X-ray equipment in the healing arts. Certification is a form of regulation which recognizes persons who have met certain educational and experience standards to engage in an occupation. Although one may practice the occupation without certification, only those who are certified may use the occupational title. Each discipline using X-ray personnel would be required to develop educational and experience standards based on the individual needs of and situations encountered in that discipline.
4. Recommend that the Board of Medicine be required to set a standard of X-ray competence as the Boards of Dentistry and Veterinary Medicine have done. Currently, practitioners of Dentistry and Veterinary Medicine are forbidden by existing Regulations of their respective Boards to allow anyone to place X-ray film or operate X-ray equipment unless that person meets certain well defined criteria of education, certification, or examination. The Code of Virginia (1950), as amended, Title 54, Chapter 12, gives the Board of Medicine authority to specify in Regulations the same standards of competence. No change in the Code would be necessary. The responsibility for implementing the new regulations would fall to the Department of Health Professions (DHP). Enforcement could be shared by the DHP and the VDH with the DHP receiving and investigating any consumer complaints and the VDH public or private inspectors

of machinery asking to see and noting the presence of the documentation of compliance with the standard at the time of machinery inspections. State funding would be necessary for additional personnel to implement this option.

5. Recommend licensing of operators based on either examination by the American Registry of Radiologic Technologists (ARRT) in agreement with the Commonwealth or certification by the Board of Dentistry (for dental hygienists and dental assistants) or by the Board of Veterinary Medicine (for veterinary technicians). Limited licenses would be granted based on special examinations administered by ARRT for operators whose use of ionizing radiation is limited to a few specific body sites. The Commonwealth would have to determine the passing score for the examinations and ARRT certification would not necessarily accompany licensure. The DHP would be responsible for the development of the standards and maintenance of the database. Enforcement could be accomplished by the joint efforts of the DHP and the VDH as outlined in 3. above.

The ARRT has had a program designed to implement this option since March 1986. The examination for the practice limited in scope to X-rays of the chest and/or the extremities has been developed and is administered by the ARRT solely for the purposes of assisting State licensing agencies. No certification is awarded from the ARRT based on this examination. The philosophy upon which the examination is based is that those persons having a scope of practice that is limited to radiography of the chest and/or extremities must be as knowledgeable in those particular areas as is the technologist whose scope of practice reflects that of the general staff radiographer at entry level (as defined by the ARRT Job Analysis Project). The depth of understanding required for the performance of a task has not been limited, but rather the breadth of content coverage has been limited according to the particular tasks performed.

It is the State's responsibility to determine that the examination is appropriate for the scope of practice being licensed. The State must handle the candidates' applications for licensing and examination, the fees paid by each candidate, and the dispersal of results to candidates. The candidates will pay fees to the State; the State will pay ARRT \$25 for each "limited scope candidate". Fees paid by the State are for services; the ARRT maintains ownership and all rights to the examinations. No modifications may be made in the examination by the State. Each State sets its own passing score for licensing based on its own concerns.

This option will also require additional funding for personnel and a panel to administer the program.

6. Recommend licensing of operators based on training at an accredited institution and satisfactory examination by a new Board of Radiologic Technology using U.S. Public Health

Service model Standards as published in the December 11, 1985, Federal Register. Under this option the State may elect to develop its own examination or to enter into an agreement with ARRT to provide the examination for those operators not already covered by the examinations given by the Boards of Dentistry and Veterinary Medicine. The State would have to establish the licensing Board and fund the personnel for the administration of the program. States currently using some variation of this option report recovering from 100% to 38% of the costs through fees charged. Again, the DHP would be responsible for the development of the standard and the maintenance of the database. The DHP would participate in enforcement by receiving and investigating consumer complaints, while the VDH public or private inspectors of X-ray machines would ask to see and note the licenses of all operators at each facility.

7. Recommend renewable licensing of operators and their supervisors (dentists, medical doctors and veterinarians) based on initial and continuing education and satisfactory examination by a new Board of Radiologic Technology using U.S. Public Health Service model Standards as published in the December 11, 1985, Federal Register. Under this option the State may elect to develop its own examination or to enter into an agreement with ARRT to provide the examination for those operators not already covered by the examinations given by the Boards of Dentistry and Veterinary Medicine. The State would have to establish the licensing Board and fund the personnel for the administration of the program. This option would affect many more people because it requires licensing of both operators of X-ray equipment and their supervisors (dentists, medical doctors and veterinarians). This option also requires a standard of continuing education for license renewal. States currently using some variation of this option report recovering from 100% to 38% of the costs through fees charged. The DHP would be responsible for the development of the standard and the maintenance of the database. Enforcement would again be the joint responsibility of the DHP and the VDH, as outlined above.

CONCLUSIONS AND RECOMMENDATIONS

The findings of the Task Force led to the conclusion that the improved inspection procedures proposed in HD 24 have been implemented and the anticipated progress in machinery safety is being seen. It was also determined that each discipline employing X-ray personnel should develop its own methods of insuring the protection of the public based on the individual needs of and situations encountered in that discipline. At the time of the Task Force, some disciplines were better prepared to determine adequacy of public protection than others; however, every discipline should strive toward continual improvement. Specifically, the Boards of Veterinary Medicine and Dentistry are to be commended for their progress in defining and upholding standards of safety and accountability. The Board of Medicine is encouraged to give greater attention to this issue as their licensees use X-rays on larger and more vulnerable areas of the body and therefore, have a greater potential for harm to the public.

The Task Force concluded that there were some related issues that had yet to be adequately addressed. These include methods of monitoring public safety relevant to X-ray use, data on harm to the public when X-ray personnel are not regulated, and data on cost to the consumer when X-ray personnel are regulated. It is unclear whether these issues have been addressed by any state at this time.

Based on these conclusions, the Task Force reached consensus on these recommendations:

1. Each discipline employing personnel to operate X-ray machinery should complete a study of their own rules and regulations to determine adequacy in protecting the public from harm. This information should be reported no later than December 1989 for review by the 1990 General Assembly.
2. The Board of Medicine should complete an evaluation and recommendations of methods for public protection to be practiced by the physicians and by the allied health personnel under their supervision. These methods might be added to the rules and regulations of the Board of Medicine. This information should be reported no later than December 1989 for review by the 1990 General Assembly. The Task Force strongly favored certification over either registration or licensure.
3. The Council on Health Professions should examine the methods by which safety is monitored, accumulate data on the harm to the public when no regulation takes place, and accumulate data on costs to the consumer when regulation takes place. This information should be reported no later than December 1989 for review by the 1990 General Assembly.

The Task Force recognizes that competence in X-ray personnel and their supervisors is multifaceted, including clinical aspects such as judgement regarding the appropriate views to take for a given clinical problem, the proper positioning of the patient, and the appropriate uses of X-ray examinations, as well as technical and safety aspects such as the proper processing of X-ray film, the proper operation of X-ray equipment, X-ray safety/dosage/biologic effects and X-ray protection/shielding. Inasmuch as the individual Boards will be reviewing their own regulations with the assistance of the Council on Health Professions, the Council should feel free to seek advice from the Board of Health and/or the Governor's Radiation Advisory Board, which have expertise in radiation safety and X-ray equipment, as well as selected other aspects mentioned above.

REFERENCES

- Begun, J.W. (1981) Professionalism and the Public Interest: Price and Quality in Optometry. MIT Press, Cambridge, Mass.
- Code of Virginia. (1950), as amended, Title 32.1, The Radiation Control Act, Commonwealth of Virginia.
- Code of Virginia. (1950), as amended, Title 54, Commonwealth of Virginia.
- Federal Register. (December 12, 1985) Code of Federal Regulations Subchapter F, Title 42, Part 75, "Standards for the Accreditation of Education Programs for, and the Credentialing of Radiologic Personnel."
- Gaumer, G.L. (1984) Regulating Health Professionals: A Review of the Empirical Literature. Milbank Memorial Fund Quarterly/Health and Society, Vol. 62, No. 3:380-416.
- Glasstone, Samuel (1967) Sourcebook on Atomic Energy, Van Nostrand Reinhold, New York, p. 734.
- House Bill 91. (1987) Commonwealth of Virginia.
- House Document 24: "The Need for the Regulation of X-ray Technicians." (1987), Commonwealth of Virginia.
- House Joint Resolution 12. (1986), Commonwealth of Virginia.
- House Joint Resolution 82. (1988), Commonwealth of Virginia.
- National Academy of Science. (1988) Allied Health Services: Avoiding Crises, Division of Health Care Services, Institute of Medicine, National Academy Press.
- Radiation Protection Regulations. (1988), Commonwealth of Virginia.

