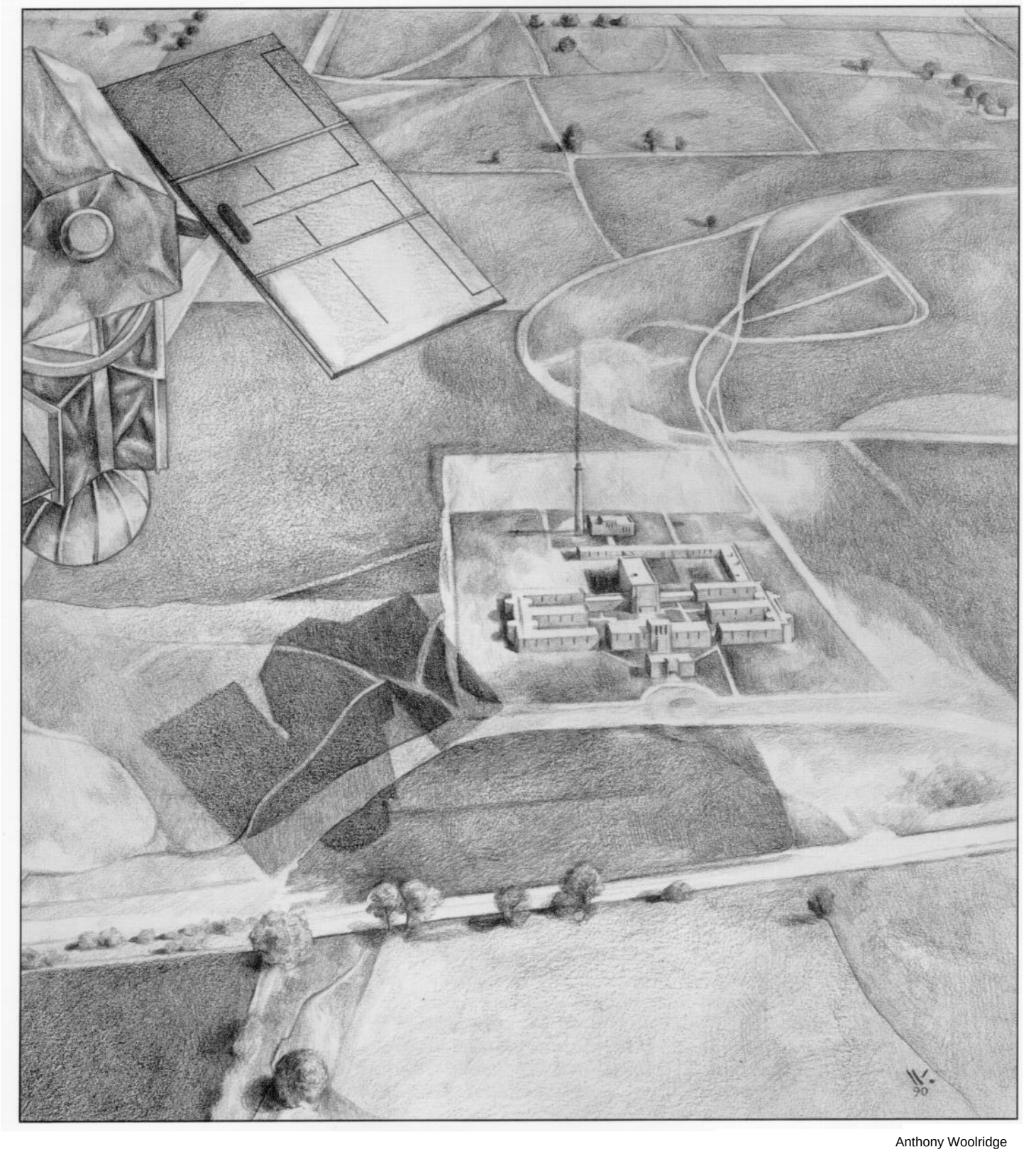


Anthony Woolridge

High Tech in Corrections

Arthur S. Lucero

Imagine a correctional facility where inmates are identified by voice analysis as they pass from one area to another. By the end of the day, the inmates' entire itineraries have been logged by a computer. In addition, they have been scanned for drug use and changes in stress levels 10 to 20 times during the day.

Imagine a facility with electromagnetic scanners that detect any contraband on or in the human body in a matter of seconds. Or an air sampling system integrated into the ventilation system that can detect the presence of narcotics or explosives in any part of a facility. How about a perimeter security system so sophisticated it can distinguish and automatically record the difference between a sedan and a station wagon?

Imagine robots that can control the strongest, most aggressive inmate, using no more than exactly the amount of force necessary to subdue the inmate. How about an electronic monitoring system that can pinpoint an individual's location within inches?

Although these systems are not currently in operation, a 2-year project involving the National Institute of Corrections (NIC) and the National Aeronautics and Space Administration (NASA) could help make these and other technologies available in the near future. In May 1989, NIC launched a project to study aerospace technology that could have a significant impact on corrections.

Identifying key concerns

The first phase of the NIC/NASA project is to identify and prioritize correctional problems that might be addressed through the use of aerospace technology. The second phase is to review NASA's present technology data base and the process for transferring that technology to other governmental or private entities. The third phase entails selection of the technologies to be developed and the tailoring and actual transfer of those technologies to corrections. The targeted technologies will be selected by NIC and NASA, with input from correctional practitioners throughout the country.

In early 1989, a request for suggestions regarding correctional problems that might be solved by aerospace technology was sent to all 50 State departments of corrections, the District of Columbia, the Federal Bureau of Prisons, and a number of probation departments. Comments from sheriffs were solicited through the NIC Jail Center. The hundreds of suggestions received yielded about 50 topics arranged in seven areas. Not surprisingly, the greatest number of responses was in the area of security—automated perimeter surveillance, contraband detection, electronic monitoring, alternative weapons, locking systems, personal security alerts, and robotics.

Responses in the area classified "behavioral" were next in frequency. These included the impact of long-term confinement, stress and stress reduction, the aging process, education, and recreation. The "materials" area included concerns regarding glazing materials, acoustical wall and floor coverings, construction materials, and materials for bedding and clothing that do not give off toxic fumes when burned.

"Environmental" concerns included air and temperature controls and fire security. "Information and communications" included identification of inmates, evaluation of programs, systems management, image processing, information processing, artificial intelligence, work schedules, and accountability. "Medical" concerns included reducing costs, communicable diseases, and physical fitness programs for confined environments. Also mentioned were staff training, inmate work and employment, and food preparation and serving.

The second phase—reviewing NASA projects with potential corrections applications—involved screening thousands of technical briefs, computerized literature searches, and numerous meetings with engineers and scientists at NASA Research Centers across the country. On September 13-14, 1989, top NASA and Jet Propulsion Laboratory (JPL) engineers and scientists met with California prison wardens and parole administrators at the JPL in Pasadena. They discussed such high-tech developments as magnetic resonance imaging for contraband detection, computer-based automation of prisons, neural network computers and voice recognition, the reversal electron attachment detector for explosives detection, and systems analysis methodologies.

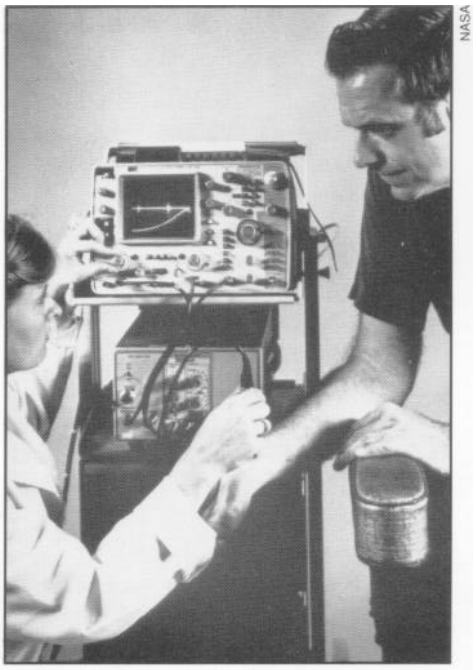
In an expanded meeting on April 14-15, 1990, NASA scientists and corrections and law enforcement officials from around the Nation met at Goddard Space Flight Center outside Washington, D.C., to explore technological spinoffs from the space program and their possible applications to corrections, law enforcement, and the war on drugs. Those in attendance included State and local

corrections officials from California, Delaware, Maryland, New Jersey, New York, Virginia, the District of Columbia, Chicago, and Arlington, Virginia, as well as representatives from national corrections associations, the Federal Bureau of Prisons, the FBI, the National Institute of Justice, The Office of National Drug Control Policy, and the U.S. Navy. Scientists from various NASA research centers—Goddard Space Flight Center, Johnson Space Center, the Jet Propulsion Laboratory, Langley Research Center—made presentations to the group on a variety of topics.

NASA has been involved in the transfer of its technology to other fields for more than 25 years. Because its charter does not allow it to directly develop commercial products, it must match up a potential user (such as the Veterans Administration or a small machine shop owner) with an appropriate technology and a vendor who will modify that technology into a form that can be used commercially. The process can be expensive: development costs are usually shared between the user and the vendor. The payoffs? The user has a problem solved, the vendor retains licensing rights, and NASA fulfills its mandated task of transferring technology to fields outside of aerospace.

Technologies with corrections potential

Many of the NASA technologies show great potential, but the area presently attracting the greatest attention is Magnetic Resonance Imaging (MRI) for use in contraband detection. MRI—familiar to many as a result of its medical uses—could be used for nonintrusive body searches to detect any contraband on or in the body. Initial indications are that this technology can be modified significantly, reducing the cost to a reasonable level and the time required for a scan to a few seconds. This method for nonintrusive body searches could hold great significance not only for corrections, but for other applications such as U.S. Customs and airport security.



Above: A technician uses ultrasound on a burn victim. The same technology could be used to detect hypodermic injection sites. Top right: The Bio-Home at NASA's Stennis Space Center, where researchers are exploring the capabilities of plants to absorb gases and reduce pollution in closed environments. Bottom right: An M200 Microsensor Gas Analyzer, developed by Microsensor Technology Inc. The technology has great potential for detecting contraband.

NASA technology in the area of eye measurements of the pupil and retina, used to detect biological and psychological changes in astronauts, could be applied to several problem areas in a correctional institution. Rapid eye scans could simultaneously record involuntary pupillary movements to detect drug use and changes in stress levels, while a scan of the pattern of blood vessels in the retina could provide additional medical information and a method for positive identification of individuals (the retinal pattern is as unique as a fingerprint). This information could be integrated into systems for access control, timekeeping, and tracking movements within a facility.

A similar system, based on voice analysis and identification, could also be developed to quickly detect drug use and positively identify an individual. These types of nonintrusive systems would be especially effective in corrections, because baseline measurements of individuals could be established against which subsequent measurements could be taken.

Some other possibilities:

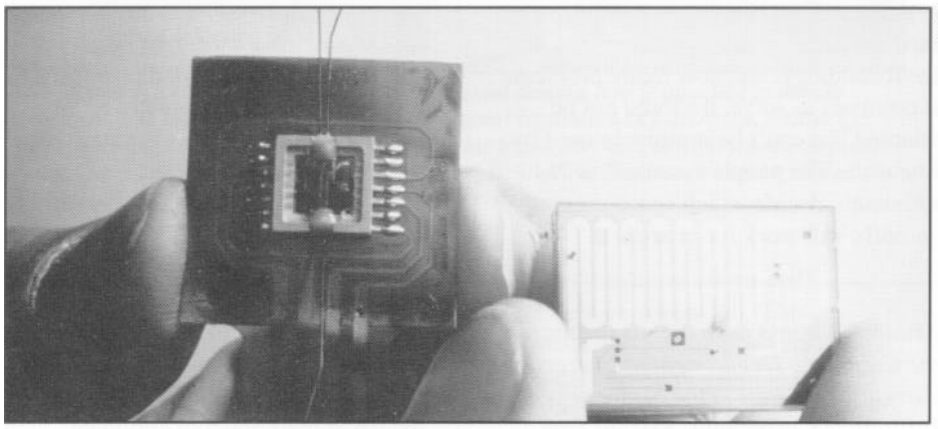
- Technologies are being developed that will detect explosives and contraband based on air sample analyses that are a hundred times more sensitive than those used today.
- Detecting hypodermic injection sites using ultrasound could help identify contraband drug use.
- Insulated food trays made of very strong, ultralight plastic that last for years, yet could not readily be made into weapons, could be developed relatively quickly.

n Satellites can presently analyze the ground below a selected prison site or analyze cooling and heating problems in a facility using infrared photographs.

Frontiers in computing

New "supercomputers" that are faster and have greatly increased memory capacity, enabling them to process incredible amounts of data, have led to the use of artificial intelligence and pattern recognition in such areas as "expert systems" that can teach individuals to pilot a space shuttle, learn high school physics, or learn to read and write. The same technology used for training and planning for worldwide military operations and for protecting nuclear facilities could easily be adapted in prisons for computer simulation of riots or natural disasters.

Pattern recognition could be used in the classification of inmates and program planning for probationers and parolees, with the added benefit that the system could provide continuous feedback on the ability of the program to predict behavior. A literacy tutor program presently being developed at the Johnson Space Center in Houston, Texas, uses artificial intelligence and pattern recognition to incorporate a voice simulator and voice identification program that speaks in sentences and can recognize and correct entire spoken sentences. The student does not need to touch the computer. A word or phrase is displayed on a screen; the student is given verbal instructions and then responds verbally. The computer evaluates the student's response and provides immediate feedback. In addition to teaching reading, the literacy program can also evaluate the reading level of a student, thus relieving the instructor of a time-consuming and difficult process.



Advances in computerization will be able to give administrators real-time information on a scale beyond the capacities of today's management information systems—on inventories, staffing, staff locations, training, inmate counts, classification, and budget (as well as instant projections in all of these areas).

The next steps

Obviously, a major concern in selecting which technologies are to be developed will be to identify those that will have the most significant impact on corrections. Other considerations include the cost of development, the length of time needed

for development, and political and legal implications. As this issue of the *Federal Prisons Journal* goes to press, a meeting of corrections officials from across the country with a knowledge of and interest in the application of technology in corrections will convene to help NIC and NASA select and prioritize the technologies that will be targeted for development. The actual development of the selected technologies will begin soon thereafter.

Corrections has traditionally been a "bricks and mortar," people-intensive profession. While prisons and spaceships wouldn't seem to have much in common, both are systems that must be as self-contained as possible. Many of these technologies seem exotic, but others are simply extensions of well-established correctional practices. While the promise is great, experience shows that no matter how exotic, expensive, and sophisticated the technology, and how many problems it promises to solve, it should not be adopted if it can't be intuitively used by line staff. The people "on the line" will ultimately decide which space program spinoffs will work for prisons. **n**

Arthur S. Lucero is an administrator for the California Department of Corrections currently on detail to the National Institute of Corrections, Prisons Division. After a nationwide search, he was selected to develop and direct the NIC/NASA project based on his 11 years of experience in engineering, and 16 years in corrections.

Video imaging at FCI Lexington

Thomas J. Gora
and W. Travis Lawson

Manpower shortages and limited access to centralized medical referral facilities are issues that must be addressed daily in the Bureau of Prisons. Given the tremendous growth anticipated within the next 5 years, creative ways must be found to address these increasing demands—including high technology.

Video imaging, sometimes referred to as telemetry, is the ability to transmit a live, still picture over regular telephone lines in as little as 7 seconds. These pictures are received on a television screen in the office or hospital of selected medical specialists. By use of a built-in microprocessor, the image is recorded on a floppy disk so that it can be stored and reviewed in the future. Operation of this device is comparable to, and as simple as, the use of a fax machine.

The most prominent use of video imaging in today's medical community is in teleradiology—the transmission of an X-ray from one location to another. Many radiologists have this device in their home to eliminate afterhours trips to the hospital.

Ophthalmology is something of a problem area for corrections. While it typically requires only specialized intervention by a few practitioners, if an ophthalmologist is not readily available within a geographic area, a great deal of coordination and expenditure of resources is required to achieve proper coverage.

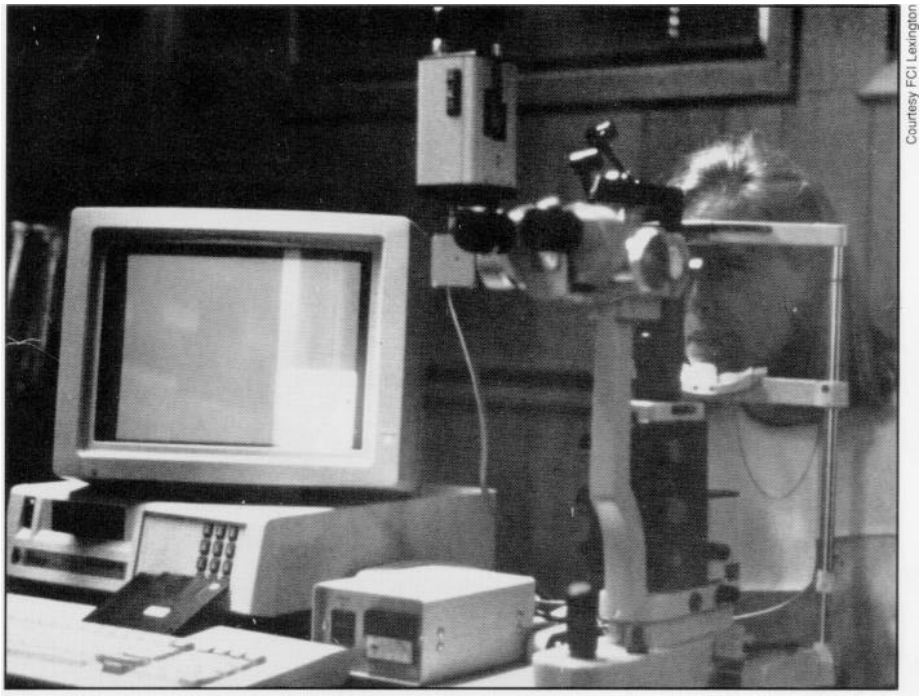
Due to the efforts of a consultant ophthalmologist in the Lexington, Kentucky, area, the Federal Correctional Institution at Lexington has participated in a pilot study of teleophthalmology. Video imaging allows an institution to transmit a live picture of an inmate's eye directly to an ophthalmologist's office. This provides for immediate consultation in what could be a sight-threatening emergency. An added advantage for the correctional setting is that the inmate doesn't leave the institution.

The unit was pilot-tested at FCI Lexington during spring 1989. In the laboratory, a standard personal computer was outfitted with a high-resolution imaging board and monitor. The Zeiss Corporation furnished a slit-lamp containing a beam splitter, to which was attached a digital camera. The computer was able to transmit images via modem over telephone lines in less than 2 minutes. West Coast Data Corporation, a major distributor of teleradiology equipment, adapted a black-and-white unit to color, adding the capability of interactive voice communication when the unit was not sending images. An arrow cursor appeared on both screens simultaneously to aid identification.

Over the 2-week test period, 18 inmates were evaluated by teleophthalmology. Initially, the patients were examined by the consulting optometrist at FCI Lexington. A text overlay containing history, refraction, visual acuity, and intraocular pressure was transferred with a color image of the pathologic lesion in question. Examination data were sent to the

centralized office in batch files to be reviewed by the consultant ophthalmologist. When further information was needed, the patient was returned to the slit-lamp; communication was established via telephone through the computer system. This allowed the consultant to instruct the sender in repositioning the specimen, magnification, focus alignment, and so on, then to transmit the images. Cursor arrows could be exchanged between screens to facilitate the process.

The clinical information was then interpreted; an independent ophthalmologist rendered a second opinion for quality assurance. Using statistical measures, it was evident that a significant correlation was achieved between the diagnoses. In addition, two images that were not felt to be adequate for diagnosis by the first examiner were randomly placed in the presentation sequence and received the same interpretation by the second examiner.



The patient is looking into a "slit lamp." A special camera lens is attached to the slit lamp, which is located at the Federal Correctional Institution in Lexington, Kentucky. The eye's image is then transmitted over regular telephone lines to a personal computer (such as the one shown here) at an opthalmologist's office. The image may be viewed immediately or stored on a floppy disk for future review.

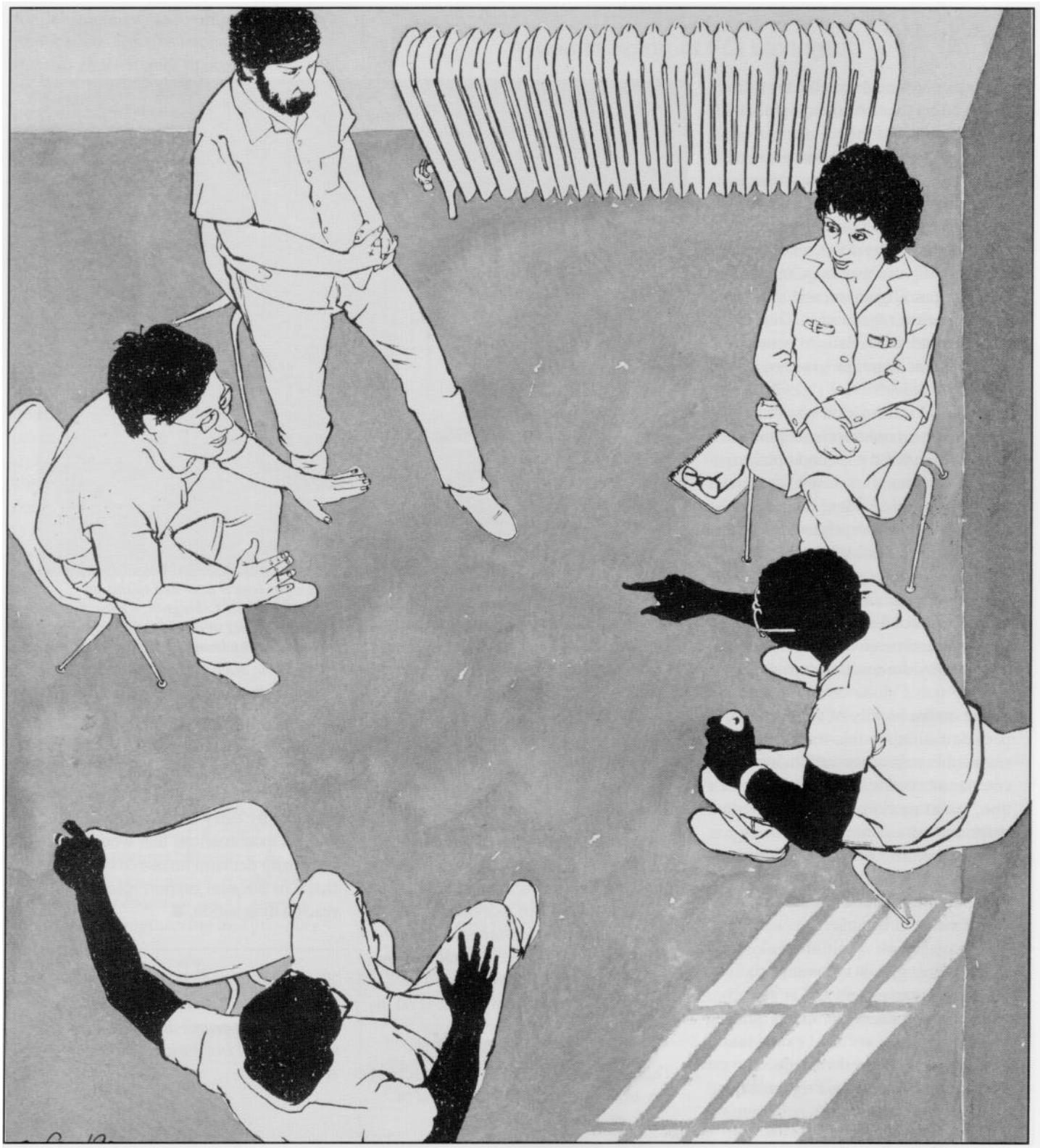
Based on the brevity of the pilot test period, it is impossible to provide a reasonable cost analysis. Obviously, all costs associated with town trip preparation, escort services, housing, potential overtime costs, examination fees, potential return visit costs, security issues and chaperon assignments, and transportation will be eliminated by the use of video imaging.

Ophthalmology is a unique specialty for computer imaging, since it is visually intensive. But the use of video imaging is possible in any medical examination that can be performed visually. The possibilities are numerous. Problems that can be solved in ophthalmology can be readily applied to radiology, pathology, dermatology, and other disciplines requiring imaging.

Several institutions are experiencing significant problems in securing the services of a contract radiologist, or are paying high fees for individual film interpretations. The Bureau of Prisons might be able to locate one radiologist (or perhaps a group) who would be willing to interpret films for several institutions by use of teleradiology.

This fascinating "cutting edge" technology offers hope for the extension of services into areas where staff shortages are sorely felt. This approach will not supplant traditional services, but offers a tool that might expediently carry out benign, routine, clinical examinations that would ordinarily demand intensive correctional or hospital support resources to reach a disposition. ■

Thomas J. Gora is Hospital Administrator and W. Travis Lawson is Chief of Health Programs at the Federal Correctional Institution, Lexington, Kentucky.



Illustrations by Sherrell Medbery

Beyond "Nothing Works"

History and current initiatives in BOP drug treatment

Susan Wallace, Bernadette Pelissier, Daniel McCarthy, and Donald Murray

The number and proportion of Federal inmates convicted of drug-related offenses continues to increase steadily. In the past 2 years alone, this segment of the Bureau of Prisons' (BOP) inmate population has grown from 42.3 percent in 1998 to 49.8 percent this year. As this group of inmates grows larger, so does the number of inmates with drug abuse problems. In response to the rising number of drug-abusing offenders in its custody. the BOP is establishing residential drug treatment programs and mechanisms for evaluating them.

Programs and policies aimed at "rehabilitating" inmates have generally paralleled society's changing views toward the purpose of prisons. During the past few decades, there has been a shift from enthusiastic support to strenuous opposition with regard to rehabilitation as a goal of corrections. Now, however, armed with the knowledge gained from the various rehabilitation and treatment programs that operated during these recent decades, the Bureau of Prisons finds itself in a more moderate and informed climate for exploring and testing intervention strategies.

There is considerable controversy over the precise manner in which substance abuse may or may not directly result in criminal behavior, but research has indicated that a link does exist—and that reductions in criminal activity have followed both prison-based and non-prison-based drug treatment programs. Effective intervention approaches have included residential treatment programs, therapeutic communities, self-help groups, family therapy, contingency counseling, role playing and modeling, vocational and social skills training, interpersonal cognitive problem-solving training, and peer-oriented behavioral programs.

There is considerable controversy over the precise manner in which substance abuse may or may not directly result in criminal behavior, but research has indicated that a link does exist.

While the BOP has made drug treatment programs available to its population in the past, recent emphasis had been on drug education and limited group therapy. The BOP's current response, however, is to expand programs for substance-abusing offenders and provide treatment through residential treatment units, followed by prerelease community-based residential programs and an extended period of aftercare services.

Previous Federal drug treatment efforts

Prior to the enactment of the Narcotic Addict Rehabilitation Act (NARA) of 1966, selected Federal inmates with narcotic abuse histories received assistance and supervision in one of two U.S. Public Health Service hospitals located in Lexington, Kentucky, and Fort Worth, Texas. NARA, however, mandated in-prison drug treatment for addicts who were convicted of violating Federal laws. The first such drug treatment unit was opened in March 1968, at the Federal Correctional Institution (FCI) in Danbury, Connecticut. Additional NARA units opened during 1969 and 1970 at institutions in Terminal Island, California; Alderson, West Virginia; Milan, Michigan; and La Tuna, Texas.

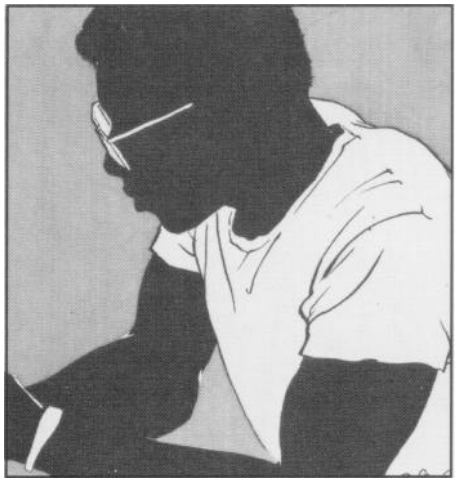
These drug treatment units were based on the therapeutic community model (a 24-hour learning environment using both peers and staff as role models), with an emphasis on group therapy. All NARA participants were required to participate in post-release aftercare, which usually consisted of frequent urinalyses and community-based counseling programs.

Several evaluations were conducted on the effectiveness of the NARA drug treatment programs in decreasing criminal behavior and drug use among releasees. Studies conducted in the early 1970's by universities, private research organizations, and the Bureau of Prisons'

Office of Research and Evaluation indicated that some groups of NARA participants used illegal drugs less frequently and had lower recidivism rates after release than groups of comparison subjects. Long-term evaluations of the NARA treatment programs, published as recently as 1988, have concluded that the programs "…worked reasonably well, or as well as any other type of intervention has worked for the narcotic addict."[1]

This success indicated that a larger population of inmates could benefit from such drug treatment programs. Beginning in July 1971, drug treatment units were opened to serve inmates with a demonstrated need for such programming who were not sentenced under NARA. By 1972, all of these programs were authorized to provide aftercare services for program participants. By 1978, there were 33 drug treatment units in Federal institutions. The *Drug Abuse Incare Manual*, released by the BOP in July 1979, called for the establishment of unit-based drug treatment programs in all institutions and specified minimum operational standards for BOP drug programs.

While the publication of the *Incare Manual* led to an improvement in the BOP's drug treatment programs for several years, the quality of these programs began to decline in the early 1980's due to changes in the social and political climate regarding drug treatment and other "rehabilitative" programs. Correspondingly, drug treatment evaluation efforts during this period were less intensive than during the early and middle 1970's. Evaluation techniques were not built into the design of these later programs, and researchers had difficulty in retrospectively reconstructing the data required for evaluation purposes. Thus, the possibility for a thorough evaluation of these programs was severely restricted.



Recent monthly participation rates show that nearly 3,800 inmates, or 7 percent of the total Federal inmate population, are currently enrolled in a substance abuse or drug education program.

By 1987, only three unit-based drug treatment programs remained, and most of the BOP's substance abuse programs were "low intensity," with an emphasis on drug education. Presently, program techniques are varied. Approximately one-third of the institutions have self-help groups, such as Alcoholics Anonymous (AA) and Narcotics Anonymous (NA). Other available programs include group psychotherapy and training in communication skills, personal development, values clarification, stress management, positive thinking, and assertiveness. Some programs also offer individualized counseling, vocational planning, and prerelease planning.

Many group programs are of a specific length, running from 6 to 12 weeks. However, some institutions such as FCI Tallahassee and FCI Fort Worth offer multistage programming, allowing inmate participation over a longer period of time. With the greater influx of Hispanic inmates, a few initiatives have been taken to provide programs for inmates who are not fluent in English. FCI Fort Worth and FCI Seagoville provide both a 12-week program led by Spanish-speaking staff and consultants and an AA group led by Hispanic volunteers.

In the Bureau of Prisons, inmates generally enroll in drug treatment programs at the beginning of their incarceration. Although program enrollment is voluntary, priority is given to inmates who have court orders to receive treatment as well as inmates with severe substance abuse problems. Recent monthly participation rates show that nearly 3,800 inmates, or 7 percent of the total inmate population, are currently enrolled in a substance abuse or drug education program.

Drug treatment program initiatives

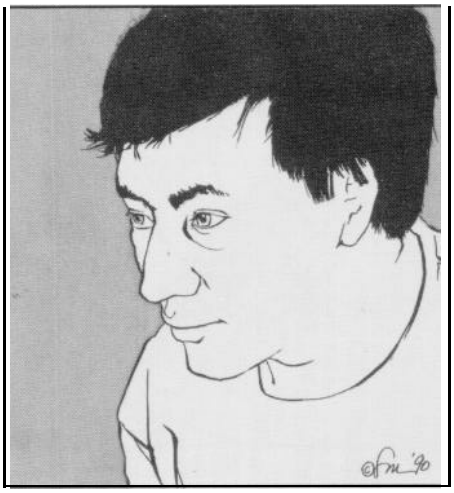
In 1988, a National Drug Abuse Program Coordinator position was established to oversee the development and implementation of the new drug treatment strategies for Federal inmates. In addition to continuing the current low-intensity treatment programs, plans are underway for revising education programs and for developing new unit-based intensive treatment programs.

The multidimensional approach to serving the growing population of drug-abusing inmates includes five types of programs.

Drug education programs
Drug education will be the only administratively mandated program for inmates who have a substance abuse history. Participants will include:

- All inmates for whom there is evidence in the Pre-Sentence Report (PSR) that alcohol or other drug use contributed to the commission of the offense.
- Individuals whose alcohol or other drug use was one reason for a violation of parole or probation supervision for which the subject is now incarcerated.
- Inmates for whom there is a court recommendation for drug programming.

The program will also be available to volunteers; however, priority will be given to inmates with alcohol and other drug abuse histories.



Comprehensive DAP's will be located nationwide. However, specific admission procedures for some of the comprehensive DAP's will be established, enabling comparisons with the effectiveness of the pilot programs.

Drug abuse counseling services
Centralized counseling services will be available to volunteers at all institutions at any time throughout their incarceration. These services will include self-help groups such as AA and NA, group therapy sessions, stress management and personal development training, and vocational and prerelease planning. Some programs will have specific lengths and completion criteria, while others will allow inmates to participate in ongoing therapy. A psychologist or drug abuse treatment specialist will coordinate all activities, and be involved in direct service delivery. These services will be analogous to the "low-intensity" group and individual services currently available at most facilities, but will be enhanced by additional staff and resources.

Residential drug abuse treatment programs (DAP's)
There will be two types of residential programs—pilot programs and *comprehensive* programs. The pilot DAP's will be located at three institutions within the BOP's Southeast and Mid-Atlantic regions: FCI Butner, FCI Tallahassee, and FCI Lexington. The programs at FCI Butner and FCI Tallahassee will serve male inmates and the program at FCI Lexington will serve female inmates.

Comprehensive DAP's will be located nationwide. However, specific admission procedures for some of the comprehensive DAP's will be established, enabling comparisons with the effectiveness of the pilot programs. These comprehensive programs will be known as the *comparison comprehensive* programs.

Both the pilot and comprehensive programs will accept volunteers only. The major features of the comprehensive residential programs include:

- Unit-based programs.
- Treatment staff-to-inmate ratio of 1:24.
- Program duration of 9 months or 500 treatment hours.
- Prerequisite of 40 hours drug education.
- Approximately 3 hours of programming per day.
- Up to 40 hours of comprehensive assessment.

■ 280 hours of group/individual counseling.

■ 100 hours of wellness lifestyle training.

■ 40 hours of transitional living issues.

■ Full unit team reviews every 90 days.

■ Treatment reviews every 30 days.

■ Increased urinalysis surveillance.

■ Individualized treatment plans based on assessment.

■ Preference to inmates who are within 18-24 months of release.

■ A comprehensive transitional services component.

The pilot research DAP's are very similar to the comprehensive DAP's, with the following exceptions:

■ Treatment staff-to-inmate ratio of 1: 12.

■ Program length of 12 months.

■ 1,000 hours of treatment.

Transitional services

Transitional services will be provided after release from the prison environment and will consist of two phases. The first phase, prerelease services, will consist of 6 months in a community treatment center (CTC), with specialized drug treatment programming either contracted out or provided directly by BOP staff. The second phase, aftercare services, will consist of 6 months during which community treatment services are coordinated in conjunction with the Probation Division of the Administrative Office of the U.S. Courts. Additional refinements in the transitional services programs will be forthcoming.

This effort takes on a special urgency as drug offenders and substance abusers swell prisons and jails across the Nation.

Program evaluation

The evaluation project involves a longitudinal, multidimensional assessment of the following groups: pilot DAP participants, comprehensive DAP participants, drug counseling program participants, drug education program participants, and several comparison groups. The research plan incorporates three basic elements:

■ The "process" evaluation will document the various components of actual service delivery to determine if the program is being implemented according to established standards, and to assess its workability.

■ "Outcome" evaluation will address questions about program effectiveness: to what extent did program participation result in prosocial behavior such as decreased criminal behavior and drug use after release?

■ Cost-benefit analyses will address questions about the relationship between resources expended and outcomes achieved for various programs.

Research has demonstrated a link between participation in drug treatment programs and reduced recidivism and drug use among participants. This link, combined with the valuable knowledge gained from the success of past drug treatment programs within the Federal Bureau of Prisons, makes a compelling argument for the Bureau's renewed effort to determine what drug treatment programs it can offer to facilitate change among the inmate population. This effort takes on a special urgency as drug offenders and substance abusers swell prisons and jails across the Nation. ■

Susan Wallace and Daniel McCarthy are analysts in the Office of Research and Evaluation, Federal Bureau of Prisons. Dr. Bernadette Pelissier is Chief of Research at the Federal Correctional Institution in Butner, North Carolina. Dr. Donald Murray is the National Coordinator for Drug Abuse Programs for the Federal Bureau of Prisons.

Notes

[1]Anglin, M. Douglas (1988), "The Efficacy of Civil Commitment in Treating Narcotic Addiction." In: Carl G. Leukefeld and Frank M. Tims (Eds.), *Compulsory Treatment of Drug Abuse: Research and Clinical Practice.* (Washington, D.C.: Department of Health and Human Services, NIDA, p. 26.)