scorch hypothesis lies in postulating the source of the heat which would have had to have acted uniformly on both sides of the body to account for the fact that the front and back images seem to be equally intense. Jumper wrote that radiation occurring in a "very short molecular 'burst' " of "around 3 sec" could be the mechanism of image formation. Rogers talks of "flash photolysis," a short, intense burst of light. But neither has any plausible notion of what the source of the radiant energy might have been.

Plans for Turin Experiments

Given the hubris of contemporary science, it is not surprising that the Shroud researchers are confident that, given time enough, they can explain how the image of the Man of the Shroud came to be. In anticipation of permission to conduct some experiments, they are already preparing for Turin. A giant frame with soft magnets is being built at an estimated cost of $20,000 to hold the Shroud. Equipment is being assembled, much of it on loan. Thought is being given to every detail, right down to the problem of electrical outlets and current. Because a number of scientists would be conducting experiments either simultaneously or in close succession, the "choreography" of the tests must be worked out.

In addition to x-ray examination, they would like to study the Shroud with infrared radiation and expose it to extensive high-resolution photographic coverage, using a variety of films and filters and techniques to get pictures ideally suited to computer analysis. Rogers would like to be able to take what he calls "surface transfer samples" of some areas of the image, using pure hydrocarbon tape that contains no reactive moieties, for subsequent chemical identification of the image composition.

And a man named Walter McCrone of McCrone Associates, Inc., in Chicago, hopes to approach the Shroud as an expert in small particle identification. McCrone is one of the few scientists to become involved in the Shroud study independently of the John Jackson connection. It was McCrone who, a few years ago, proved that Yale University's "Vinland Map"—supposedly a map of the new world that predated Columbus—was a fraud by showing that one of its pigments contained a synthetic chemical first made in the 1920's. After that, British sindonologists asked him if he'd be interested in the Shroud.

McCrone wants to "vacuum" the Shroud with a "microvacuum cleaner" that would pass air through the cloth to a filter that would collect particles whose chemical composition he could then determine back in Chicago with a new machine for micro-Raman analysis. The instrument, which focuses a laser through a microscope at particles as small as 10^{-12} gram, reveals molecular composition through characteristic Raman spectra, which McCrone says are related to the infrared spectra. He can use it to identify organic and inorganic substances and told *Science*, "If it has atoms, we ought to be able to tell what it is."

Eventually, McCrone hopes to receive permission to apply carbon-14 dating to the Shroud, from which a few threads, now in the custody of Italian authorities, have already been removed. Current carbon-14 techniques require a larger sample of material than is possible to take from the Shroud, but McCrone anticipates the availability of new methodology that makes use of a linear accelerator and can accurately date a sample as small as a 1-centimeter length of a single thread.

And so it seems likely that modern science and religion may soon meet in a cathedral in Turin, with no outcome guaranteed. The circumstantial case for the Shroud's authenticity, while intriguing, is hardly compelling. In light of the fact that it has been largely inaccessible to scientific researchers, it must be noted that some of the existing "data" about its features could prove to be incorrect; in any event, no final judgment will be possible until the cloth is accurately dated and carbon-14 dating is at least a couple of years away. Furthermore, it could turn out that sophisticated scientific examination will reveal new information that explains how the image was made.

Still, Rogers, in a philosophical frame of mind muses, "What better way, if you were a deity, of regenerating faith in a skeptical age, than to leave evidence 2000 years ago that could be defined only by the technology available in that technical age?"—BARBARA J. CULLITON

Britain's National Health Service: It Works and They Like It, But—

The British are marking the 30th anniversary of the National Health Service (NHS) this summer, and the occasion has been marred somewhat by recognition that the NHS is in trouble. Earlier this year, for example, spokesmen for the British Medical Association warned that a dispute over pay could lead to mass resignations by NHS physicians. The threat now seems to have been less of a forecast of action than an expression of discontent, but the NHS faces financial, administrative, and ideological issues serious enough to have prompted creation of a Royal Commission on the National Health Service, which is expected to report in the spring of 1979.

During its three decades, the NHS has been a topic of keen interest and controversy in the United States. Opinion here has ranged between the views of those who see the NHS as proof of the perniciousness of "socialized medicine" and those who regard it as a desirable alternative to the American health care system. Recently, with the discussion of national health insurance plans for the United States on the upswing, the NHS has been getting more attention here.

Perhaps the first thing an American interested in the NHS must do is come to grips with the paradox of British attitudes toward their own health system. While even the most ardent supporters of the NHS concede that it has major shortcomings, opinion polls consistently show public approval of the NHS to be overwhelming. And although physicians as a group have been the strongest and most persistent critics of the NHS, only a very small minority practice outside the health service or, indeed, oppose it in principle.

Advocates for the NHS tend to stress that, in marked contrast to the United States, no one in Britain is afraid of being sick because of the cost of care. The quality of acute care in Britain is generally acknowledged to be high and the British seem to have done a relatively good job of ensuring patients' access to the health care system via a large corps of

0036-8075/78/0721-0239$00.75/0

general practitioners. It is in the middle ranges of health care—in the treatment of chronic illness and particularly in elective surgery—that strains are evident and some critics see a breakdown occurring.

Old and inefficient facilities are the most conspicuous NHS problem today. This is a legacy of straitened capital spending on health in Britain during the Depression, World War II, and the postwar years, and the NHS today must make do with too many Edwardian hospitals and Victorian lunatic asylums.

Increasingly, complaints are heard that measures taken by the government to allocate resources more fairly and to improve services are adversely affecting medical education and research. Perhaps most serious of all is the attitude of physicians in the hospital service. A long series of pay disputes, conflicts with hospital workers' unions, and arguments over care of private patients in NHS hospitals has left many doctors demoralized and disaffected. The implications of these developments will be discussed in a second article.

While none of these problems can be discounted, experienced observers note that the NHS, from the start, has seemed to operate on the brink of one catastrophe or another and has always managed to muddle through. It is difficult, therefore, for the outsider to judge whether disaster really impends or the situation is simply one of crisis as usual. One thing, however, does seem certain. For the British—meaning both major political parties and most people—there is no controversy over the principle of a national health service.

Are there any lessons for Americans in this? The NHS, of course, differs fundamentally from the forms of national health insurance being considered here. Under the NHS the government owns and operates the hospitals, employs physicians and other health personnel, and broadly regulates the delivery of health care. In both countries, however, concern has grown about improving the supply and distribution of health manpower, equalizing services, and controlling costs. By and large, the British moved earlier to address these matters, so while British actions do not necessarily offer precedents for the United States to follow, they do provide some perspective.

The NHS's difficulties are attributable at least in part to a history of chronic underfinancing. The root cause of this underinvestment has been the indifferent performance of the British economy in the postwar period. But the allocation of funds for the NHS was also allowed to

grow less rapidly than those for education and other social services. And Britain has consistently spent a smaller proportion of its gross national product (GNP) on health care than have its European neighbors or the United States. The British have increased the proportion in recent years, but, as a percentage of GNP, the British figure last year was about 5.6 percent compared with over 8.5 percent in the United States. In terms of expenditures per person, the U.S. figure of about $700 was three times the figure for the NHS.

The British have, in effect, rationed health care through control of the NHS budget, while in the United States, to a much greater extent, rationing is left to the marketplace. In Britain, the best-known result of this rationing has been the long waiting lists for elective surgery. The NHS has some promising innovations to its credit—in geriatric care and social psychiatry, for example—but the effects of such innovations have often been circumscribed by funding limitations. Not all the problems of the NHS, however, can be written up to underinvestment. Currently, for example, problems on a grand scale have been generated by efforts to make the NHS function more effectively and fairly as a system.

Prevailing Patterns

When the NHS was set up in 1948, the prevailing pattern of medical service was retained. General practitioners (GP's) had traditionally been separated from physicians practicing in hospitals to a much greater degree in Britain than in the United States. This was continued under the NHS, although both groups were employed by the central government. The responsibility for public health services and for social workers lay with local authorities prior to NHS, and this tie was perpetuated. These divisions, accepted by the government as politically necessary at the outset, exacerbated the problems of integration for the NHS. Finally, in 1974 an effort to "rationalize" these arrangements was made through a major reorganization.

The reorganization was ambitious enough to prompt allusions to a "new National Health Service," although the reference was sometimes intended ironically. The chief aim was to unify the main elements of the NHS—the GP's, the hospital service, and social services—but it also intended to improve planning and give the government greater leverage in deployment of resources.

Britain still has medically underserved areas and, as in the United States, these are generally rural and inner-city areas. In Britain, Wales and Scotland had already been recognized as deficit areas and received higher per capita funding for health care than the average for the country. The south of England, particularly the London region, enjoyed a substantial advantage over the north in health resources and budget.

The Labour government's resolve to see resources shared more equitably resulted in the appointment of a Resource Allocation Working Party (RAWP), which in 1976 issued an interim report recommending a formula for equalizing resources. Because RAWP—the inelegant-sounding acronym was soon adopted as a noun and a verb—appeared at a time of high inflation and static government funding, it meant that implementation would entail application of the Robin Hood principle of taking from the rich to give to the poor. RAWP was put into effect in a substantially modified form last year by Secretary of State for Social Services David Ennals. The impact on the relatively affluent regions—the four regions into which the London area is divided and the four-county Oxford region—was painful, but the main reaction there was apprehension about the effects of future arbitrary shifts of funds and personnel.

The most controversial feature of the reorganization was an increase in the number of administrative tiers from three to four. The basic organizational unit of the NHS is the district, intended to provide a full range of service to about 250,000 people and to be centered on a district general hospital. Some 205 districts in England were grouped under 90 area health authorities (AHA's), which in turn were divided among 14 regions. At the top is the Department of Health and Social Security. By giving major budget-

ary and administrative responsibility to the newly created AHA's, the reorganizers not only added a layer to the management structure, but severely wrenched established relationships. Critics complain that the effect has been to increase bureaucratization of the NHS, without substantially improving services. Governing boards of district hospitals, who say they formerly felt they had direct access to decision-makers, now grouse about delays in getting decisions on local problems and about the loss of able administrators to higher-paying upper-echelon jobs where they have no operational function.

Some of the sharpest reproaches against reorganization and RAWP have come from the medical schools and related teaching hospitals in London. The 12 London medical schools presented special problems even before reorganization. The population of central London has been declining for several decades, affecting the catchment areas of the London teaching hospitals and reducing the variety of "clinical material" available to the medical schools. This decline had been recognized, and plans had been put forward for mergers among London medical schools and for relocation of the hospitals to outlying areas. Lack of funds and resistance from London loyalists, however, slowed the pace of change.

London's historic medical schools had developed earlier and rather differently from the provincial schools, which were closely linked with universities. The London schools had a tie with London University but had been dominated by private specialists—the proverbial Harley Street consultants—who operated as voluntary part-time faculty. After World War II, a style of academic medicine with full-time faculty, closer to the American model, developed in the provincial schools, with the London schools following more slowly and grudgingly.

Reorganization and RAWP struck hard at the teaching hospitals linked to the medical schools in London. As one professor put it, RAWP was pronounced "rape" in London. The number of beds in teaching hospitals were ordered reduced, merger and relocations were pushed, and the replacement of faculty who, for one reason or another, vacated their posts became difficult or impossible.

Provincial medical schools and teaching hospitals began to feel similar if somewhat less strong pressures as resources were transferred within as well as between regions. Traditionally, there had been little love lost between the London and provincial schools, but in the new climate the two groups made common cause by forming the University Hospitals Association, whose membership is made up of medical school deans and top officials of teaching hospitals.

The association's view of current policy is summed up for the Royal Commission in a statement which starts, "We believe arrangements for the provision of medical care, in particular, for medical education in this country are set upon a course of disaster because of an unfortunate conjunction of circumstances. . . ."

A major problem, said the association in a background memorandum, is dependence on central Treasury funds for revenue. "Economic circumstances have forced a near standstill in investment in medical care in this country as funded from central Government Revenue. This standstill finds the National Health Ser-

Briefing

Carter Cancels Two Trips by Scientists over Human Rights

The Carter Administration, taking particular umbrage at the start of a trial of a Soviet dissident on charges of spying for the United States, last week canceled two trips by government scientists to the Soviet Union.

The Soviet dissident is Anatoly Shcharansky, a Moscow computer technician who resigned his job in 1973 to seek an exit visa. Along with Yuri Orlov, a Russian physicist, and Alexander Ginzburg, a poet, Shcharansky was one of the Jewish members of a group set up informally to monitor Soviet compliance with the Helsinki Rights Accord. He was arrested on charges of treason last May, and his trial began on 10 July under near-total secrecy in Moscow. A trial of Ginzburg on charges of anti-Soviet propaganda began the same day.

Shortly after the timing of the trials became known on 7 July, and hours before a delegation of scientists from the Environmental Protection Agency (EPA) was scheduled to depart for the Soviet Union, Secretary of State Cyrus Vance asked that the trip be canceled. At the same time, a forthcoming visit to the Soviet Union by presidential science adviser Frank Press and other government scientists—much the same group that has just returned from China—was also canceled. The visit by Press was intended as a general consultative exchange; the visit by scientists at the EPA, led by assistant administrator Barbara Blum, was to review research in climatology and pollution-control being conducted under a joint U.S.–Soviet agreement.

It was reported that the impetus for the cancelations came from the U.S. ambassador in Moscow, Malcolm Toon, and that the final decision was made by Carter over some State Department opposition but with the backing of national security adviser Zbigniew Brezinski.

State Department spokesmen also said that a review of all cooperative agreements with the Soviet Union was being conducted by the Administration, including a review of the basic agreement on scientific exchange signed by Nixon and Brezhnev in 1972. Last week, however, no one in Press's office seemed to know who would be conducting the review, when it would begin, or what its potential outcomes could be.

Pardes to Head NIMH

After a 6-month search, a new director for the National Institute of Mental Health has been named, Herbert Pardes, who up until his appointment had been chairman of the department of psychiatry at the University of Colorado and chief of psychiatric services at the Colorado Psychiatric Hospital and Clinics.

Like his boss, Secretary of Health, Education, and Welfare Joseph Califano, Pardes was born and raised in Brooklyn, New York. He received his medical degree in 1960 from the State University of New York and between 1972 and 1975 was chairman of psychiatry at the university's Downstate Medical Center in Brooklyn.

Pardes, who is 43, has conducted most of his research in the area of mental health services delivery. He is a coauthor, with Richard Simons, of *Understanding Human Behavior in Health and Illness*, considered a basic text. He is also a fellow in the American College of Psychiatrists and the American College of Psychoanalysts.

R. Jeffrey Smith

0036-8075/78/0721-0241$00.50/0

vice in a state of chronic under-investment both on capital and revenue accounts, and that has already resulted in a significant fall in the standards of medical care and a serious loss of morale."

The memo went on to assert that government policies are having the effect of diverting money away from teaching centers to general medical services and nonteaching hospitals. These policies it describes as implicit in the 1974 reorganization and "now apparent" in the RAWP recommendations.

Analysis Faulted

A barrage of criticism is dropped on the RAWP analysis and its consequences: It fails to take into account such things as social deprivation in the large cities. Its statistics are suspect because they are based on mortality rather than morbidity figures. The results of the freeze on filling staff posts in teaching hospitals is inadequate teaching of medical students.

Teaching hospitals serve as general hospitals for their districts, and perhaps the deepest sense of grievance arises from the change that tied the hospitals administratively to local area health authorities. Before reorganization, the governing boards of the teaching hospitals were subordinate to regional authorities but, in effect, had direct access to the ministry. Since 1974, they have operated under area health authorities, and had to deal with local government officers and administrators the critics say have little understanding of medical schools.

The basic contention of the University Hospitals Association is that the effect of the reorganization and RAWP focusing on services has been a weakening of medical education and research. This can be regarded as special pleading on the part of medical schools, which have gone through a period of expansion and now appear to be getting less favored treatment. But there seem to be cause for alarm in academic medicine that the movement to equalize services will create a claim on resources at the long-term expense of medical education and research. And it seems fair to say that NHS policy-makers, in seeking to solve one set of problems have, as in the past, exacerbated others.

Reorganization and RAWP, however, were aimed at real problems. The tripartite organization of the NHS perpetuated frictions and inefficiencies which, after decades of delay, demanded attention. RAWP was a response to acknowledged inequalities and was also intended to break the hold of incremental funding which is endemic in government operations. As the RAWP report put it:

> Supply of health facilities is, in England as elsewhere, also variable and very much influenced by history. The methods used to distribute financial resources to the NHS have, since its inception, tended to reflect the inertia built into the system by history. They have tended to increment the historic basis for the supply of real resources (eg facilities and manpower); and, by responding comparatively slowly and marginally to changes in demography and morbidity, have also tended to perpetuate the historic situation.

It was bad luck and bad timing that reorganization and RAWP were implemented in the midst of a financial crisis. Of the resulting confusion and frustration, it is hard to say what was due to reorganization and what to the financial squeeze.

Reorganization has not become a partisan political issue because it was conceived under a Conservative government and implemented by Labour. Because the international management consulting firm of McKinsey and Company played a major role in designing the reorganization, there were widespread mutterings over the application of industrial management ideas inappropriately to the NHS. But there is plenty of blame to be spread around. Certainly, the new administrative structure is overelaborate and cumbersome. The NHS displayed more than a little ineptitude in implementing the changes—for example, by requiring national competition for many top jobs, thus ensuring confusion and uncertainty at a critical time. And many NHS interest groups interpreted change as threatening to them and devoted all their energies to successful obstruction. The Royal Commission is being counted on to tidy up after the reorganization and RAWP, and it is widely anticipated, for example, that the commission will recommend dismantling one layer of administration.

The commission can hardly ignore the NHS's chronic affliction, underfinancing. Projections for public spending on the health service in coming years show little real growth in resources; no amount of reallocating, no matter how skillful, will solve the problem.

The common reality of health care systems these days, whether nationalized or private, is that there is never enough money—an increase in the supply of services seems inevitably to create excess demand. The rise in the numbers of the aged, who require more services, and the high cost of high-technology medicine are exerting heavy pressure on health services in all industrialized countries, as is competition for funds with other social services.

In Britain, funding is still the unbitten bullet. Critics accuse politicians of continuing to talk about comprehensive health services, free and unconditionally available, in a way that misleads people about the real situation. The fatal flaw, say many critics, is exclusive dependence on central government funding, which they see as chronically inadequate.

What can be done? One obvious and often advocated course is to find additional sources of funding. The NHS has gotten a portion of its funds from national insurance payments—under 10 percent of the £6 billion annual budget of the NHS—and from small charges for prescriptions, eyeglasses, and some dental procedures. Private health insurance can be used to pay for so-called amenity beds in NHS hospitals, but is used mostly for services in the private sector, particularly to avoid the waiting lists for elective surgery under the NHS.

Political Volatility

Supplementary charges for NHS services are a politically volatile subject. The Conservative party has favored them, partly as a way to persuade patients and physicians to give more thought to costs. The Labour party and its trade union constituents have steadfastly opposed supplementary charges as an unfair burden on working people. The British Medical Association's continuing advocacy of supplementary charges seems to reinforce Labour opposition.

An alternative which is gaining support steadily is the use of local taxing authority on behalf of the health services. A community could decide what existing services it wanted augmented or new services provided and impose taxes to finance them. Such measures are favored by such diverse advocates as the University Hospitals Association and McKinsey and Company officials. In testimony prepared for the Royal Commission by McKinsey officials on their own hook, the suggestion was made that local authorities might consider means such as sales taxes or lotteries to augment funds for local health services. Expansion of the use of private health insurance in the NHS is also being urged.

The unions and the Labour party have long regarded additional forms of financing for the NHS as heretical. The comments of the Royal Commission are likely to indicate whether the subject can yet be discussed seriously. However, it does seem clear that public awareness is stronger than it ever has been in Britain that the principle of free, universally available, comprehensive care has its limits.—JOHN WALSH