In the inpatient service, for instance, goals are set for each year: return of patient's behavior quickly to acceptable discharge state, reduction of admissions to jail on insanity warrants and reduction of admissions to state mental hospitals. These goals are reached by setting individual goals for patients. A major goal might be the return of a patient to work. Sub-goals could be an increase in conversation, increase in job skills and increase in out-of-bed time. Base-rate data are collected on these activities, and contingencies and reinforcements (such as tokens, social praise and passes to leave the grounds) are devised to increase them. As desired behavior is learned and established, patients are transferred to the outpatient service.

Two years of operation show that the system is working. The number of residents from Madison County in the state hospital has decreased from 153 in 1970 to 93 at the end of 1972. The number of admissions has decreased from 112 to 28. The frequency of jailings on insanity warrants has decreased from 74 to 13, and the number of days in jail has been reduced from 514 to 67. The number of patients admitted to the inpatient unit has remained almost the same, but the average stay has decreased from 18.4 to 12.5 days. This reduction alone has meant a savings of $40,219.

Similar achievements have been made in the outpatient service with clients whose behavioral problems are not severe enough to warrant intensive care. Behavioral therapies are successfully used with outpatients in the modification of such behaviors as phobias, marital problems, family conflicts, sexual anomalies, drug use, psychosomatic complaints and depression. Members of the patients' families are encouraged to learn behavior therapies and use them to maintain adaptive behaviors in the home. Using these and other behaviorally oriented therapies the Huntsville center is able, with a staff of 35, to effectively provide a variety of comprehensive mental health services to a population of 186,000 residents.

At a time when the Federal Government is cutting back on social programs and consumer protection agencies are calling for accountability, mental health centers will be fully funded and supported only if they are shown to be effective. Goodson and Turner feel they have met these qualifications and have taken the concepts of mental health out of the ephemeral realms and given them concrete meaning.

So, while behavior manipulation may have its drawbacks and detractors, the fact remains that the Huntsville center (like Achievement Place and the Keller method) has shown itself to be a workable and efficient operation. □

aerospace

Outmaneuvering the Great Lakes ice

A major problem with shipping in the Midwest is ice on the Great Lakes, which limits the shipping season to eight months a year. Commerce worth millions of dollars is blocked. In a joint effort, NASA and the U.S. Coast Guard are now working on a method to maneuver around the ice.

The ice information system would use aircraft and, some day, satellites equipped with special sensors that detect the ice thickness, the type and its distribution. Maps would then be made of the ice and given to icebreakers and cargo vessels on a regular basis. Scientists and engineers at NASA's Lewis Research Center in Cleveland tested the instruments this winter. They used side-looking radar aboard an OV-1B aircraft on loan from the Army. The result was detailed images of the ice distribution.

Ballima's link to probes in deep space

Tracking and communicating with spacecraft to the far corners of the solar system require a network of large space antennas—the 210-foot versions. The first one, at Goldstone, Calif., has been operational for seven years.

Last week the second such 210-foot antenna was dedicated at the Tidbinbilla Deep Space Communication Complex near Canberra, Australia. Prime Minister E. G. Whitlam and NASA Administrator James C. Fletcher officiated. The new antenna is called Ballima, the aboriginal term for "very far away." The antennas communicate with Pioneers 10 and 11 on their way to Jupiter. Tidbinbilla was first opened in 1965 with an 85-foot antenna called Weemala, meaning a distant view.

A third 210-foot antenna is nearing completion at Madrid, Spain.

Soyuz and Apollo in Paris

The Paris Air Show in May will feature actual-size models of the Apollo and Soyuz spacecraft docked together. The two spacecraft will link up in orbit in 1975 in the first international cooperative manned mission. Teams are at work to develop compatible systems for the mission.

astronomy

Binary X-ray sources and W-R stars

So far four X-ray sources have been identified with binary systems containing a star that appears very young and a dark companion. The X-rays are believed to be generated by matter falling onto the dark companion, which could be either a neutron star or a black hole.

In the April 2 NATURE PHYSICAL SCIENCES E. P. J. van den Heuvel of the Free University of Brussels and the State University of Utrecht links these X-ray binaries evolutionarily with another astronomical curiosity, binaries containing Wolf-Rayet stars. [Wolf-Rayet stars are extremely hot (about 50,000 degrees K.) and surrounded by an expanding envelope of gas.]

The hypothetical history of the X-ray binaries is that they start out as binaries with very massive stars. The primary transfers its outer layers (about 70 percent of its mass) to the secondary. The transfer rejuvenates the secondary, taking it back to the early stages of stellar evolution. Meanwhile the primary, now become the secondary, evolves rapidly to a supernova explosion that produces the collapsed object. In a few million years the rejuvenated star begins to send matter to the collapsed object, and X-ray emission begins.

Van den Heuvel suggests that during some of this period of evolution the system is a Wolf-Rayet binary. He shows that if the W-R star in known W-R binaries exploded in such a way that it left behind a collapsed object with a mass similar to those in the X-ray binaries, the remaining binary system would have orbital periods and other parameters like those of the X-ray binaries. From this he predicts that certain W-R systems should evolve into X-ray binaries and that X-ray binaries with periods between 10 and 150 days should exist.

A star for Centaurus X-3

A variable star has been proposed as the optical identification of the fifth known X-ray binary, Centaurus X-3. In International Astronomical Union Circular 2518 William Liller of the Harvard College Observatory suggests a star with a variation period near that of the X-ray source.

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