

In Praise of Progress Reports

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Have you noticed that half of a typical issue of this publication is now occupied by its Progress Report section? The preceding issue brought you 130 pages of these reports in an issue (first in the new large-page format) that contained 259 pages.

Most of the Progress Reports arrive on a semiannual basis. In the VA, the research year's midpoint is the end of June, with the end of December being the year-end. Thus the semiannual reports are due here by early July (for publication in the "Fall" issue) and in early January for publication in the "Spring" issue. The BPR staff tries to have the decks cleared for action at those times, with all major papers already safely through the review process and subsequent revision and rewriting if needed, and copyediting, etc., before the torrent of progress reports breaks upon us.

It is a torrent, too. A recent log of fall-issue progress reports arriving from VA projects shows that the first one arrived June 5th, with three more coming in the final weeks of June. In July a rapid buildup brought 14 reports across our desks in the week of the 14th. Two or three came in almost every working day during the rest of July to raise that month's total to 36. Then the flow dried up except for two or three in all of August and September. Normally August and September arrivals would be held for a following (Spring) issue, but delays caused by typesetting snarls and a new format have made it possible to include late reports in this late Fall issue—giving you a total of 42 VA progress reports in this issue. (1981 Spring and Fall issues are not expected to be late!)

In addition to the independent VA RER&DS projects, there is a report (covering three R&D projects and four clinical evaluations) from the VA Rehabilitation Engineering Center (VAREC, formerly VAPC) in New York. This is a special report which differs in style from the familiar VAPC Report which has appeared in the Bulletin since publishing began in 1964. Those have covered a wide range of clinical evaluations of devices as well as reporting on development and work on standards, compliance testing, etc. In the future, VAREC will limit its Bulletin contributions to research results, either in the form of individual project progress reports or full-scale juried papers when results justify that. The change reflects VAREC's decision to seek more direct two-way communication with clinicians not involved in research. To do that, VAREC has started its own clinically-oriented publication, "VAREC Review", which emphasizes evaluation activities. Some copies of the initial issue are still available: consult the VAREC Report in this issue of the Bulletin for the correct address to use in requesting a sample copy.

To conclude the statistical resumé: this issue of BPR also presents 79 progress reports contributed by 10 Rehabilitation Engineering Centers (RECs) of NIHR, plus seven projects of the National Science Foundation and four from the Office of Special Ed-

^aDr. Murphy is Editor of this publication.

ucation. The grand total is approximately 140 reports occupying 133 pages. (An individual report may occupy anything from five-or-six lines of type to a dozen pages, with references, bibliography, illustrations and tables.) A three-page index of progress reports opens the section and, in this issue, for the first time includes a complete listing of investigator-authors—almost 200 of them. The index may become even more useful in future issues, but we hope a more detailed index doesn't prove a disincentive for serendipitous browsing and skimming.

VAPC (now VAREC) contributed the bulk of the Bulletin's progress reports in BPR's very early years when progress reports were received from only a handful of other VA-supported projects. The number and the strength of the other RER&DS reports tended to grow through the years. Then an article in BPR 10-31, Spring 1979, set forth a new congressional attitude toward rehabilitation research, with emphasis on the coordination and interrelationships of such research throughout the federal government and the nation (Sherman E. Roodzant and John G. Clements: Congress Emphasizes Rehabilitation Research. BPR 10-31, Spring 1979, pages 3–10.) In response to the logic and urgencies well expressed in that paper, BPR felt justified in extending to its progress report section the same policy long in force with regard to scientific papers, reports of meetings, etc.—a completely non-parochial openness to worthwhile material from all sources domestic and foreign which might hasten the improvement of function and lifestyle for handicapped veterans and all the handicapped. Under this impulse, the work of other agencies has been added: the National Institute of Handicapped Research and its predecessor agency in the Fall 1979 issue, the National Science Foundation beginning with the Spring 1980 issue, the Office of Special Education (formerly Bureau of Education of the Handicapped) in this current issue, and at least one of the technology-related programs of the National Institutes of Health beginning with the Spring 1981 issue. Thus these progress reports will cover substantially all the work sponsored by the United States government in this area of rehabilitative engineering to improve the function and life style of the severely disabled.

In addition to work in this country, a few NIHR projects (originally supported by counterpart funds) in foreign countries are also included. There is, however, no serious effort to solicit progress reports from the many important projects in other countries sponsored by their own governments, or by private agencies in this country or abroad. (Perhaps there should be such an effort. The reports would certainly be welcome, particularly if they were provided on a regular annual or semiannual basis.) The scientific papers in the front of the Bulletin, published after review by multiple referees and frequently after considerable revision, often represent the work of authors from other countries, and of projects sponsored by agencies other than the Veterans Administration, including some funded by private sources.

If one views the research panorama represented by the

progress reports, in some cases there may be real or apparent duplication, whether overlap of subject area by different projects or support of a given investigator or team by multiple agencies. Wasteful duplication is quite unlikely—project monitors and merit review boards are too alert. There are, however, a fair number of cases of deliberate approach to a given problem by several independent routes, or of specialization such as pioneering work by one laboratory, with development, broader clinical trials, and further refinement by another. In addition, different agencies, having different missions and operating policies, quite properly may support work on different aspects of a single problem. Sometimes a talented investigator receives several different grants, contracts, or projects of both types. These may be handled entirely separately, each with unique equipment and assistants, but often the equipment, staff, and funds are pooled with the goal of producing an effect greater than the sum of the parts. Careful distribution of acknowledgments (as well as suitable cost accounting) will then be needed. The Inter-Agency Conferences of recent years, agency-sponsored conferences, professional meetings and journals, the inter-agency coordinating committee mandated by PL 95-602 creating the National Institute of Handicapped Research, and the growing number of progress reports in this Bulletin should all tend to foster awareness of related efforts, encourage friendly competition for prompt and excellent results, and promote coordination of the entire field of rehabilitative engineering. Our fight is against suffering and ignorance, not rivals.

We feel that the Bulletin's presentation of progress reports is close to being unique and is valuable from a number of points of view. The reports provide a record more nearly current than formal papers, presented after a final report is prepared and much of the material is already many years old. It may be fascinating to historians—and consoling to younger investigators—to find that even the old masters sometimes try blind alleys, reporting ideas enthusiastically in one issue only to report failure in later issues. In contrast, most formal scientific and technical papers, often in a dry and stolid fashion, present an apparently straightforward, logical, orderly, and successful route from basic hypotheses and initial inventions (or inspirations) through successive steps to an impressive conclusion or a final design, seemingly without any major disappointments, difficulties, or back-tracking. Needlessly, a younger investigator may wonder dejectedly why *he* cannot have such skill and inspiration as to follow such straight-line routes, unaware that in many cases the older investigator has merely omitted the frequent difficulties and side-tracks which plague research, development, extensive evaluation, and the transfer to widespread use of new ideas.

Review of these progress reports over a series of years may also disclose something of the fashions, trends, patterns of introductions of new ideas, and perhaps even the fads and foibles within this broad field of rehabilita-

tive engineering. The transition, often slow and painful, from basic ideas through early models, trials on patients, re-engineering, repeated evaluations on gradually increasing numbers of patients, and (one always hopes) successful overcoming of inevitable and numerous frustrating difficulties, should also be revealed.

From such progress reports we learn first-hand something of the style and philosophy of each developer. Some, after encountering these serious obstacles, seek to bypass them, even if major changes are needed. Sometimes this technique succeeds, as may an attack on another front or the island-hopping campaigns in the South Pacific in World War II. Alternatively, a designer reconnoitering the problem and evaluating many alternatives with sketches, calculations, and tests, may select what seems a basically good idea, then systematically and seemingly obstinately pursue it. He must overcome every obstacle as it appears.

There are tradeoffs of values but serious risks in either approach (or at any point in a spectrum between them). The user of diversionary tactics may indeed avoid wasting time and effort, but he risks leaving serious problems behind the lines to be mopped up afterward, or he may miss a potential opportunity. Indeed, he may be criticized as a dilettante, leaping nimbly from one impossible task to another in a wasteful and frenetic appearance of activity, impressive at first glance but lacking substance.

In contrast, the steady, intelligent, and patient pursuit of a single plan of attack may lead to accusations of an obsessive, stubborn approach, a blind pursuit of a will o' the wisp, or a goal of a lifetime project—but it *may*, if carefully selected, overcome all obstacles to reach a successful conclusion. Study of development of a single type of device may illustrate the problems and delays in a process where the typical 3-year government grants often lead only to tantalizing but crude models.

In 1945 there was an old and extensive literature, especially in patents in several countries, on artificial knee joints intended to provide controlled stance-phase stability and safety for above-knee or hip-disarticulation artificial legs, yet allow flexion during swing. Nevertheless, the lack of any satisfactory solution was a major complaint of amputee veterans and of surgeons. The government's Artificial Limb Program, coordinated and advised by the National Academy of Sciences-National Research Council, supported over many years some 10 laboratories which, using various strategies, produced dozens of designs and scores of models. Many were tested independently by still another government-supported project. In addition, knee joints privately developed in this country or abroad were systematically studied; often models were purchased and tested by research contractors.

From all these capable, sincere, and prolonged efforts, documented in numerous reports, papers, and major texts, the Henschke-Mauch Model A swing-and-stance control, invented by Ulrich K. Henschke^a and Hans A. Mauch, emerged the sole survivor. (Some others, dropping the difficult goal of stance control, were modified to

become successful swing-control units.)

Mauch Laboratories reported in frank detail in the Bulletin over many years the frustrating series of clicks, leaks, occasional breakages and other difficulties which beset the development of the Henschke-Mauch Model A and finally the Mauch S-N-S Swing and Stance Phase Knee Control. Ultimately, after literally over two decades of persistent work, and patient, prolonged support by the Veterans Administration, the S-N-S knee became a commercially available device, with some 9,000 now sold both in the United States and abroad. There were scientific papers in BPR 10-10, Fall 1968, on successful field trials, through a series of Veterans Administration clinics, of the Henschke-Mauch Model A, and by Mr. Mauch on the development of the S-N-S unit, a somewhat simpler and shorter unit retaining the same basic control principle which he had developed many years earlier. Numerous seemingly trivial but actually very important elements had received intensive development.

Eventually, with the Mauch S-N-S commercially available, VA support of development, and reports, ceased. Nevertheless, with its own funds Mauch Laboratories continued to introduce some seventy-five additional refinements as proprietary further improvements. The period of guarantee was successively raised to 12, 18, and now 24 months, giving both private prosthetics facilities and amputee clients alike greater confidence in the durability and long-term economic feasibility of the unit.

Despite this degree of success, there still remain problems of educating new generations of clinicians, including the prescribing doctors, the prosthetists who fit and adjust limbs, and the therapists who train the patients, in the most effective adjustments of this sophisticated unit. Even a badly maladjusted unit performs so well (compared with a conventional single-axis free-knee joint) that the amputee and the remainder of the clinic team alike are lulled into acceptance without realizing the further possibilities of better performance, greater comfort, and minimized energy consumption which could be obtained by more sophisticated alignment and adjustment.

Meanwhile the Mauch Ankle, invented in the mid-1950s and covered by a patent assigned to the Veterans Administration which has already expired after its 17 years, was developed in a similarly patient manner. Progress reports from Mauch Laboratories again described frustrating difficulties which occurred (though with decreasing frequency and decreasing level of seriousness) during shakedown trials on a relatively few amputees, first at Dayton, and then at New York and elsewhere in the country. These reports were frank and specific about the leaks, clicks, and, in rare instances, breakages which came to light with increasing use of the device. The steps taken to overcome

^aWe recently learned that Ulrich K. Henschke, M.D., Ph. D., age 65, died as a result of an airplane crash in Ngorongoro Crater in Tanzania, on June 29, 1980. Both physician and physicist, he had been Professor of Radiotherapy at Howard University Medical School since 1970 and was in Africa on university business. He had received a number of national and international awards.

these difficulties, unfolding in successive reports, contained some priceless bits of information on the characteristics of metals, gasketing materials, lubricants, heat treatment, etc.

Eventually others began to urge Mauch to release the ankle for widespread use because its functions were so obviously appreciated, but Mr. Mauch resisted what he regarded as "premature" release of the device with even minor faults which he always fully expected to overcome.

Finally both the (then) VA Prosthetics Center and Mauch Laboratories agreed that the time had come for a wide-scale field test on 50 copies of the improved version. These field trials have begun, under supervision of what is now VAREC, at a number of widely scattered VA orthopedic and prosthetic appliance clinic-team locations. Initial acceptance by both amputees and clinic-team professionals has been enthusiastic. Nevertheless, further difficulties will come to light and improvements will be made if past history is any guide. More importantly, the field trials will help generate the prescription criteria, the training methods for amputees and for clinic team members, and the greater understanding needed to accept a radically different device. The prosthetists from commercial facilities who attend the clinic team, whether active in fitting specific patients themselves or not, will also have opportunities to observe the new device, thus becoming more familiar with it and deciding, as they did with hydraulic knee controls in the 1960s, whether they wish to provide such devices for their private patients. Periodic progress reports on this evaluation should appear in the Bulletin and elsewhere. Eventually, as in the case of the Model A field test and the Mauch S-N-S improved knee model, full-scale reviewed papers are expected to appear in the Bulletin.

Another value of progress reports, in a sense an unexpected byproduct, is the information conveyed to foreign observers as to what is going on throughout the United States, especially with increasing coverage of the programs of more and more sponsors. Thus a foreign expert has a better idea of where to visit, or with whom he may correspond on topics of mutual interest. This frequent publication of relatively current activity thus provides a better guide to the exchange of scientific information than would be possible if formal scientific presentations based on final reports were the major source.

Progress reports also may assist in stimulating new ideas and suggestions. We are aware of some examples of such cross fertilization, but undoubtedly many others occur.

The format provided in the new VA Graphic Standards allows greater flexibility for page layout and matching of illustrations with the supporting text. The use of one, two, or three columns is considerably more versatile than the single-column format in the smaller size the Bulletin used for its first 16 years. In addition, the three-column format of the progress report section (as distinct from two-column layout of the formal refereed papers) will serve as an informal visual clue to the special purpose and informal

tone of the section.

Eventually it is hoped that the Bulletin of Prosthetics Research (with its subtitle Rehabilitative Engineering Research and Development serving also as a clue to its broad nature) will be published more frequently, at least on a quarterly basis. (We do not expect quarterly reports from individual projects, though!) Such a schedule should help to bring more current information to the attention of readers. With more frequent publication the Government Printing Office probably would be willing to entertain the concept of subscriptions, though the Superintendent of Documents has not been willing to provide subscriptions for a publication coming out only twice a year.

For the various reasons discussed above, the progress reports seem to play a unique role in the Bulletin. Most of all, of course, everyone concerned appreciates actual progress worthy of report!