About one-third of children enrolled in Head Start have significant behavior disorders and/or developmental delays, according to research conducted by Carolyn Webster-Stratton, Ph.D. The federally funded program, now almost 40 years old, serves disadvantaged children in low-income families throughout the nation, with the overall goal of increasing readiness for school.

A University of Washington professor of nursing, director of the UW’s Parenting Clinic and research affiliate at the Center on Human Development and Disability, Webster-Stratton has been conducting research at the UW into early childhood conduct problems for 23 years, developing and evaluating training programs for parents, teachers and at-risk children. CHDD has been actively involved in research involving Head Start for many years on a number of fronts, including research into mother-child attachment with low income families enrolled in Early Head Start.

For the first years of the Parenting Clinic’s existence, its focus was on children who were already diagnosed with significant behavior problems such as oppositional defiant disorder or conduct disorder. Webster-Stratton and her colleagues developed treatments to work with families and to help teachers manage the classrooms in which these children were enrolled. Children participated in a small-group after-school treatment program called Dinosaur School, a social, emotional and problem-solving curriculum designed to promote social and academic competence.

To extend the reach of services, the decision was made in 1990 to conduct research into whether the Parenting Clinic’s treatment programs would also work as prevention programs in the classroom, where interventions could be offered in a non-stigmatizing way before conduct problems escalate. The clinic staff began working with families of preschoolers enrolled in Head Start programs in the Seattle area, where the children, mainly three- and four-year olds, were at high risk for behavior problems and were already being offered services to promote school readiness.

“This sample of socioeconomically disadvantaged preschoolers is at higher risk for developing oppositional behavior disorders and attentional hyperactivity disorders, as well as experiencing learning and language delays,” said Webster-Stratton. “By developing interventions targeted at training teachers and parents to enhance children’s social competence, reduce aggression and strengthen pre-reading and pre-writing literacy skills, we hope to prevent some of the secondary risk factors such as school failure, peer rejection and conduct disorders. We want to help parents bring out the best in their children, encourage their special competencies, and nip behavior problems in the bud. Managing behaviors in preschool and kindergarten classrooms is a major issue for teachers, and our goal is to help them use classroom management strategies and a social-emotional curriculum that fosters children’s self-regulation skills, problem solving and emotional literacy.”

In their current research, the investigators have adapted Dinosaur School and are presenting it with teachers twice a week not only to children with behavior problems, but to every child in participating classrooms. By the time the project concludes next year, See ‘Dinosaur School’ on page 2
most Head Start classrooms in Seattle public schools will have been offered the program. Since 50 to 70 percent of participating families are from minority and immigrant groups, the program is offered in a number of languages.

Participating classes are randomly assigned to receive the prevention program or to receive the assessment but no program. Those chosen for the assessment-only group are given the opportunity to receive the program the following year. Funding for substitute teachers is provided so classroom teachers can receive training. “Teachers already have so much on their plates, but we take responsibility for the preparation and materials, and they learn as they teach with us,” said Webster-Stratton. “Our hope is that they will see the value of the program and incorporate it into their curriculum in subsequent years.”

The Dinosaur School curriculum focuses on “emotional literacy” and helping children learn words to express their feelings and understand other people's feelings. Such skills as effective problem-solving, anger management, making and keeping friends, and communicating with others are taught during “circle time,” using child-sized puppets named Dina Dinosaur, Wally Problem-Solver, Molly Manners and Tiny Turtle. Molly and Wally come in various ethnic versions including African American, Asian, Hispanic and Muslim, and encounter problems common to young children, who become comfortable talking to the puppets about their own issues.

During the small-group time that follows, activities focus on concepts covered in circle time. “If we are working on sharing, for example,” said Webster-Stratton, “children might be given a craft activity that requires glue, and have only one glue bottle among them. They practice the skill of sharing, and we coach. The rest of the day, the teachers look for times when children naturally share in order to encourage it, especially during less structured situations like lunch and playground time.”

The comprehensive curriculum is outlined in teacher manuals and demonstrated on videotape training tapes. It is reinforced through home activities that children complete with their parents, for which they receive prizes such as dinosaur buttons and stickers. Key concepts are presented using pictures, since many children are pre-readers. For example, Wally has a detective kit with clue cards illustrating various solutions to problems. A child with a problem may go to the detective kit to see if a solution card might help him with his issue. Suggested solutions might include talking to the teacher, giving a classmate a hug, sharing, asking to trade, walking away and doing something else, or apologizing.

Academic skills such as pre-reading, reading, writing, science and math activities are interwoven with social/emotional objectives, said Webster-Stratton.

See 'Dinosaur School' on page 8
CARE Northwest gives telephone advice on risks of environmental exposures during pregnancy, nursing

Statistics show that infants in the United States and other developed nations have up to a five percent risk of being born with a serious congenital abnormality, with or without mental retardation. Environmental factors present during pregnancy probably account for no more than ten percent of congenital anomalies, but they receive special scrutiny because they are potentially preventable sources of problems.

The Center on Human Development and Disability offers a telephone consultation service called CARE Northwest (Counseling and Advice on Reproductive Exposures) to expectant and nursing mothers and health care professionals in Washington, Alaska, Oregon and Idaho who have questions about maternal exposures to teratogens. Teratogens are environmental agents— including drugs, chemicals, viruses and pollutants—that have the potential to harm the embryo or fetus. (A notorious teratogen is thalidomide, which produced severely stunted limbs in babies whose mothers took the medication to control morning sickness.)

Launched nine years ago, CARE Northwest provides information on the effects of environmental exposures during pregnancy and breastfeeding. The co-directors are Janine Polifka, Ph.D., and Thomas H. Shepard, M.D., professor emeritus of pediatrics; the teratogen information specialist is Elizabeth Rudy, R.Ph. With startup funds from the Washington State Department of Health, the information service was initially free and fielded some 200 calls a month. In more recent years, CARE Northwest charged a fee to callers from outside the University of Washington, but it has now become a free service once again, thanks to the generosity of a private donor.

"There is much in the news about exposures during pregnancy," said Polifka, "but patients as well as health care providers may be confused by seemingly contradictory reports of research. Our goal is to provide accurate, up-to-date information about pregnancy and lactation exposures."

A variety of agents may cause concern, including medications, both prescribed and over-the-counter; diseases or infections acquired during pregnancy; chemical, pesticide or radiation exposure in the workplace or home; alcohol, tobacco and illicit drug use; and use of medications while breastfeeding.

"We receive a wide variety of calls," said Polifka. "Women call who are concerned because their workplace exposes them to various chemicals; for example, to the lead used in soldering. Such exposures can be difficult to assess, because we don't know whether they're being exposed in a clinically meaningful way. We work with the UW Department of Environmental Health Community Outreach and Education Program (COEP) and the Pediatric Environmental Health Specialty Unit (PEH SU) on such questions.

"We receive calls from women who consumed alcohol before they learned they were pregnant and they're very upset," said Polifka. "We reassure them that they have probably not harmed the baby. People always hear that no amount of alcohol is safe during pregnancy, and in a sense that's correct because we don't know the safe level. It's better not to drink alcohol during pregnancy since it's not needed for any medical purpose, but women shouldn't lose sleep because they have consumed some alcohol."

Women who drink to excess are another matter, said Polifka. Unfortunately, the service doesn't receive many calls from women who abuse alcohol, whose babies are at risk for fetal alcohol syndrome “This surprises me, because so much is written about abstaining from alcohol during pregnancy, and because callers can choose to remain anonymous," she added.

"We receive frequent calls about medications, including antidepressants. The physician or the baby's father may urge the patient to cease taking her medication to protect the baby, but she may be afraid to stop for fear of becoming depressed again."

Responding to calls from health care professionals can prove difficult if the physician has an assistant make the call, said Polifka, since the assistant may not possess enough information about the patient in question. "People tend to think the risk is associated only with the drug. But it's associated with the level of exposure, the stage of pregnancy, the woman's background and medical history, and the other medications she's taking. There are many factors that determine whether a drug is going to be harmful."

Accurate assessment of the timing of the exposure is critical, since the greatest risks are from 18 days to 60 days after conception, when organs are being formed. Prior to this time, malformations are less likely, but death of the embryo can be caused by certain exposures. Later in pregnancy, insults to the fetus are less likely to produce malformations but may cause other problems.

About 40 percent of CARE Northwest's calls are related to breastfeeding exposures. "Women feel it's important to breastfeed, but if they require a medication their physician may advise them to stop breastfeeding to avoid transmitting it to the baby in breast milk," said Polifka. "They don't want to do anything that's harmful to the baby, but they want a second opinion."

See 'CARE Northwest' on page 5
UW neonatologist investigates potential of rEpo to prevent newborn brain damage from lack of oxygen

Erythropoietin, also known as Epo, has long been recognized as a naturally occurring hormone, produced in the kidneys, that controls and stimulates the production of oxygen-carrying red blood cells. A synthesized form, recombinant Epo (rEpo), was developed to treat anemia. When Epo is mentioned in the popular press, it is often in reference to its misuse by athletes illicitly attempting to boost performance by "blood doping."

It was once thought that stimulating red blood cell production was Epo's only function. In recent years, however, researchers have found that receptors for Epo are present not only in red blood cells, but also in the cells of the brain and spinal cord.

Sandra Juul, M.D., Ph.D., associate professor of pediatrics in the Division of Neonatology at the University of Washington and a CH D D research affiliate, began investigating the function of Epo in the developing brain eight years ago. Her research focuses on the role of rEpo in decreasing cell death in neurons exposed to damaging conditions such as oxygen deprivation (hypoxia).

"Injury to the brain before, during and after birth is a leading cause of death and disability in children," said Juul. "Despite dramatic improvements in the survival of newborns, brain damage resulting from perinatal asphyxia (oxygen deprivation) remains a devastating occurrence, leading to severe and life-long neurodevelopmental disabilities for many children, including mental retardation, cerebral palsy, seizures and learning disabilities. We currently do not have successful therapeutic regimens for the treatment of brain injury in children."

Epo may have potential as such a treatment. "There is a lot of interest in Epo since it has become clear that it is neuroprotective," said Juul. "Several labs around the country are looking at Epo in rodent models. The receptor for Epo is present in both the developing brain and the spinal cord, and I was very curious to find out what it might be doing there."

Juul's early research involved looking at the distribution of Epo and its receptor in the developing fetus, in both humans and animal models. "We found the receptor for Epo in cells of the brain and the gut and the heart," she said. "The obvious questions to me were why are the receptors there and what are they doing? Are they functional?"

She and colleagues undertook some preliminary experiments to determine whether cultured nerve cells responded to Epo. They did. "Epo decreases cell death in neurons that have been exposed to damaging conditions," said Juul. "If neurons are exposed to Epo and then confronted with various damaging conditions such as hypoxia, ultraviolet radiation or glutamate toxicity, the amount of cell death that occurs is much decreased, compared to neurons not exposed to Epo."

The results of these earlier experiments led to Juul's current research involving laboratory rats and monkeys, studying Epo as a rescue agent after brain injury. "We are trying to elucidate how Epo works," she explained. "Does it work by a single mechanism, or are there multiple smaller mechanisms that, when combined, are a very significant protector for the brain? What would be the best dose, and how many doses would be needed to protect the brain?"

To simulate the brain injuries often suffered by human babies in the perinatal period (before, during and after birth), the rodents are subjected to decreased blood flow to one side of the brain as well as to a period of hypoxia, breathing reduced oxygen. The combination results in significant brain injury on the side deprived of both blood flow and oxygen, and less damage on the side subjected only to reduced oxygen. Half of the animals then receive rEpo, the other half receive a placebo, and the results are compared. "With this research we're looking at a whole host of questions," said Juul, "including how much neuroprotection the rEpo provides, and whether the protection is specific to certain cell types."

A pilot study involving young primates will mimic conditions seen during the human birthing process that deprive the brain of oxygen, such as a compressed umbilical cord or a hemorrhage of the placenta. "These animals will be treated with rEpo and studied for four months after delivery," said Juul, "so that we can look at complex behavioral changes and developmental reflexes."

The researchers must establish that rEpo is safe for infants at the doses required for neuroprotection, since the dosage is significantly higher than that already in use in premature infants to stimulate formation of red blood cells. "In promoting production of red blood cells," said Juul, "we give doses of 100-400 units per kilo of body weight per day, a level known to be safe. For neuroprotection, the dosages range from 1000 to 5000 units per kilo per day." The high dosage—required to cross the blood brain barrier—has already been shown to be safe in adult animals. Juul's research with
the laboratory rats will also be looking at gene expression in the brain after administration of Epo, in order to gain an understanding of its mechanism of action.

Juul notes that there is growing interest among researchers in Epo's potential to mitigate damage to the adult brain deprived of oxygen by various causes, including stroke, seizures, subarachnoid hemorrhage and head trauma. “The study of Epo has really taken off,” said Juul. “There is a lot of interest around the world, including a German study of stroke patients treated with Epo. There are currently no medicines available to protect the brain from this type of injury, so people are very excited about Epo’s possibilities.”

Juul cautions that Epo is not a miracle drug. “We are hoping that a child who suffers hypoxia who might have had severe brain damage and severe functional deficit might, if treated with Epo, be mildly affected or have little functional deficit. The notion that any one drug is going to be a silver bullet is not likely. If you can intervene and reduce potential brain damage from moderate to mild, or from mild to no effects, that will be a huge achievement. Perhaps in the future we’ll be able to come close to a silver bullet by combining Epo with other therapies.”

Nevertheless, research in adult animal models shows that administration of rEpo even up to six hours after the damaging event reduces subsequent brain injury by 50 to 70 percent.

Juul’s current research is focused on full-term infants. “Later research will look at premature babies,” she said. “Epo decreases apoptosis or programmed cell death, which is part of normal development. So we need to make sure that we don’t cause damage by giving Epo to developing babies.”

Later on, we’ll look at models of pre-term brain injury. There is a huge population of pre-term infants who suffer intraventricular hemorrhage and other forms of brain injury.”

Juul notes that some 40,000 babies in the United States every year suffer perinatal asphyxia. “Ten percent die, and of those who survive, about 40 percent have significant long-term disabilities,” she said. “This is a devastating occurrence, and one of the most difficult problems in neonatology. If rEpo therapy achieves a reduction in brain damage in human newborns with perinatal asphyxia similar to that achieved in research animals, there could be significantly improved outcomes for these children.”

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CARE Northwest . . . from page 3

The service also receives frequent calls from prospective parents considering adopting a child, who are concerned about the neurodevelopmental risks to the baby of drug abuse by the birth mother during pregnancy.

Healthcare professionals who call CARE Northwest are sent a written summary of information on the specific agent in question from TERIS, the Teratogen Information System, an international database maintained at the University of Washington of some 1,200 drugs and chemicals that can cause problems for the developing embryo or fetus. CARE Northwest, in fact, is an outgrowth of TERIS.

The TERIS summaries are written by J.M. Friedman, M.D., Ph.D., of the University of British Columbia, and by Polifka. “TERIS summaries are peer-reviewed,” she said. “We have an advisory board of six experts in clinical teratology from around the country.” The board members review the summaries and provide a consensus risk assessment of each agent.

CARE Northwest also has access to three other reproductive databases, including Reprotox, which offers information on lactation exposures as well as paternal exposures—agents that the prospective father is exposed to that may affect his fertility and his offspring. It also utilizes Dr. Thomas Shepard’s Catalog of Teratogenic Agents. “Tom’s database is the bible of clinical teratology,” said Polifka. “It includes numerous chemicals involved in workplace exposures, whereas TERIS contains mostly medications.” The Shepard database offers information on general occupational categories, for example, the likely exposure that a female firefighter, welder or nurse might receive on the job.

“Discussing environmental or drug exposures with one’s physician is an important part of prenatal care,” said Polifka, “and we are here to help.” The telephone number for CARE Northwest is 888-616-8484.
All parents have concerns about feeding their new babies and making sure they receive adequate nutrition to give them a healthy start in life. Are they eating enough? Why are they fussing? Why won’t they breastfeed? Are they gaining weight as they should? When should solid foods be introduced? When should they be weaned? Nursing and meal times can be occasions of joy and connection between parent and child, but if things are not going well, it can be an unhappy time for both and a source of worry for parents.

Parents of children who have or are at risk for developmental disabilities and other special health care needs have special concerns, since such children experience a higher incidence of problems related to feeding and nutrition. They may have a wide range of diagnoses, including autism, Down syndrome, cystic fibrosis, cerebral palsy, pediatric AIDS, spina bifida, muscular dystrophy or Prader-Willi syndrome.

Feeding and nutrition problems may arise from such issues as prematurity, extended hospital stays and tube feedings at the beginning of life, poor muscle tone, compromised oral-motor abilities, effects of medications, biochemical imbalances, gastroesophageal reflux, behavioral problems, and even anxious parenting.

“Good nutrition is essential to promote optimal growth and development,” said Betty Lucas, RD, MPH, nutritionist at the Center on Human Development and Disability. “It’s important to intervene early on and help families who have children with special needs. An estimated 40 percent of all children with special health care needs may be at risk for nutrition and feeding problems. Children present for a variety of reasons: underweight, failure-to-thrive, overweight, obesity. Picky eaters may have inadequate dietary intake. For example, the rigid patterns in children with autism may be reflected in their food intake as well as in other aspects of life. A child who is not a self-feeder is always at risk because he has to be fed by someone. If a child is not able to chew, she may be limited to soft, mushy foods. With children who have developmental delay, the parents sometimes don’t understand stages in feeding, such as readiness to start finger foods. So there is a need for education and guidance on moving the child to a more mature diet.”

Some of the more challenging cases, said Lucas, involve babies born prematurely or at low birth weight. “They often have major issues,” she said. “They’re sometimes in the hospital for a long time, they have breathing problems and other medical issues, they can’t feed orally, and they receive tube feedings and oxygen. Once these babies come home, there may be difficulty transitioning to bottle or breastfeeding. Some may have gastroesophageal reflux and so it hurts to feed. The baby’s distress makes the parents worried and anxious, which can compound the problem.”

CHDD approaches childhood feeding and nutrition problems of children with special health care needs on a number of fronts, including clinical services, professional training, outreach to the community and dissemination of information on relevant research.

In collaboration with the Children with Special Health Care Needs Program of the Washington State Department of Health, CHDD administers a program called Nutrition for Children with Special Health Care Needs (CSHCN) to support nutrition services statewide for children and adolescents and their families. Some 90 registered dietitians—from local health departments, community clinics, hospitals, early intervention centers and home health agencies—belong to the CSHCN Nutrition Network. CHDD launched and continues to coordinate some fifteen Community-Based Feeding Teams, also part of the contract with the Department of Health. These interdisciplinary teams typically include a registered dietitian; a feeding specialist such as an occupational therapist, speech therapist or physical therapist; a public health nurse or school nurse; a feeding behavior therapist such as a social worker or psychologist; sometimes a physician; and other professionals as appropriate. The teams are based in community facilities across the state and work directly...
with families and other caregivers to resolve feeding and nutrition problems. Team members meet annually at the UW for continuing education and sharing of information.

CHDD staff member Sharon Feucht, RD, MA, is a member of a community-based feeding team at Holly Ridge, an early intervention center located in Bremerton, Wash. “Our four-member team’s activities are typical of most feeding teams,” she explained. “Someone—often the child’s direct therapist—videotapes the child eating in the home. As a team we watch and analyze the video. The child’s growth and food intake are evaluated and a feeding assessment is completed. The team report goes to the child’s doctor and direct therapist, making recommendations for nutrition therapy interventions.”

Clinical feeding and nutrition services are an important component of CHDD’s Child Development Clinic, which offers comprehensive interdisciplinary evaluation, diagnostic, intervention and referral services for children with a wide range of developmental disabilities. Lucas coordinates the nutrition evaluations. While CHDD has a feeding team, since the state’s community feeding team network is now well established, most children can be referred for follow-up services in their own communities.

Lucas and other specialists in the Child Development Clinic also see infants, children and adolescents with Prader-Willi syndrome, a genetic disorder. In the early months, a child with PWS is at risk for failure-to-thrive, because the sucking ability is impaired by low muscle tone. By school age, children with PWS usually develop an obsessive interest in food, which can lead to overeating and life-threatening obesity. Intensive intervention is required. “Success is making sure they don’t gain excess weight, and that the family is managing as well as they can,” said Lucas. “Since PWS can now be diagnosed in the first few weeks of life, we have the opportunity to intervene early.”

Children and young people with phenylketonuria receive ongoing dietary management in the PKU Clinic at CHDD, coordinated by Cristine Trahms, MS, RD. People with PKU lack a liver enzyme to metabolize an amino acid called phenylalanine, and must remain on a lifelong highly restrictive low-protein diet to prevent severe brain damage. (An article on the PKU clinic is in the Spring, 2003 issue of CHDD Outlook.)

CHDD’s child nutrition focus, a bimonthly newsletter for health professionals and others who serve children with feeding or nutrition problems in a community or ambulatory setting. The newsletter, edited by Feucht, is available by subscription.

Each issue highlights a specific disorder or nutrition concern and offers practical suggestions, including nutrition assessment and intervention strategies, case studies, and references and resources for clients, families and health care professionals. Sample topics include updates on pediatric formulas, growth assessment, prematurity, prevention and management of childhood obesity, issues related to specific syndromes and health conditions, and costs of nutrition services.

Subscribers to Nutrition Focus may also receive a membership in the Pediatric Nutrition Consultation Online Listserv, a closed, consultative online forum for registered dietitians who serve children with special health care needs or chronic conditions. It is unique in providing evidence-based answers to posted questions, using nutritionists and dietitians from CHDD and Seattle’s Children’s Hospital and Regional Medical Center as consultants. Information on the newsletter and listserv is available online at http://depts.washington.edu/chdd/credd/co_NutriFocus.html or from Feucht at 206-685-1297 or sleucht@u.washington.edu.

The listserv was developed as part of a federal grant to CHDD and Children’s Hospital that also funded development of an three-day pediatric nutrition course, “Assuring Pediatric Nutrition in the Hospital and Community,” now offered every summer to participants from across the country and abroad, as well as development of a new Pediatric Nutrition website at http://depts.washington.edu/nutpeds/.

“Without intervention, many children with feeding problems require costly medical treatments,” said Lucas. “Early assessment and intervention by qualified nutrition and other health care professionals can lead to improved diet, appropriate growth, improved health status and fewer hospitalizations, as well as cost savings in overall health care expenditures.”

New research affiliate appointed

Dennis W. Shaw, M.D., has been appointed as a research affiliate at CHDD. He is an associate professor of radiology and a staff radiologist at Children’s Hospital and Regional Medical Center. His research focus is on the application of magnetic resonance technology, including MR imaging and MR spectroscopy, to gain a greater understanding of central nervous system development and function. He is current research projects focus on autism, mitochondrial disease, and abnormal cerebellar and brainstem development. Shaw received his medical degree from the University of Washington in 1983.
We think this prevention program is a model that could help build a stronger community around the classroom and school.

Webster-Stratton has a second project that focuses on children in kindergarten and first grade, many of whom are graduates of Head Start programs. Schools picked for the research program serve families demographically similar to those served by Head Start. They are chosen based on the percentage of families served who live in poverty and who speak English as a second language, since such factors increase family stress and the risk of children having social adjustment problems.

While the current research focuses on Seattle, programs based on Webster-Stratton's six earlier randomized control/treatment studies of children diagnosed with behavior disorders, called the Incredible Years Training Series, have been widely promulgated in other parts of the United States, as well as in Canada, Norway, Sweden, Holland, Britain and Wales. The federal Office of Juvenile Justice Delinquency Prevention has highlighted the series as an exemplary best-practices and "blueprint" program and an empirically validated means of strengthening the family and helping prevent and reverse trends of increasing delinquency and violence.

"Our earlier programs worked with children diagnosed with behavior disorders, and we believe the classroom preventive program is going to be even more effective, because the 'dose' of intervention is higher," said Webster-Stratton. "The children receive the curriculum from teachers several times a week. Not only the aggressive child is learning problem-solving skills, but the shy, withdrawn child is learning how to make friends, and everyone in the class is learning how to respond to the aggressive child. The teacher is building a community somewhat like a family where each individual has different needs and contributions."

Visit the CHDD website at http://depts.washington.edu/chdd