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# **Advances in Health Care and Medical Science**

*Presenting New Challenges for Schools*

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**T**he last several decades have seen tremendous progress in the medical science, research, and technologies that can be used to prevent and fight childhood disease. As a result, children born with or who acquire a medical disorder or disease are much more likely to survive the condition and live longer, healthier lives. However, a greater chance for survival does not come without complications. Although children with serious medical conditions may survive, they often experience physiological, psychological, and emotional effects secondary to the medical condition and/or the treatment. Many of these effects continue into adulthood. In addition, changes in the way medical treatments are administered have increasingly emphasized outpatient care and de-emphasized inpatient stays, in part due to advanced technologies and medications that make this possible. Therefore, most, if not all, treatment may be administered on an outpatient basis. This paradigm shift places an increased burden on families to oversee the child's treatment and follow-up, as well as on educators, who must coordinate home instruction or make necessary preparations for the child's re-entry to the classroom. It is important to examine how

advances in medical science and medical treatment strategies have affected schools and the role of educators in ensuring every child in the class has a chance to succeed.

## **ADVANCES IN MEDICAL SCIENCE**

### **Increased Survival Rates**

The survival rates for most childhood medical conditions have improved dramatically over the past several decades, even in light of increased prevalence rates for some diseases. For example, while the incidence of all forms of invasive cancers has increased over the past 30 years from 11.5 cases to 14.5 cases per 100,000 children, the 5-year survival rates also increased, from 58 percent in 1975 to almost 80 percent in 2005 (Ries et al., 2008). The number of live births of low birth weight (LBW) and very low birth weight (VLBW) infants increased 11.8% and 24.3%, respectively, from 1980 to 2000, while infant mortality declined 45.2% during the same period (Iyasu & Tomashek, 2002). Incidence rates of new cases of pediatric AIDS in the United States decreased 4% from 2003 to 2005, and in 2005, only seven children under the age of 13 died from AIDS-related causes (Abdelmalek & Elston, 2008). Prevalence rates for both type 1 and type 2 diabetes are rising worldwide, yet rates of death from diabetes-related complications have dropped three- to sixfold over the past 50 years (Portuese & Orchard, 1995).

Although survival rates for childhood illness are improving, the long-term consequences of surviving a major medical condition and treatment remain significant. For instance, while rates of death attributed to type 1 diabetes in childhood have dropped due to better insulin maintenance and prevention of acute metabolic complications, the chronic effects of insulin therapy over time cause significantly greater chances of death from cardiovascular disease by adulthood (Portuese & Orchard, 1995). Advances in care of LBW and VLBW infants has significantly reduced infant mortality, but their survival has introduced new challenges in terms of rehabilitation and long-term outcomes arising from complications due to prematurity. Treatments for childhood cancer, including chemotherapy and stem cell transplants, have significantly increased survival rates, but they carry with them significant short- and long-term side effects. Thirty years ago, many children with chronic illnesses died from complications before reaching the age of 5, whereas nowadays most children are surviving their illnesses and participating in general education. However, the side effects and long-term consequences of treatment can be significant.

### **Greater Specificity of Medical Diagnosis and Treatment**

Research advances have been employed to design more refined and narrowly targeted technology, methods, and pharmacological interventions to combat disease. Forty years ago, brain scans consisted of fixed image scans of moderate detail, useful for identifying gross abnormalities. Modern scanning technology offers substantially greater image clarity,

including three-dimensional rendering as well as the ability to monitor brain processes at work, both of which are helpful in identifying more subtle abnormalities of function. Treatments for childhood cancer consisting of powerful, broadly acting radiation, chemotherapy, and radical surgery (removing large amounts of cancerous and interconnected healthy tissue) have paved the way for increasingly refined treatments and surgery, which use computer-generated modeling and lasers that target the cancer cells directly with less collateral damage to surrounding healthy cells. Research on bone marrow and stem cell transplants is promising and predicts even more targeted interventions, as new, healthy cells will target and replace malignant ones.

Medications have also advanced significantly in past decades and now have much greater specificity of action and reduced side effects. Historically, psychopharmacological treatment for psychotic symptoms involved broad-acting dopamine antagonists such as chlorpromazine (Thorazine), which also induced marked side effects, including drowsiness, cardiovascular changes, neuromuscular reactions, dyskinesias, autonomic reactions, and so on. More recent antipsychotic medications, such as aripiprazole (Abilify), are highly targeted to specific dopamine receptors and offer partial antagonist (blocking) action while facilitating other necessary dopamine transmissions. This differential action is believed to moderate dopamine receptors involved in psychotic symptoms more effectively while decreasing the range and intensity of potential side effects.

Medications for controlling asthma have improved from bronchodilators, which minimized acute symptoms, to anti-inflammatory and antileukotriene medications and immunotherapy, which seek to control long-term effects and prevent the occurrence of acute asthma attacks. Medications to abate allergy symptoms have improved to include sustained-release mechanisms with targeted antihistamine action, which minimizes side effects such as drowsiness, enabling children to remain in school and alert (McCabe, 2008). Children with diabetes can successfully participate in general education using insulin pumps, oral or injected medications, or both in addition to dietary management. HIV medications, such as integrase inhibitors, entry inhibitors, nucleosides reverse transcriptase inhibitors, nucleotide analogs, and protease inhibitors, have demonstrated efficacy in reducing the reproduction of the HIV strain. Many of these HIV medications are combined into one pill, making it easier for children to adhere to the regimen. Better medicines allow for shorter hospital stays and greater ability to reintegrate with normal daily activities while still effectively fighting disease.

### **Increased Emphasis on Outpatient Care**

Outpatient services increased 29% from 1992 to 2000, while the rate of inpatient hospitalization and length of stay plateaued or decreased during the same time (Bernstein et al., 2003). This is largely due to financial pressures of cost containment, as well as the scientific and technological advances described above that have allowed a shift from primary care in hospitals to outpatient settings, ambulatory settings, or home. The treatment of certain childhood medical conditions, such as cancer, will

likely continue to require a period of hospitalization due to the complexity of the treatment and need for continual monitoring. However, even these treatments increasingly are conducted on an outpatient basis. Whereas a cancer treatment may have previously required a 2- to 4-week hospital stay, current methods may use a hybrid approach with a 1- to 2-day admission followed by 6 to 10 outpatient visits (Blank & Burau, 2004; Shaw & McCabe, 2008). It is increasingly likely that many pediatric conditions will be treated on an outpatient basis, which means that families and schools will be expected to step into the caregiving role previously fulfilled by the hospital treatment team. This trend reflects a decentralized approach to health care, where parents, schools, and outpatient clinics must share the burden of care and new roles may be assigned to ensure continuity of treatment (Shaw & McCabe).

## **CHANGING ROLE OF SCHOOLS**

Schools are responsible for ensuring a free and appropriate education is provided to all children, including those who are experiencing a medical condition. Schools are challenged to develop flexible education plans that meet the needs of the child's medical regimen. For example, a child may not immediately and fully transition back to school from an inpatient setting but instead be reintegrated in a staggered fashion that reflects a medical protocol requiring brief inpatient stays, ongoing outpatient visits, and recuperation time at home. The use of medications to continue treatment beyond the hospital is common practice, which means that schools are increasingly educating children who are medicated for a variety of reasons.

### **Increase in Pharmacological Interventions**

Recent evidence suggests an increasing trend for medication therapy as a primary treatment strategy. For example, use of psychotropic medications with children has tripled over the last decade, with prevalence rates as high as 6.3%, comparable to adult utilization rates (Zito et al., 2003). Between 6 and 9 million children are diagnosed with a serious mental illness (NAMI, 2004), and most are receiving psychiatric medications, many of which have not been extensively studied for efficacy and long-term effects in children. In some cases, the medications are not prescribed for their original intended purpose. For example, prescriptions of antipsychotic medications to children increased fivefold from 1995 to 2002, and over half of those prescriptions were written not for psychotic symptoms but for behavioral or affective disorders, conditions for which antipsychotics have not been extensively studied (Cooper et al., 2006).

In addition to the millions of children receiving psychopharmacological interventions, over 7 million children suffer from seasonal allergies (Bloom & Cohen, 2009), 9 million children suffer from asthma (Akinbami, 2006), almost 200,000 are diagnosed with type 1 or type 2 diabetes (NIDDK, 2008), and almost 250,000 children suffer from cancer (Ries et al., 2008). Between 2002 and 2005, pediatric prescription medications to treat type 2 diabetes increased 135% to 166%, asthma medications increased 47%, ADHD medications increased 40%, and antihyperlipidemics (cholesterol-lowering)

drugs increased 15% (Cox, Halloran, Homan, Welliver, & Mager, 2008). This means that at any given time, educators are likely to encounter one or more children receiving medications that may significantly alter physical states, arousal, attention, cognition, behavior, and emotional functioning.

### **Multidisciplinary Approach**

An Individualized Education Plan (IEP) must account for the physical, psychological, and academic consequences associated with the medical condition and treatment. Best practices call for school multidisciplinary teams to collaborate with medical and community agencies and the family to identify an education strategy that accommodates the medical regimen while optimizing the child's opportunity for as normal a schooling experience as possible. Education teams need to be knowledgeable of the medical condition, the nature of the treatments administered, and typical side effects. The child may have academic, physical, socioemotional, and adjustment needs resulting from the condition, treatment, multiple absences from school, or a combination of these factors. For example, many pharmacological interventions, which are designed to attack dangerous infectious or malignant agents or remedy neurological conditions, cause side effects that significantly impact learning and behavior. These side effects include sedation, restlessness, irritability, lethargy, fatigue, difficulty focusing, pain, nausea, emotional lability, tremor, dyskinesias, and so on. When the education team is able to anticipate and mitigate these effects through careful planning of an IEP and/or an individualized health plan, in cooperation with the family and medical team, the child's adjustment and responsiveness to instruction is maximized.