CHAPTER 2

Evidence-Based Interventions and Supported Inclusion of Students with ASD

Although the ASD are neurological disorders, specialized behavioral and educational approaches are the main interventions. However, not all approaches are equally useful. Research has identified some definite dos and don'ts, and it offers some guidance on the effects of inclusive and self-contained settings, though our knowledge of this topic is far from complete. Medications can also help some students with ASD, but are not substitutes for behavioral and educational interventions.

In order to develop and implement sound educational programs for students with ASD, teams need to have a working knowledge of what is known about effective interventions. This knowledge will enable them to recognize opportunities to use evidence-based practices, and to steer clear of approaches that are likely to fail.

EFFECTIVE INSTRUCTION: WHAT DOES THE RESEARCH SAY?

The evidence base on effective instructional practices has accrued mainly from a large number of meticulous but small studies (National Autism Center, 2009). These studies have yielded a broad repertoire of useful instructional techniques, but the nature of the evidence hinders all but the most die-hard readers of published reports from "seeing the forest for the trees." Fortunately, however, some general themes have emerged. In an influential review, Iovannone, Dunlap, Huber, and Kincaid (2003) have condensed the research findings into six elements:

1. *Individualized services and supports*. Studies in this area have made use of the particular interests and learning styles of each student with ASD to increase engagement in

academic and social activities. For example, the use of objects relating to preoccupations of students with ASD may increase participation in play activities (Baker, Koegel, & Koegel, 1998) and support the development of such skills as asking questions (Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998). The use of pictures rather than verbal instructions, which may be difficult for students with ASD to attend to and comprehend, may increase students' time on task during academic activities (Bryan & Gast, 2000). Iovannone et al. (2003) suggest that individualization also involves taking into account family priorities in selecting instructional goals. Though these authors have not identified research studies to support this suggestion, it certainly makes sense. We return to these issues in Chapter 5.

2. *Systematic instruction*. Systematic instruction involves selection of goals based on a careful assessment of each student, specifying instructional procedures for achieving these goals, and collecting objective data to determine whether the goals are being met. Most studies in this area have been conducted within an ABA framework. As noted in Chapter 1, ABA is a systematic approach to using principles of learning theory to address socially important problems. Iovannone and colleagues (2003) point out that this research does not focus on any one teaching technique. Rather, ABA techniques range from highly structured one-to-one instruction to group instruction to child-led interactions. Many of these techniques are presented throughout this book. The key is to be thoughtful about selecting goals and instructional methods, and diligent about evaluating progress by directly and objectively measuring how the student is performing. Approaches to implementing and evaluating instruction are discussed in Chapters 7–12.

3. *Comprehensible/structured learning environments*. As also discussed in Chapter 1, students with ASD often struggle to identify social expectations, know when to make transitions within and between activities, and pick out relevant information to focus on. Strategies to address these issues include the use of visual schedules to facilitate transitions, timers to indicate the beginning and end of an activity, separate and clearly defined spaces for different activities, and organized work spaces (e.g., with folders for different subjects, locations for putting completed assignments).

4. *Specific curriculum content focusing on difficulties associated with ASD*. Iovannone et al. (2003) have emphasized instruction in social and communication skills, such as initiating and responding to invitations to join an interaction, play and leisure skills, engaging in conversations, making appropriate requests, and comprehending statements made by others. Also important are skills that will increase students' independence, such as completing self-help tasks. Curriculum for difficulties associated with ASD is discussed in Chapter 10.

5. *Functional approach to problem behavior*. This approach begins with an assessment aimed at identifying three sets of factors that may influence challenging behaviors for an individual student: (a) *antecedents*, which are events in the environment that precede a problem behavior and may serve as a trigger (e.g., requests to complete a task or put away a preferred toy); (b) *consequences*, which are events that immediately follow a behavior and may increase the likelihood that the behavior will recur (e.g., attention from adults, postponement of having to do work); and (c) *setting events*, which are situational factors

that may influence how the student responds to antecedents and consequences (e.g., illness, lack of sleep, being in unfamiliar surroundings). Assessment of these factors leads to the development of a behavior plan aimed at reducing the problem behavior and enhancing more appropriate behaviors. The primary emphasis is on preventing the problem behavior. Examples of prevention strategies include teaching and rewarding more appropriate ways to communicate displeasure, avoiding antecedent events that are not necessary for the student to encounter, and improving the overall school experience by scheduling favorite activities at various times throughout the day. The plan also may include strategies for responding to the behavior when prevention efforts fail (e.g., ignoring problem behaviors when safe to do so, redirecting the student to the task). Functional behavior assessment and intervention are described in Chapter 12.

6. *Family involvement.* As with all other students, it is important to collaborate with families in educating their children, but this point warrants particular emphasis for students with ASD for several reasons. First, by the time students enter elementary school, their families already have a long history of adjusting to the students' ASD. Many students will have been diagnosed at the age of 2 or 3 years and will have shown difficulties long before then. Others, particularly those with high-functioning ASD, may not be diagnosed until elementary school or even later, but their families still have had to cope with the students' social and communication difficulties. Thus families are likely to have acquired considerable expertise, both from direct experience and from what they have learned from other families, searches of published materials, reports in the popular media, and so on. For this reason, their opinions need to be taken seriously. Second, because of the communication difficulties associated with ASD, students with ASD may be unable or unwilling to report what happened at school. Although it can be difficult to get information on school even from typically developing students, who are notorious for giving monosyllabic answers to their parents' inquiries, it may be impossible to obtain it from some students with ASD. Consequently, regular information sharing between home and school is crucial. In addition, to help these families cope with the challenges of raising children with ASD, teaching caregivers effective ways to enhance their children's skills and cope with challenging behaviors can be a very effective intervention that promotes educational achievement (Iovannone et al., 2003). Family involvement is examined in more detail in Chapter 5.

INSTRUCTIONAL PRACTICES THAT DON'T WORK

A number of interventions are based on simplistic or outdated notions about ASD, and unfortunately these interventions often turn out to be unhelpful or worse. Surveys reveal that many (perhaps most) students with ASD participate in such interventions at one time or another (Levy & Hyman, 2003). Often families initiate these interventions, but perhaps just as often they are recommended by professionals (Smith & Antolovich, 2000).

An outdated notion that continues to influence educational practice is that many or all of the problems in ASD are due to an inability to process sensory information or produce

a motor response. For example, an intervention called *sensory integration therapy* is commonly offered to students with ASD; despite its name, however, it does not address the kinds of sensory integration problems identified in research, such as difficulties in combining gestures and speech (see Chapter 1). Rather, it is based on the view that some senses develop earlier than others and provide a basis for the development of other senses and higher-level skills (Ayres, 1979). In particular, it focuses on tactile activities (e.g., brushing a student's body), moving the student through space (e.g., swinging him or her back and forth), and stimulating visceral responses (e.g., putting pressure on the child's joints). Many students with ASD enjoy these activities and find them relaxing. Regrettably, however, there is little research on whether sensory integration therapy actually helps students with ASD (Dawson & Watling, 2000). Research on applications of this therapy to groups of children with such other classifications as attention-deficit/hyperactivity disorder (ADHD) suggests that it probably is not effective (Vargas & Camilli, 1998).

In contrast, focusing directly on known difficulties in sensory processing or integration and applying the principles of effective instruction are often successful. For example, if a student with ASD appears distressed by something in the environment, teams can conduct a functional analysis to identify the particular sights or sounds that are triggering the distress. Then they can provide systematic instruction to desensitize the student to those sensations, or they can rearrange the environment to minimize the student's exposure to the sensations (Koegel, Openden, & Koegel, 2004).

As another example, nonspeech oral–motor therapies are intended to improve students' ability to produce speech sounds by having the students engage in various exercises, such as blowing horns, making movements with their tongues or mouths, puffing their cheeks, or massaging their gums or jaws. Unfortunately, these exercises do not really involve muscles used to produce speech, and the available research evidence, though admittedly limited, suggests that the exercises fail to improve the quality or quantity of students' speech sounds (Lof, 2008). Accordingly, the American Speech and Hearing Association has recommended against them (Ad Hoc Committee on Apraxia of Speech in Children, 2007). In contrast, systematic instructions on oral–motor skills that do involve producing speech sounds, such as positioning the mouth, jaw, and tongue to support making a particular sound, may have some utility (Rogers et al., 2006).

Another simplistic but popular notion is that students with ASD have problems with attachment or bonding. As previously discussed, however, attachment to caregivers is actually a strength for students with ASD and is seldom an area that requires intervention. Nevertheless, a number of school-based interventions do focus on attachment or bonding. For example, *gentle teaching* focuses on providing unconditional support and encouragement to individuals with ASD (McGee & Gonzales, 1990). The Higashi School approach is described as a "holistic approach [that] captures the essence of humanity and reflects the sensibilities and sensitivities, the intellect and the aesthetics of humankind" (Welch, 1997). None of these interventions have been scientifically evaluated for students with ASD, and they are unlikely to be effective. In contrast, systematic instruction on social skills that really are difficult for students with ASD, such as conversing with peers, is usually effective (Bellini & Akullian, 2007).

Unfortunately, perhaps because students with ASD often display isolated areas of age-appropriate or superior functioning, and perhaps because they often are so attractive (without obvious physical features revealing a disability), dubious educational practices abound. Educators must be on the alert to distinguish plausible from implausible teaching approaches. Plausible ones will have the six features identified in the preceding section. Implausible methods will usually raise red flags beyond simplistic appeals to apraxia or bonding. Signs to beware include promotion of the intervention on personal anecdotes and case reports rather than careful scientific research; a disconnect from what is known about ASD (e.g., describing ASD as gastrointestinal disorders, despite much research indicating that they are genetically based neurological disorders); claims that are too good to be true (e.g., "cure" or "miracle"); vague goals (e.g., increased centering or modulation); and failure to consider disconfirming results from well-designed studies (Smith & Wick, 2008). Table 2.1 compares the characteristics of effective and ineffective practices.

INCLUSION VERSUS SELF-CONTAINED EDUCATIONAL PLACEMENTS

Beyond identifying teaching methods that do and do not work, a crucial question is how to develop an educational plan that enables a student with ASD to benefit. An overarching issue is placement—especially whether a student is to be included in general education classrooms or assigned to self-contained classrooms, which may be located in the same building with general education services or on a separate campus. The conventional wisdom is that because inclusion puts students with ASD together with typically developing peers, it offers more opportunities for social interaction, provides more appropriate role models, and creates higher expectations than do self-contained placements. Self-contained classrooms, however, may offer more opportunities than inclusive settings for individualized instruction by educators who are skilled in teaching students with ASD. Also, they may provide

TABLE 2.1. Characteristics of Effective and Ineffective Practices

Effective practices	Ineffective practices
Individualized services and supports	Claims of miraculous improvement or even cure
Systematic instruction	Reliance on personal anecdotes as evidence
Comprehensible/structured learning environments	Failure to recognize ASD as neurologically based learning differences
Specific curriculum content focusing on difficulties associated with ASD	Simplistic or outdated views of ASD
Functional approach to problem behavior	Vague goals
Family involvement	

a haven where students with ASD can experience more academic and social success than they would in an inclusive setting, without as many distractions and stressors.

The IDEA 2004 legislation and regulations stress the importance of the "least restrictive environment." The underlying belief is that students with disabilities (including ASD) have a right as citizens to be in the most inclusive placement possible, rather than segregated from other students. Thus, all else being equal, inclusion in a general education placement is regarded as preferable to a self-contained classroom. However, skeptics worry that the real motives for focusing on the least restrictive environment are sometimes more pecuniary than principled: Inclusive placements tend to be cheaper than self-contained classrooms (Tomsho, 2007).

Despite long-running debate about the relative merits of inclusive versus self-contained placements, few studies have actually compared outcomes of students with ASD in such settings, and those few studies focus mainly on preschoolers rather than school-age students. With preschoolers, there is evidence that students may interact more (Smith, Lovaas, & Lovaas, 2002; Strain, 1983) and display fewer repetitive behaviors (McGee, Paradis, & Feldman, 1993) when they are with typically developing peers than when they are with other students who have ASD. However, there is also evidence that students with ASD can be physically present in a general education class but not really included in any meaningful way. They may spend the large majority of their time sitting in a separate part of the classroom and doing activities that are irrelevant to what the rest of the class is doing (Myles, Simpson, Ormsbee, & Erickson, 1993). In addition, they may be socially isolated, with few or no peer interactions (Chamberlain, Kasari, & Rotheram-Fuller, 2007). As is true of individual teaching methods, therefore, it is important to be wary of simplistic views about inclusion versus self-contained classes. "Full inclusion for everyone" or "specialized classes for all students with ASD" are slogans rather than useful guides to decision making.

Another important consideration is that the distinction between inclusion and self-contained classes may be less clear than it initially appears. Students with ASD in inclusive placements often have pull-out services that take place in self-contained settings for part of the day, while students in self-contained classes often have opportunities for inclusion during selected activities. For this reason, IDEA (2004) distinguishes *full inclusion* (defined as spending at least 80% of the day in general education) from *partial inclusion* (defined as spending 40–79% of the day in general education). According to this definition, 35% of school-age students with ASD in the United States were fully included in 2007. Another 18% were partially included. An additional 37% were placed in general education schools, but spent most of their time outside of general education classes and activities. Only 10% were in separate locations, such as special schools or residential facilities. Overall, the large majority of students with ASD spend some portion of their day in inclusive settings, though the amount of time varies greatly across students.

Moreover, within an inclusive placement, students with ASD can be supported in a variety of ways. For example, related services such as speech therapy can be provided in the classroom rather than by pulling the student out for an individual session. Assigning a paraprofessional aide to help the student follow the daily routine is also possible. *Collaborative teaching* (also referred to as *coteaching*, *support facilitation*, and *team teaching*) is another

option. This approach involves a special education and a general education teacher working together to teach a single classroom with students of varied abilities. With these supports, an inclusive placement may end up costing as much as or more than a self-contained classroom.

In the absence of research demonstrating a clear advantage for one kind of placement over another, and with options ranging from 0% to 100% inclusion and a range of strategies to support students in inclusive settings, how can anyone decide whether a placement is appropriate? There is no easy answer, but there are some key considerations. For students who are not yet in an inclusive setting, the two best predictors of successful inclusion are overall level of functioning and severity of challenging behavior. Unsurprisingly, the more age-appropriate skills that students have, the more likely they are to benefit from a general education curriculum. The fewer challenging behaviors that students display, the fewer concerns arise about safety and about the potential for disrupting the class. Thus students with ASD who score in the average range on standardized tests of cognitive and academic functioning tend to be strong candidates for inclusion. Students with mild delays may also benefit. Students with more significant delays are likely to require extensive supports, such as a one-to-one aide, daily speech therapy and special education sessions, and other individualized services. However, with such supports, many of these students can be successfully included as well (Browder & Spooner, 2006). Partial inclusion is more likely than full inclusion, as the number of individual services and modified assignments require extensive time outside of the general education setting.

Students with significant behavior problems (e.g., frequent aggression) may need to be in a self-contained setting to ensure safety and consistent implementation of a behavior plan. Even milder challenging problems may raise concerns. For example, such behaviors as occasional loud protests, flopping to the floor, running away, or vocalizing at the wrong times may be viewed as trivial in a self-contained setting, where special educators feel sure they can handle them. However, in a general education setting, educators may feel much less comfortable and may worry that if other students see a student with ASD "getting away with" these behaviors (i.e., not receiving the same kind of discipline that other students would receive, such as being sent to the principal's office), the whole class will spin out of control. In our experience, however, many general education students understand and accept that a student with special needs may need an individualized plan to address challenging behaviors and that some behaviors simply need to be tolerated if they are a bit distracting but are not otherwise a problem. When students lack this understanding, it is an important lesson for them to learn and not, in our judgment, a reason to keep a student out of a general education setting.

For students with ASD who are already partially or fully included, the considerations in determining whether or not inclusion is successful include the following, with more detailed information about how to assess them in Chapters 3–4:

1. *Does the student have meaningful, satisfactory social interactions with peers?* The most obvious potential advantage of inclusion over self-contained placements is the opportunity to interact with typically developing peers. If little or no such interaction is happen-

ing, this defeats one of the main purposes of inclusion. It is often useful to have an outside observer watch for an hour or two, during some times when interaction could occur (e.g., recess, physical education, lunch), and note how often the student with ASD interacts with peers (Chapters 3 and 11). The interactions could take place in response to invitations by peers, collaborative activities set up by adults, or initiations by the student. The point is that some sorts of positive interactions need to be occurring on a regular basis.

2. *Does the student participate successfully in group activities?* To be truly included in a general education classroom, a student needs to be able to join group activities, rather than always working alone or individually with an adult. Educators may modify the expectations for group participation in a number of ways to promote success (Chapter 7). For example, they can be selective about which group activities the student joins—asking the student to participate in some but skip others, based on the student's abilities and interests. Thus a student who enjoys writing and has strong motor skills may participate in group activities focusing on handwriting, but may work on an independent assignment instead of joining a group discussion about a historical event. Educators may also provide differentiated instruction during group activities, so that the student receives individualized questions or assignments. The amount and kind of group participation do not necessarily have to be the same as for other students, but such participation does need to occur in order to justify an inclusive placement. Some signs of successful participation include greeting classmates, listening to the teacher who is leading the activity, responding to questions or volunteering comments, taking notes or recording answers, working on an assignment that the teacher is discussing, or joining classmates to sing or recite a passage.

3. *Is the student actively engaged in learning throughout the large majority of the day?* This is necessary if the student with ASD is to have the same opportunities as other students. It includes both structured times when educators are directly teaching students, and less structured times when students have more freedom to choose activities (such as lunch, recess or free periods, and pauses when some students have completed an assignment and are waiting for the rest of the class to catch up). Both structured and unstructured times can be challenging. During structured times, students with ASD may leave or wander away from the teaching area, or they may stay where they are supposed to be but fidget, turn away from the rest of the class, pay attention to something other than what is being taught (e.g., noises in the hallway), or display repetitive behaviors. During unstructured times, while other students are likely to find something useful to do (e.g., striking up a conversation with each other, reading a book, or playing a game), students with ASD may isolate themselves, engage in repetitive behaviors or routines, or simply sit and do nothing. Periodic "downtimes" of a minute or two between activities, as well as one or two longer downtimes of perhaps 10–15 minutes a couple of times a day, are appropriate. However, it is important that the student engage in constructive activities—academic, social, self-help, or play—for the remainder of the school day, as other students do.

4. *Is the student making measurable progress toward most goals in his or her IEP or 504 plan?* Obviously, such progress is necessary to justify continuation in an inclusive place-

ment (or any other placement). Evaluation of whether progress is occurring should be based on objective information documenting skill acquisition, such as data recorded from direct observations of how often a student displays specific skills in a particular setting (Chapters 7–12).

5. *Is the student learning academic skills at a rate that would be expected, given his or her previous history?* As with progress toward IEP goals, academic progress should be documented with objective data (e.g., tests conducted before and after a unit). If the data show that a student is learning new academic material, this is important evidence in favor of continuing an inclusive placement. However, if the student is making slow progress, he or she might be better served in a self-contained classroom with more access to specialized instruction.

6. *Does the student enjoy coming to school and appear happy or satisfied most of the time?* If not, does he or she seem happier outside school? The student's feelings about an inclusive placement are a key consideration. Some students with ASD can express their feelings in words, while mood and behavior may be more reliable indicators for other students.

7. *Does the student show increased independence and reduced reliance on the support of adults (such as a one-to-one aide) over time?* When students leave school and enter the adult world, there will be few or no opportunities for them to have the support of a one-to-one aide. In the long run, therefore, it is essential for them to learn to complete tasks and take care of themselves with more and more independence. If this is not happening in an inclusive placement, a self-contained setting may be necessary to consider.

Before concluding that a "no" answer to any of the above questions indicates that inclusion is inappropriate, it is important to examine whether the six elements of effective instruction are in place (individualization, systematic instruction, comprehensible environments, specialized curriculum content, functional approach to problem behavior, and parent involvement), as well as to evaluate the quality of these elements. These issues are examined in more detail in Chapters 7–12.

MEDICATIONS

Although medications take a back seat to behavioral and educational interventions, a few students with ASD (but not the majority) do benefit from them. Of course, educators and ASD specialists cannot prescribe or recommend medications unless they are also qualified health care professionals, but they should be aware of what medications are available (summarized in Table 2.2).

The clearest indication for considering medication is significant irritability, manifested by aggression, self-injury, or frequent and severe tantrums. Functional behavior assessment and intervention can be quite effective, as described in Chapter 12. However, if the

TABLE 2.2. Medications for Students with ASD

Challenging behavior	Possible medications
Irritability (tantrums, aggression, self-injury)	Atypical neuroleptics (e.g., risperidone [Risperdal])
Overactivity, inattention, impulsivity	Methylphenidate (e.g., Ritalin, Concerta, or Metadate) Dextroamphetamine (e.g., Adderall)? Atomoxetine (Strattera)?
Repetitive behaviors or routines	Selective serotonin reuptake inhibitors (e.g., fluoxetine [Prozac])? Atypical neuroleptics?
Mood swings	Guanfacine (Tenex)? Clonidine (Catepres)? Valproic acid (Depakote)?

Note. A "?" indicates that a medication has not been well studied in students with ASD as of this writing.

behaviors are too severe to permit waiting until the function-based intervention takes effect (often several weeks), or if the behaviors persist even when such an intervention is in place, medication may be warranted. The best-studied medication for irritability in students with ASD is risperidone (Risperdal), which reduces levels of the neurotransmitter dopamine in the brain. Risperidone has approval from the U.S. Food and Drug Administration (FDA) for use with the subset of individuals with ASD who are highly irritable, and it substantially reduces this problem in most such individuals (McCracken et al., 2002). It also may have collateral benefits, such as improvements in social functioning (Williams et al., 2006). A troublesome side effect, however, is that the drug promotes weight gain. In the McCracken et al. (2002) study, the average gain was 6–9 pounds in 16 weeks. Little information is available on whether this weight gain continues over time and, if so, whether it poses health risks, but obviously this is a potential worry. Risperidone can also cause lethargy and unresponsiveness. Thus it is an important treatment option for individuals with ASD who have severe tantrums or aggresssion, but it also has significant drawbacks.

Risperidone is part of a class of medications called *atypical neuroleptics* or *antipsychotics*, and other medications in this category may produce similar effects and side effects. Examples are aripiprazole (Abilify), quetiapine (Seroquel), and ziprasidone (Geodon). Like risperidone, ariproprazole now has FDA approval for irritability associated with ASD.

Other possible indications for medication are overactivity, inattention, or impulsivity. The primary medications for these problems are stimulants, including methylphenidate (e.g., Ritalin, Concerta, or Metadate), dextroamphetamine (e.g., Dexedrine), or combinations of methylphenidate and dextroamphetamine (e.g., Adderall). There are also nonstimulant medications, such as atomoxetine (Strattera). Of these, methylphenidate has been evaluated most extensively in individuals with ASD who also display overactivity. Although many of these individuals derive little benefit or have uncomfortable side effects such as reduced

appetite, some do show a reduction in overactivity or impulsivity (Research Units on Pediatric Psychopharmacology Autism Network, 2005).

Medications are frequently considered when individuals with ASD display especially high rates of repetitive behaviors and routines, or when they resist efforts to redirect them from these behaviors to other activities. In such cases, physicians often prescribe medications called *selective serotonin reuptake inhibitors* (SSRIs), which increase levels of the neurotransmitter serotonin in the brain. Examples of SSRIs are fluoxetine (Prozac), sertraline (Zoloft), paroxetine (Paxil), and citalopram (Celexa). Unfortunately, the largest and most careful test of an SSRI (citalopram) found that it was of no benefit at all in reducing repetitive behaviors and routines (King et al., 2009). Risperidone is another drug that may reduce repetitive behaviors (McDougle et al., 2005), but evidence for this is preliminary. In sum, it is reasonable to consider medications for repetitive behaviors, though additional research is needed.

Several other uses of medications are common but not well studied in individuals with ASD. Antiseizure drugs such as valproic acid (Depakote), and antihypertension drugs such as clonidine (Catapres) or guanfacine (Tenex), may be prescribed to alleviate mood swings. Clonidine also may be prescribed to improve sleep. SSRIs may be prescribed for anxiety or depression. Any of these medications should be closely monitored by an individual's physician.

COMPLEMENTARY AND ALTERNATIVE MEDICINE

Many (perhaps most) students with ASD receive treatments referred to as *complementary and alternative medicine* (CAM), usually initiated by their parents. Educators and ASD specialists have little say in whether such treatments are administered to their students, but, given how common they are, they are likely to hear about them. As shown in Table 2.3, some of the more popular CAM treatments include special diets, vitamin therapies, treatments intended to enhance the functioning of the immune system, and efforts to detoxify the body.

Currently, the most prevalent special diet for students with ASD is the gluten-free, casein-free (GfCf) diet. Gluten is an elastic protein in wheat that gives cohesiveness to

TABLE 2.3. Common Complementary and Alternative Medication (CAM) Interventions

- Special diets (e.g., gluten-free, casein-free [GFCF] diet)
- Vitamin therapies (e.g., high doses of vitamin A, B6, or B12)
- Antibiotic or antifungal medications
- Homeopathic or naturopathic solutions (e.g., secretin, herbal treatments)
- Detoxification treatments (e.g., chelation therapy, hyperbaric oxygen therapy)

Note. All of these interventions are currently underresearched or have not been found to be effective in well-designed studies.

dough. Casein is a protein in milk, cheese, and other dairy products. The diet involves making sure that students with ASD eat only foods that lack gluten or casein. The hypothesis on which this diet is based has two parts. First, students with ASD are thought to have a metabolic disorder that causes them to break down gluten and casein into opioids, which are peptides produced by the body and found in such drugs as morphine (Shattock, Kennedy, Rowell, & Berney, 1990). Second, it is proposed that students with ASD have "leaky guts," which allow some of the opioids to escape from the digestive system and circulate to other parts of the body, including the brain (Horvath, Papadimitriou, Rabsztyn, Drachenberg, & Tildon, 1999). At present, evidence in support of this hypothesis is tenuous at best (Smith & Wick, 2008), and preliminary evidence indicates that the GfCf diet is not effective (Elder et al., 2006), though additional research is underway. The diet also may place students at risk for nutritional deficiencies (Arnold, Hyman, Moody, & Kirby, 2003). However, educators need to respect and cooperate with the parents' wishes. Storing foods that contain gluten or casein out of sight, and locating students who eat such foods during snack or lunch at arms' length from the student with ASD, may limit the temptation to ask for or take foods that are not allowed. Letting parents know about events during which foods containing gluten or casein will be available, such as birthday parties with cake or classroom celebrations with pizza, may make those events go more smoothly. Finding substitutes for school supplies that may contain gluten is also important. For example, the student with ASD may be given Gak or Crayola Model Magic instead of Play-Doh (which contains gluten), Elmer's Glue-All (which is gluten-free) instead of other brands (which may not be), and gloves to wear while handling envelopes or stickers (because the adhesives contain gluten).

Vitamin therapies are based on the hypothesis that students with ASD have a metabolic or acquired metabolic disorder (as yet unspecified) that increases their need for certain nutrients. Such therapies may involve high doses of vitamin B6 (pyridoxine) with magnesium, dimethylglycine (DMG), vitamin A (often in the form of fish oil or omega-3 fatty acids), vitamin B12 (folic acid or folate), or Vitamin C. Preliminary evidence indicates that these therapies may be ineffective (Smith & Wick, 2008), but studies are ongoing. Parents may wish to have students receive doses of the vitamins at school, but, as with medications, a prescription from a licensed physician is necessary for this to happen.

Students with ASD may receive antibiotic or antifungal medications designed to treat a hypothesized underlying infection. They may also receive immunoglobulin injections or homeopathic and naturopathic solutions intended to bolster the functioning of their immune systems. Although some evidence suggests that students with ASD may have atypical immune functioning (Pardo, Vargas, & Zimmerman, 2005), all of these interventions are underresearched (Smith & Wick, 2008). Another substance that has been widely used for students with ASD is secretin, which is a hormone found in the small intestine. Secretin has been studied very extensively, and indeed has been described as the best-studied intervention of all for students with ASD (Levy & Hyman, 2005). Unfortunately, it does not work (Williams, Wray, & Wheeler, 2005).

Detoxification treatments include homeopathic and naturopathic interventions, as well as several forms of chelation therapy, which involves administering a substance that binds with metal ions so that the metal can be excreted from the body. However, there is no reli-

able evidence that students with ASD have unusually high levels of exposure to metals or carry unusually high levels in their bodies. Also, because none of the chelating agents that are currently used cross the blood–brain barrier, they do not make sense as treatments for brain disorders such as ASD (Levy & Hyman, 2005). Some chelating agents have substantial risks and have been linked to at least one death, that of a 5-year-old boy with ASD (Kane, 2006). Thus medical providers with expertise in ASD are very wary of chelation treatments.

Another detoxification treatment is hyperbaric oxygen therapy, in which oxygen is delivered in a pressurized chamber, with the goal of increasing oxygen absorption and reducing free radicals in the body. It is unlikely that this therapy would have beneficial effects for students with ASD; moreover, the pressurized oxygen poses a fire hazard and risks ear damage and elevated blood sugar (Liptak, 2005).

These are only some of the most popular CAM interventions. For educators who wish to learn more, resources are listed at the end of this chapter. Still, some general points should be clear. Despite the profusion of CAM interventions, none of them can currently be recommended, and at least one (secretin) has been refuted. The main roles for educators are to maintain open lines of communication about interventions that a student is receiving, do their best to be informed about what the interventions entail, and help ensure consistency in following diets or other interventions that require follow-through at school.

Because standard educational and medical interventions are not cures for ASD, it is understandable that families and practitioners will search for other possible remedies to try—even ones that are untested, implausible, and sometimes dangerous. While remaining skeptical about CAM treatments, educators can be understanding and supportive.

> Paul, introduced in Chapter 1, is the 7-year-old boy who excels at sight reading but struggles to comprehend what he reads. His parents have decided to take him across the state once a month to see a physician affiliated with an organization called Defeat Autism Now!, which advocates the use of CAM interventions. The physician recommends hyperbaric oxygen therapy, the GfCf diet, and various herbal treatments (including *Melissa officinalis, Passiflora*, and *Chamomila*). Paul's parents ask the school district's ASD specialist, Dr. Jackson, what she thinks of these interventions. Dr. Jackson confesses that she has not heard of most of them. She thanks the parents for letting her know what treatments they are trying for Paul, and asks whether there is anything that the team should do. Dr. Jackson agrees to work with Paul's team to prevent him from eating or touching substances that contain gluten, though she admits that she cannot realistically promise that the prevention efforts will be totally successful. She asks the parents what the goals of the treatments are, offers to collect data on Paul's behavior, and volunteers to investigate what scientifically sound research might be available on the safety and efficacy of the treatments. The parents say that the treatments are intended to reduce inflammation in the body, increase Paul's attention span, and calm him. They decline Dr. Jackson's offer to collect data on Paul's attention or mood and search the scientific literature. However, they promise to try to schedule their trips so as to minimize Paul's absences from school, and they assure Dr. Jackson that they will keep her informed about new treatments that Paul may start in the future.

CONCLUDING COMMENTS ABOUT EVIDENCE-BASED INTERVENTIONS

There is no shortage of proposed quick fixes or miracle cures for students with ASD, but such interventions represent the "triumph of hope over experience," not a realistic approach to developing an education plan. An effective plan for such a student will involve individualized decision making about specific teaching methods and goals, as well as about placement in inclusive or self-contained settings. Progress will be incremental, with skills acquired one at a time instead of in a sudden breakthrough. Still, many effective teaching methods are available, and over time students with ASD can and usually do make impressive gains.

PUTTING KNOWLEDGE INTO PRACTICE

While awareness of the characteristics of ASD and effective intervention strategies (as reviewed in the preceding and current chapters) are necessary foundations for developing an individualized intervention plan for a student with ASD, formulating and implementing a plan for supported inclusion remain daunting tasks. As discussed in Chapter 1, despite having characteristic behaviors and learning styles in common, students with ASD are a very heterogeneous group. Their academic, cognitive, and communication skills range from superior to severely delayed, and they may be highly motivated to interact with peers and adults, or quite solitary, or somewhere in between. Their needs are likely to change significantly from the time they enter kindergarten at age 5 to the time they leave the school system at age 21, and of course the school environment will also change from grade to grade. In addition, by law, intervention plans in a public school setting must be based on shared team decisions. Therefore, no one—not an ASD specialist, the parents, or school personnel—can dictate what will happen. Another legal requirement is that students, regardless of disability, must have some exposure to the general education curriculum. Accordingly, the focus cannot simply be on addressing difficulties associated with ASD; students need to be taught the three R's and other academic skills. If students are still classified with ASD when they reach the age of 16 years (earlier in some locations), a transition plan needs to be developed to prepare the students for adulthood, along with vocational training.

To address all of these issues, implementation of evidence-based practices in a supported inclusion model involves integrating such practices within existing systems, rather than creating a whole new program from scratch (as occurs in many home-based programs for young students with ASD, and in many specialized classrooms for older students). Thus teams cannot simply consult one of the many curriculum manuals for providing individual instruction to students with ASD and transplant the curriculum into an inclusive school setting. Nor can any one team member try to convert everyone else on the team into card-carrying proponents of a specific intervention approach. For example, many interventions for students with ASD are based on the principles of ABA, but it is not realistic to try to make all team members into board-certified behavior analysts. Other common interventions include the Developmental, Individual difference, Relationship-based (DIR) approach and

the Treatment and Education of Autistic and Communication related handicapped CHildren (TEACCH) project, but inclusive settings will never contain many credentialed DIR providers or certified TEACCH instructor.

At the other extreme, teams cannot insist on continuing "business as usual" in general education classes and the school or district as a whole. Students with ASD have particular needs and learning styles that require resources (discussed further in Chapter 5), changes in teaching practices (Chapters 7–11), and possible policy changes (such as implementing a behavior support plan, as discussed in Chapter 12).

Finding the right balance between the needs of the student with ASD and the requirements of the various systems in which the student lives is an ongoing process, not a one-time event. It begins with a thorough assessment that should include not only an evaluation of the individual needs of the student with ASD, but also the academic and social demands that he or she is likely to encounter in his or her grade and assigned classroom(s), and the preferences and skills of the family and educational team. Following the initial assessment, the intervention will need to be rolled out in a series of steps rather than all at once, and adjustments to the intervention will need to be made continually and based on continual measurement of student progress. Figure 2.1 outlines these steps.

Generally, the first priority is to help the student start on a successful note in the inclusive setting. Once this has occurred, the focus can shift to teaching skills and enhancing peer support that will allow for continued success over time. Accordingly, in the model we present, the initial steps (which ideally occur even before the student enters a general education classroom) will be (1) preparation of the student for inclusion and (2) team building to ensure that the educators have the cohesiveness and capacity to serve the student with ASD. The next step will be (3) implementing classroom supports to promote engagement in classroom activities and independence in managing the daily routine. Subsequently, (4) adaptations to the general education curriculum should be implemented, and (5) a cur-

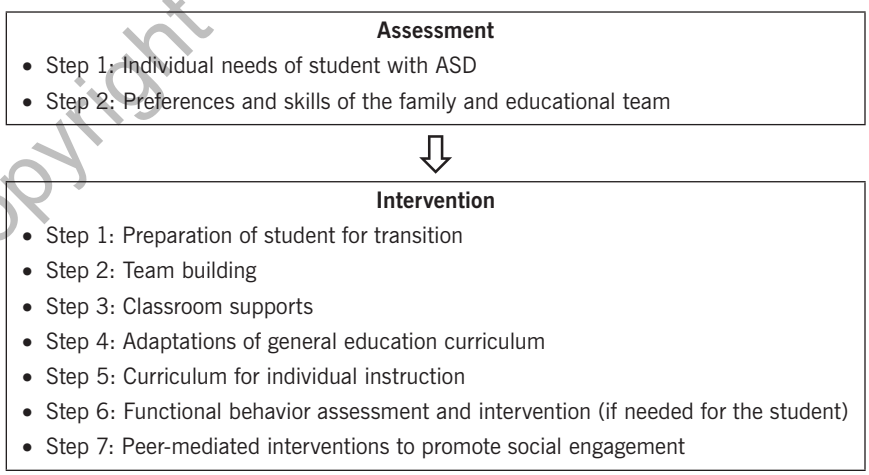

FIGURE 2.1. Steps in putting together and implementing a supported inclusion plan for students with ASD.

riculum for individualized instruction should be set up to address difficulties associated with ASD. If the student displays significant challenging behaviors, (6) functional behavioral assessment and intervention will be necessary. Finally, (7) recruiting peers to facilitate social interaction will be important.

In reality, such a neat progression from one step to another may not be feasible. For example, if a student with ASD is not already acquainted with classmates, it is often wise to involve the classmates sooner rather than later to establish a positive social climate. If a student displays challenging behaviors that are disruptive or dangerous, the behaviors may require immediate attention. If a team already has some expertise in individualized instruction, or if the student enters an inclusive setting with a curriculum of individualized instruction already in place, the initial focus may be on preparing the team to pick up where the previous team left off. Still, all other things being equal, the sequence in Figure 2.1 is the one to follow. Details about how to do so are provided in the remaining chapters.

FOR MORE INFORMATION

Association for Science in Autism Treatment: *www.asatonline.org*

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