7. Language disorders and autism

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Evidence supports early intervention targeting areas of need

The parents of a 2½-year-old boy bring their son to you because they are worried that his development is very different from that of his peers. He only knows a few words, and is not pointing or waving "good-bye". They report that, when they expressed similar concerns when their son was 18 months old, they were told that he would "catch up". At that time, apart from delayed speech, they had noticed that he was either very irritable or "too good", keeping himself occupied for extended periods of time, and was not showing any pleasure in social interaction.

The mother's pregnancy was complicated by premature labour at 34 weeks' gestation, and the boy was born by normal vertex delivery. His birthweight was 2 kg and he had good Apgar scores. He was an irritable baby, who was hard to settle, and establishing feeds was difficult, but admission to an infant-care facility had not been helpful.

Initially, you refer the boy to a speech therapist, who expresses concerns about his general development and unusual behaviours. He lines up objects like his toy cars, walks on his toes, flaps his hands when excited, and often looks at objects out of the corner of his eye.

You refer him for a hearing assessment and then for a formal developmental assessment by a paediatrician. His development, assessed using the Griffiths Mental Development Scale,[1] is reported to be within the range of mild general developmental delay, with more significant language and social delay. An autism-specific assessment by a multidisciplinary team is consistent with a diagnosis of childhood autistic disorder (*Diagnostic and statistical manual of mental disorders*, 4th edition). Further medical investigations show no abnormalities.

His parents feel that they have not responded adequately to the boy's needs, and you refer them to a social worker for counselling.

You refer the boy to a service provider for an early intervention program focusing on his communication, socialisation and behavioural skills. You alert his parents to the possibility that his future education program may have to be modified.

You regularly monitor his progress in collaboration with his paediatrician, therapists and educators.

Delayed acquisition of language is a common presenting problem in children. In the case described above, further history taking and observation revealed deficits in non-verbal communication (poor use of gestures), deficits in socialisation and several persistent and unusual behaviours. It is the persistence and pervasiveness of these deficits that differentiate children with autism from children with specific developmental language disorders. Early referral for therapy is beneficial for both groups of children.

Children with significant language disorders can present with some autistic features which may diminish as their language and communication skills improve. It is well recognised that in children under 2 years of age, it can be difficult to distinguish between those with autism and those who are non-autistic and non-verbal and have significant cognitive deficits. In these children, it is more important to identify the areas of need and provide intervention than to wait for a definitive diagnosis to be made. The child's progress and diagnosis can be reviewed on a regular basis.

ABSTRACT

- Early diagnosis of language disorders and autism is important, and early intervention for autism and some language disorders makes a difference. Developmental surveillance of children to detect these disorders should be a routine part of medical practice.
- The persistence and pervasiveness of communication and socialising deficits differentiate children with autism from those with specific developmental language disorders.
- Hearing and vision assessment is essential in any communication disorder.
- Interventions, targeted to identified areas of need, should encompass communication enhancement, behavioural therapy, educational modification, parent education and family support.
- Pharmacological interventions have an important but discrete role in autism, but there are no magic bullets. It is important to remember that the normal childhood illnesses occur in children with developmental disorders.
- Parents should be directed to reliable websites on the Internet, and given information and books to read as well as phone numbers of relevant services (eg, autism associations). There is a need for increased government financial support for early intervention programs.

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Language disorders

Communication is a complex cognitive and motor activity. The act of communicating can be verbal or non-verbal or a combination of both. These skills are developmental and have a number of components. Communication includes semantics (understanding the meaning of words) and pragmatics (social use) of language. Between 7% and 14% of children have difficulty acquiring some or all of the normal language skills (Box 1) in time to enable a smooth transition to school.

Developmental language disorders are classified in different ways. The *Diagnostic and statistical manual of mental disorders*, 4th

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1 Normal language development

Normal "adult-like" oral language skills acquired by most children by 5–6 years of age include:

- A large, varied vocabulary, and clear, readily understood speech.
- An ability to use complex sentences spontaneously in conversation and to generate well structured oral stories or recounts.
- An ability to understand simple and abstract questions and to follow complex instructions and a range of concepts, such as time, causality and space.
- An ability to follow the rules of conversation, such as topic initiation, maintenance and closure, remembering to make appropriate eye contact and to take turns. They are practised, active communicators.
- An ability to recognise many letters and sounds and know that print has meaning.

For children learning more than one language, the process is similar, but slower.

edition (DSM-IV)[2] includes *expressive language disorder*, *mixed receptive–expressive language disorder*, *phonological disorder* (failure to use developmentally expected speech sounds) and *communication disorder not otherwise specified*.

Interventions for language problems

Any interventions to overcome children's speech and language difficulties can be difficult and must be continued in the long term. Some well controlled studies have shown that providing only limited therapy has little benefit.[3] A cure is not always possible, so therapy aims to improve communication in order to support the child in his or her environment. Educating parents and training other important people in the child's life are pivotal to successful therapy.[4] The Canadian early language Hanen Program aims to teach parents useful strategies for communicating with their children. A pilot study of its effectiveness demonstrated that it increased language acquisition for children and their families.[5]

Research into early brain development and the use of validated early developmental screens has promoted the use of preventive programs for very young children in the community.[6] WILSTAAR, developed by British speech and language therapist Dr Sally Ward, is a program for 8-month-old babies identified by parent questionnaire as having possible delay in language development. This program involves home visits and provision of play activities for carer and baby to target areas of weakness. There is a strong emphasis on regular play and interaction with the baby *in a quiet environment*. The program also promotes attachment between parent and infant.[6]

The importance of early exposure to books to encourage literacy is well documented.[7] High et al showed that exposure to books increased the vocabulary of young children and "changed parent attitudes toward the importance of reading with their infants and toddlers".[8] A wide vocabulary at 3 years is a strong predictor of reading level at Grade 2.

In a systematic review of 25 studies of the effectiveness of intervention in speech–language therapy, Law et al found more studies demonstrating the effectiveness of therapy for children with expressive language problems and vocabulary and phonology deficits than for children with comprehension and expressive syntax problems.[9] Early intervention for children with stuttering has been found to be particularly effective.[10]

Children with *central auditory processing disorder* have normal hearing, as assessed by routine audiological tests, but trouble distinguishing certain sounds in some situations (eg, where background noise levels are high), or they have difficulty in auditory attention and memory. Central auditory processing disorder is a controversial diagnosis requiring assessment by an audiologist. Furthermore, these children may meet the criteria for other diagnoses, including developmental language disorders and attention deficit hyperactivity disorder (ADHD). Problems with research methods have complicated attempts to show evidence of long-term effectiveness of interventions for this condition. Interventions that have been used include simplifying instructions and checking that instructions have been understood, placing the child toward the front of a classroom, and using closed-loop earphones.

Sequelae of speech and language problems

Researchers have documented that there are clear adverse sequelae of speech and language problems, including poor socialisation, difficulties with literacy[11] (reading, spelling), and comorbidity with psychiatric disorders (especially when there are comprehension problems). Comorbid psychiatric disorders include behavioural disorders, attention deficit disorders, oppositional and conduct disorders, and anxiety.[12] It is helpful to continue to review children who have developmental language disorders, particularly into the early school years, to assess the risk of these comorbidities. Children who have difficulty with speech (sound) development are at risk of literacy difficulties, including spelling — particularly those with atypical patterns of speech development (eg, developmental verbal dyspraxia), and children who have severe and ongoing speech and language difficulties.[13] The "Fast ForWord" program (www.fastforword.com) is a popular and proven therapy program sometimes advocated in Australia to enhance language and reading skills, including listening accuracy, phonological awareness and language structures. However, reading is a very complex activity and there are many possible causes of reading difficulties.

Lining up sandcastles

Persistent lining up of toys and objects is commonly observed in toddlers and young children with autism.

2 DSM-IV diagnostic criteria for autism disorder[2]

A. *A total of six (or more) items from (1), (2) and (3), with at least two from (1) and one each from (2) and (3)*

(1) Impairment in social interactions

(a) marked impairment in the use of multiple nonverbal behaviours such as eye-to-eye gaze, facial expression, body postures and gestures to regulate social interaction

(b) failure to develop peer relationships appropriate to developmental level

(c) a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (eg, by a lack of showing, bringing, or pointing out objects of interest)

(d) lack of social or emotional reciprocity

(2) Impairment in communication

(a) delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)

(b) in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others

(c) stereotyped and repetitive use of language or idiosyncratic language

(d) lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(3) Repetitive behaviours and stereotyped behaviour patterns

(a) Encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus

(b) Apparently inflexible adherence to specific, non-functional routines or rituals

(c) Stereotyped and repetitive motor mannerisms (eg, hand or finger flapping or twisting, or complex whole body movements)

(d) Persistent preoccupation with parts of objects

B. *Delays of abnormal functioning in at least one of the following areas, with onset before age 3 years: (1) social interaction, (2) language as used in social communication, or (3) symbolic or imaginative play*

C. *The disturbance is not better accounted for by Rett's disorder or childhood disintegrative disorder*

Well controlled studies with larger numbers would be useful to help clarify best practice in this complex area.

The autism spectrum disorders

The term *autism spectrum disorders* (ASD) is now commonly used to describe the spectrum of behavioural phenotype and severity that is part of the continuum from "normal" to "disordered" development of communication, socialisation and interests. ASD are generally accepted to include *autistic disorder*, *Asperger's disorder*, *atypical autism*, and *pervasive developmental disorder not otherwise specified* (PDD-NOS). These diagnoses come under the classification of *pervasive developmental disorders* in the DSM-IV, but the term ASD does not appear in DSM-IV. *Rett's disorder* and *childhood disintegrative disorder* are also included in the pervasive developmental disorders classification.

Autistic disorder is characterised by qualitative impairment in social interaction and communication, and restricted repetitive and stereotyped patterns of behaviour, interests and activities. These core features are present in all individuals with ASD throughout their lifetime, but clinical manifestation and functional disability will vary according to age, linguistic and cognitive ability, comorbidity, family and social environment. Several recent review articles have summarised the medical literature on autism.[14-16]

For a diagnosis of autistic disorder, a child must meet a specified number of the 12 criteria given in DSM-IV (Box 2).[2] The definition of autism in the ICD-10 classification system[17] is almost identical.

By definition, individuals with *Asperger's disorder* have an intellectual ability within the average range, and have superficially normal early language development. This means they use single words by age 2 years and two-word communicative phrases by age 3 years. Their language development is, however, often significantly idiosyncratic.

Atypical autism and *PDD-NOS* include presentations that do not meet the criteria for autistic disorder because of the late age at onset, atypical presentation or subthreshold symptomatology. This category should be used when there is a severe and pervasive impairment in development in all the three areas impaired in autism (social interaction, communication and behaviour patterns), but not sufficient criteria for a diagnosis of autistic disorder.

The differential diagnoses of the autism spectrum disorders are listed in Box 3.

Prevalence of autism

Autism was once considered a rare condition affecting only 3–4 per 10 000 children.[18] More recently, autism is reported to affect between 0.7 and 26.1 per 10 000 children, with a male to female ratio of 4.8 : 1.[19] The reported increase in prevalence may be due partly to better recognition of ASD and partly to a change in primary diagnostic criteria. However, it is not possible at this stage to exclude an environmental factor that may be triggering a genetic predisposition, resulting in the increased prevalence.

Aetiology of autism

Although autism is behaviourally defined, recent research supports an organic cause and points towards multiple interrelated factors.[20] It is recognised as the endpoint of several organic diseases, including fragile X syndrome, tuberous sclerosis, congenital rubella, phenylketonuria and postnatal encephalitis. However, a specific medical cause is identified in only a few children with ASD. For example, over 60% of intellectually disabled individuals with tuberous sclerosis are also autistic, and many of these patients will

3 Differential diagnoses of the autism spectrum disorders

- Global developmental delay
- Language disorders
- Sensory impairment (visual/hearing)
- Specific developmental disorders; eg, developmental coordination disorder
- Other pervasive developmental disorders
  - –Rett's disorder
  - –Childhood disintegrative disorder
- Selective mutism
- Other (reactive attachment disorder of infancy and early childhood; anxiety disorder; attention deficit hyperactivity disorder; stereotypic movement disorder; epilepsy [Landau–Kleffner syndrome])

4 Diagnostic pathway for children suspected of having autism

Autism suspected by routine surveillance or incidental detection

Absolute indications:

- No babbling or pointing by 12 months
- No sharing of interest in objects with another person
- No single words by 16 months, or no two-word spontaneous phrases by 24 months
- Any loss of language or social skills at any age

Administer autism-specific screening tests

- Checklist for Autism in Toddlers (CHAT)[27,28] (at 18 months) (Box 5)
- Modified Checklist for Autism in Toddlers (M-CHAT)[29] (at 24 months)
- Social Communication Questionnaire (SCQ)[30] (one for <6 years and one for >6 years)
- Developmental Behaviour Checklist (DBCL)[31] (at ⩾4 years)

If features of autism identified, refer for further assessment

- Audiology assessment
- Developmental and autism-specific assessment from a multidisciplinary team. Includes a thorough medical and neurological examination
- Screening tests to eliminate other causes
- Chromosomal analysis, DNA assessment, specific genetic testing

have epilepsy. In contrast, the proportion of autistic individuals with tuberous sclerosis is estimated to be between 0.4% and 3%.[14]

A number of rigorous studies show no epidemiological evidence to support the theory of a link between measles–mumps–rubella vaccination and autism.[21] There is also no rationale for giving separate vaccinations as opposed to the combination vaccine.

Twin studies have consistently documented a strong genetic component in the aetiology of ASD. Monozygotic twins show a 60% concordance for autistic disorder, and up to a 92% concordance for all ASD. Dizygotic twins and siblings have a 10% concordance for autism and a 30% concordance for other cognitive, social or language deficits.[22]

Available evidence suggests that several genes contribute to the underlying genetic risk of developing autistic disorder; possibly more than 10 genes are involved. A specific DNA probe for fragile X syndrome is usually undertaken in children with autism. Between 3% and 25% of individuals with fragile X syndrome have autism. Individuals with fragile X, however, account for only a very small proportion of all children with autism.[23]

Estimates for the prevalence of epilepsy in autistic children range from 7% to 14%, whereas those for the accumulative prevalence in adulthood range from 20% to 35%.[24,25] Seizure onset peaks in early childhood and again in adolescence. It is important to always consider seizures, particularly if regression of skills occurs. Intellectual disability and a family history of epilepsy are significant risk factors for the development of seizures in autistic individuals. However, in investigations for autism, routine electroencephalography is not indicated.

In a retrospective study, Courchesne et al[26] noted abnormalities in the rate of head growth of children who subsequently received an ASD diagnosis. Head circumference was similar in size to that of controls at birth, but between the ages of 3 and 14 months, 10%–20% of children with autism had a rapid increase in head circumference. He coined the term "transient macrocephaly". A number of anatomical differences in the brain have been noted in some patients with ASD, none of which are consistent or pathognomonic, and routine brain imaging is not indicated.

Diagnostic pathway for autism (Box 4)

Early identification

The identification of children with autism requires developmental surveillance, which should be a routine part of medical practice. There are certain absolute indications for referral for an autism-specific assessment (Box 4). Routine developmental surveillance may identify children with a high likelihood of developmental disorders (using instruments such as Parents' Evaluation of Developmental Status [PEDS],[33] Ages and Stages Questionnaire [2nd edition] [ASQ],[34] and the Brigance Series of Screens[35]). Finally, in up to 25% of children with autism, there is regression in language and socialisation skills noted before 18 months of age. Information that is helpful in deciding whether to refer a child for diagnosis of possible autism is obtained by administering autism-specific screening checklists (Box 4 and Box 5).

5 Checklist for Autism in Toddlers (CHAT) — abbreviated version[32]

This can be administered at approximately 18 months of age. If a child fails all three items, referral is indicated, as the chances of autism are high. If a child fails only one or two items, still refer, as the chances of developmental delay are high.

Section A: Ask the parent	Section B: GP's observation
1: Does your child ever pretend, for example, to make a cup of tea using a toy cup and teapot, or pretend to do other things?	Get the child's attention, then give the child a miniature toy cup and teapot and say "Can you make a cup of tea?" Does the child pretend to pour out tea, drink it, etc? (*If you can elicit an example of pretending in some other game, score a YES for this item.*)
2: Does your child ever use his/her index finger to point, to ask for something?	Get the child's attention, then point across the room at an interesting object and say "Oh look! There's a (name of toy)!" Watch the child's face. Does the child look across to see what you are pointing at? (*To record a YES for this item, ensure the child has not simply looked at your hand, but has actually looked at the object you are pointing at.*)
	3: Say to the child, "Where's the light?", or "Show me the light". Does the child *point* with his/her index finger at the light? (If the child does not understand "light", repeat this with "Where's the teddy?" or other unreachable object.) (*To record a YES for this item, the child must have looked up at your face around the time of pointing.*)

Diagnosis of autism

Reviews from the United States and the United Kingdom support the use of multidisciplinary teams.[36,37] The teams should include a range of professionals — doctor (usually a paediatrician or psychiatrist), psychologist, speech therapist, occupational therapist and social worker. A thorough medical and neurological examination is carried out, with specific consideration given to growth parameters, neurocutaneous stigmata, dysmorphism, hearing and vision.

Other medical investigations include screening tests — serum lead level (if there is a history of pica or living in an old house); a full blood count, iron and folate levels, and vitamin B_{12} levels (if dietary habits limited); and, if clinically indicated, thyroid function tests, creatine kinase level, and a urine metabolic screen.

Chromosomal analysis and DNA assessment for fragile X syndrome is performed, as well as specific genetic testing as indicated by behavioural and clinical phenotype (eg, Rett's syndrome, Smith–Magenis syndrome). Specific genetic consultation should be considered.

Investigations not required

Routine electroencephalography is not required, neither is routine neuroimaging (although the high risk of seizures requires vigilance).

There is inadequate supporting evidence to recommend hair analysis, measurement of celiac antibody levels, allergy testing (particularly food allergies — gluten, casein and candida), immunological abnormalities, intestinal permeability studies, stool analysis or urinary peptide levels.[14]

6 Contacts for autism associations in each state

Autism Queensland
PO Box 363, Sunnybank, QLD 4109
Ph: 07 3273 0000
Fax: 07 3273 8306

Autism Association of South Australia
3 Fisher Street, Myrtle Bank, SA 5064
Ph: 08 8379 6976
Fax: 08 8338 1216

Autism Victoria
PO Box 235, Ashburton, VIC 3147
Ph: 03 9885 0533
Fax: 03 9885 0508

The Autism Association ACT (Inc)
c/o SHOUT, PO Box 717, Mawson, ACT 2607
Ph: 02 6286 8887
Fax: 02 6286 4475

Autism Tasmania
Post Box 1552, Launceston, TAS 7250
Ph: 03 6423 2288

Autism Association of NSW
41 Cook Street (PO Box 361), Forestville, NSW 2087
Ph: 02 8977 8301
Fax: 02 8977 8399

Autism Association of Western Australia
Locked Bag 9, Post Office, West Perth, WA 6872
Ph: 08 9489 8900
Fax: 08 9489 8999

Northern Territory
(via Northern Territory Carers Office)
Ph: 08 8948 4877

Interventions for autism

There is good evidence supporting the short- to medium-term benefits of early intervention, but as yet little information about the impact of intervention into adulthood. Based on current evidence, intervention should be initiated before 4 years of age and focused on establishing appropriate behaviour management strategies and developing effective communication strategies; this will reduce or even avoid the development of many disruptive behaviours and facilitate learning.[36] The outcomes for children with autism are variable, reflecting the influence of comorbidities, such as intellectual handicap and mental health, as well as family functioning.

From earlier research providing evidence of the effectiveness of early intervention, it was suggested that as many as 40 hours per week be spent in therapy.[38] It is now widely accepted that between 15 and 25 hours of specific intervention is adequate, and that 40 hours per week of therapy may put unnecessary stress on families and their financial resources, with an uncertain added benefit.[36] In the typical programs of today, a child may spend time in individual therapy, in preschools with support, in special playgroups, and in home-based interventions. Services avail-able differ between areas, and in Australia there are no government-funded programs providing the recommended amounts of intervention. There is a need for increased government financial support for early intervention programs. Many families are therefore actively pursuing their "rights" to obtain services. The onus falls on the families and therapists to juggle between waiting lists, different organisations, and service providers, often at significant personal and emotional expense. Autism places a considerable burden on families, and stress-related illnesses in the child and family are common. General practitioners in Australia may now assist families to access some limited allied health therapy through the Medicare Enhanced Primary Care program (www.hic.gov.au/providers/incentives_allowances/medicare_initiatives/allied_health.htm).

Applied behavioural analysis is one of the methods of therapy that may be appropriate. This uses learning theory (originally derived from animal behaviour experiments) to dissect a behaviour into its sequential components — antecedent, behaviour and consequence. The ability to correctly identify the antecedent that elicits a specific behaviour, and the consequence which then maintains the behaviour, enables both to be modified in order to change the behaviour in a desired direction. The various service providers each practise their own versions of applied behavioural analysis, making it difficult to evaluate the programs in general. Other therapy methods are also successfully used in therapy centres around Australia.

When the child with autism enters the school system, it is important to establish the best possible educational placement. This takes into consideration the degree of associated intellectual disability, the communication and socialisation skills, the severity of autism, safety issues, the individual family circumstances and the availability of local resources.

Medical and pharmacological interventions

General practitioners need to remember that the "normal" childhood illnesses (eg, ear infections, gastro-oesphageal reflux and dental issues) occur in children with developmental disorders.

Pharmacotherapy has a valuable but discrete role in the management of autism and its comorbidities. Having autism in itself is not an indication for drug therapy — medication does not cure autism, and behavioural and educational strategies should be explored before turning to medication.

Safe and effective medication use[39]

Medication is indicated for specific target symptoms when they severely affect the child's progress and daily life and the daily life of

Evidence-based practice tips

- Early diagnosis (by 2 years of age) of autism is possible. Screening questionnaires are helpful in identifying those at risk (**II**).[27-29]
- Early intervention for some language disorders (**I**)[10] and autism is beneficial (**III-1**).[36,38]
- There is insufficient evidence for the efficacy of complementary and alternative therapies in autism (**I**).[41,42]

Levels of evidence (**I-IV**) are derived from the National Health and Medical Research Council's system for assessing evidence.[43]

the family. The goal of treatment is reducing (but not necessarily eliminating) interfering behaviours so that the individual may be more amenable to education and other psychosocial interventions. Many of the medications used are not licensed for use in children or individuals with ASD.

Best practice in pharmacological management should involve:

- maintaining close liaison with the school and carers;
- obtaining informed consent with regard to side effects and benefits;
- putting in place a system to monitor response; and
- ensuring that the child's living arrangements allow for safe medication use.

In broad terms, the behaviours that may show some response with medication are divided into four main categories:

- ADHD-like symptoms — stimulant medications, clonidine, atomoxetine;
- Ritualistic/compulsive behaviours and anxiety — selective serotonin reuptake inhibitors (SSRIs);
- Sleep disorders — melatonin; and
- Challenging behaviours (eg, aggression, self-injury) — a stepwise approach is used, attempting to understand the function of the behaviour before simply trying to suppress it. If the aggression is related to impulsivity, stimulants may be indicated; and if anxiety-related, then SSRIs or mood stabilisers (carbamazepine/valproate) are used. If aggression is severe and intractable, then the new atypical antipsychotics (eg, risperidone) may be considered.

The role of complementary and alternative therapies and diet

Families of children with ASD commonly use complementary and alternative therapies (CAM). Medical practitioners should be supportive of families using these therapies, but caution them against alternative therapies that may have a detrimental effect on the child's health. Some of the CAM therapies for which there is insufficient evidence include: Vitamin B_6 and magnesium treatment; auditory integration therapy; casein and gluten free diets; and heavy metal chelation.[40] There is a need for controlled evaluation of CAM used in children with autism.

Many children with ASD have some rigidity regarding their eating routines and eat a restricted range of foods. This creates significant concern and distress for families. Parents often need reassurance and advice on sensible healthy eating practices suitable for any child (eg, avoiding caffeinated drinks and high intakes of fruit juices; encouraging adequate water intake and sufficient fibre and fresh foods in the diet). The possible advantages and disadvantages of more restricted diets need to be very carefully evaluated, as there is a significant risk of introducing an even more restricted eating practice that could make the child more resistant to the introduction of a normal varied diet.

Support for families and carers

All children with the diagnosis of autistic disorder (but not "ASD") currently are eligible to receive a carers allowance. Families are usually provided with relevant information and websites (including advice about the reliability of information on the Internet). Useful websites include: <www.firstsigns.org>; <www.mrc.ac.uk>; <www.dbpeds.org>. A review of autism research by the UK Medical Research Council is available on the MRC website.[37] The state autism associations (Box 5) are a good source of information about the therapies available in each state. See also the links on the website of the Autism Council of Australia <www.autismaus.com.au>.

Conclusion

We need to gain a greater understanding of the underlying brain processes involved in language disorders and autism, as well as the characteristics of more effective therapeutic interventions. Research over the next 10 years should provide greater insights.

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