What can be done for ADHD?

By James Chandler, MD FRCPC

The tragedy of ADHD is that it is by far the most treatable illness in psychiatry or neurology, yet few physicians have developed expertise in its treatment.

Introduction

ADHD turns out to be the most studied disorder in child psychiatry. There are two major types of interventions, medical and non-medical.

Medical Interventions

Among the Medical Interventions for ADHD are two types of treatments- substances which are derived from natural substances, usually called "natural treatments" and medications.

What is the perfect treatment for ADHD?

It would be something that is extremely safe, has virtually no side effects now or in the future, and almost always works right away. Natural treatments fit part of this description: they are usually very safe and have very few side

effects. The downside is that they don't work too well. Medications are just the opposite. They work much quicker, but are more likely to cause side effects.

Natural Treatments

There are thousands of natural treatments for ADHD. Almost none of them have ever been compared to placebo, so it is hard to know if they really work.

Pycnogenol

This is an extract of bark that has been tried for hundreds of conditions, including ADHD. There is one very good study showing that it was much better than placebo for ADHD when given at a dose of 1mg for every two pounds (that is 1mg/kg). It comes in 25 mg size pills, so that means most children would take a few pills each day. (67). It is available in most health food stores and on line.

Fish Oil

So the next step has been to try giving people Omega-3 Fatty Acids. From this research, it has been determined that:

1. Giving Long Chain Fatty Acids and adding it to your food doesn't work any better than placebo (46)
2. Giving a certain Long Chain Fatty Acid called DHA derived from algae doesn't work better than placebo (47)..
3. Giving two Long Chain Fatty Acids called Omega-3 and Omega-6 worked better than placebo in children who had behavior problems, attention problems, and academic problems. (48,49)

That sounds great! Is there any problem?

Yes. First of all, it isn't clear how much you need and what kind. Also it isn't clear whether or not the specific form is going to get into your brain or not. Secondly, they taste horrible. In my experience, only a quarter of children can tolerate it.

Right now, I am mostly using a local product called Omega Gold. I have children take 800 mg a day. It is cheap, has plenty of the right fatty acids in it, but it is unclear how well it is absorbed and whether or not other toxins are present in it.

Zinc

There are studies which show that children with ADHD have lower Zinc levels and that adding Zinc to medications or giving it alone helps ADHD. But they are from areas of the world that are naturally low in Zinc, so right now it is not worth trying. (68)

Giving natural treatments scientifically

To determine whether or not natural treatments help ADHD, you need to be able to measure how much change there is over time. Since these substances do not work overnight, it can be hard to answer the question, " Is my child really better than he was 6 months ago?"
First, I use the SWAN rating scale, which is sensitive to drug effects, before we start the trial. Then about 6 weeks later, we check it again. If there is a significant difference, there is a good chance that the natural treatments was doing something. If we really want to be sure it was doing something, then I will discontinue the natural treatments and check the SWAN scale a few weeks later. However, usually this isn't needed.
I usually give natural treatments for a year and then stop them to see if there is any improvement. There is absolutely no data to know how long it is necessary to give them.

Should everyone receive natural treatments before they are tried on medication?

No, there are some people who are so ill with ADHD that the most effective treatment which will hopefully work tomorrow needs to be started right away.

Will natural treatments help medications work better?

There has never been a study like this done. In my experience, I have not seen an additional effect from adding natural treatments to medication.

Overall-

> Natural Treatments are worth trying, not because they work so well, but because they have so few side effects. However, don't be surprised if they are ineffective.

Standard Medications for ADHD

There is no doubt that medical interventions for ADHD are effective. Not only that, medications are more effective than any other intervention. Furthermore, adding all sorts of non-medical interventions to carefully prescribed medications doesn't work any better than medications alone. Medications are also effective if there is comorbid Oppositional Defiant Disorder, Conduct Disorder, or anxiety disorders. (25, 26)

On the other hand, medications have some real drawbacks. First of all, they can cause side effects. Given how serious ADHD usually is by the time I see it and how safe these medications are, this usually isn't a real reason not to use

medications. That is, since the risk of serious side effects is very low and the risk of the disorder causing severe problems for the child is quite high, the balance favors using medications.

The main reason not to use medications has nothing to do with the medications themselves. It has to do with how much parents hate the idea of giving their children psychiatric drugs. There are three types of parents in my mind

Sally - "If it will help, I'll do it"

Sally's daughter is totally out of control. She can not get through a day of school without going to the principal's office. Sally is a nervous wreck. The rest of their family life is on hold since every ounce of energy they have goes for caring for this child. Sally would like to get her child better right now. Right now, if possible. Sally takes home a prescription for medication for her daughter on the first visit.

Jeremy " I hate the idea of giving my son drugs. It would be my last choice"

Jeremy's son is moderately disabled, but most of the problem is at school, not at home, so it doesn't seem that bad to Jeremy. The fact that Jeremy is not home until about 6:00 pm every night makes it a little easier to bear, as he doesn't have to deal with his son all afternoon. So Jeremy is going to try a few other non-medical things first. After two months, if things aren't better, we will try medications.

Beth "Nothing would make me give my daughter psychiatric drugs that will affect her brain"

Beth's son is quite disabled by ADHD, but for her the idea of having to give her child medications is worse than dealing with disabling ADHD. Beth tries all sorts of non-medical treatments but will never let her child take pills. Beth is hoping (gambling, in my opinion) that the ADHD will go away on its own. If she is right, she will feel very proud of herself.

Non Medical Interventions

ADHD has been around a lot longer than medications have been. There are a host of interventions that are useful in ADHD that do not involve medications. The usual approach is to use a number of these together. These interventions are not as potent, but in combination they sometimes can be helpful enough to make ADHD go from moderately disabling to mildly disabling. For mild ADHD, this is the place to start. Often times they are combined with medications,

although the most recent work would suggest that the non-medical treatments don’t add too much to medical treatment. (25)

Medications

Questions and Answers about Medications in general

What exactly do the drugs for ADHD do?

These drugs alter the way signals are transmitted in the brain. They work on substances in the brain which help transmit messages. They work at different levels of the brain to alter the core symptoms of ADHD. The different drugs work on different parts of the transmission system. That is why sometimes one drug will work and not another, as they are working on different parts of the transmission system.

Why would anyone want to give drugs that affect the brain to children?

The main reason would be if the non-medical interventions are not working or in more severe cases of ADHD. No one would suggest trying medical treatments before the non-medical interventions are used in very mild ADHD. It is similar to diabetes in that way. If you have diabetes which is not severe, your doctor will first suggest you try diet control. If that doesn't work, only then will the doctor consider medical treatment. However, if your diabetes was severe, you would start on a diet and medication right away. In other words, if ADHD is severe, sometimes we use medical and non-medical treatments together from the start.

If the drug works, how will my child be different?

In cases where the drugs work very well, the three core symptoms of ADHD (inability to pay attention to things they aren't interested in, hyperactivity, and impulsiveness) are brought down to a level which is close to the average for their age group. As a result, people are usually more successful socially, academically, and there are less family problems. Usually a person's self esteem improves. When these drugs work right, the change can be quite amazing. When children take these drugs, in 75 % of the cases they are indistinguishable from normal children and nothing else is really necessary, that is, very few of these other interventions will be needed.

What if it doesn't work?

Sometimes a medication won't work because the dose is too high or too low. Some people will not respond to one medication for the treatment of this problem but they will respond to another. If the drug doesn't work, of course, it is discontinued, and then you and I decide what do next. Try something else? Abandon medical treatment? Both are sometimes reasonable options.

I have heard that these drugs can do a lot of bad things. Is this true?

Yes, it is. Like all medical treatments, there are side effects and sometimes people can have pretty bad side effects. There are two types of side effects. One type is the kind that disappears when you stop the drug. The other kind can last long after the drug is discontinued.

What exactly are the side effects?

It depends on the drug. Some drugs can interfere with sleep and appetite. Others can make you depressed or angry. Some can affect the heart. Others can make you wet yourself or actually make the hyperactivity worse. Others can make people have movements they didn't have before. Or, they can make you like a zombie.

Are they that dangerous??

Yes, when used improperly they can be quite dangerous. However, when used carefully they can be very safe.

How can that be?

Each drug has certain problems that need to be watched for. The current medical literature suggests three basic principles when using psychiatric drugs in children. 1) Start low, 2) Go slow, and 3) Monitor carefully

What do you mean by Start Low?

This means that you do not start any of these drugs at the usual dose, or the maximum dose. When you have pneumonia, it can be a real emergency. You want to give people plenty of medicine right away, and if there are problems, then you reduce it. Unfortunately, many people use this same strategy in the medical treatment of ADHD. The problem is that big doses can cause big

problems, and when the problems affect your mind and personality, this usually means trouble for the person taking the medicines. So I start with the lowest dose possible. I start with about 25% of the usual dose. That way, if the child is sensitive to the drug, it only causes little problems. I also find that some children respond to drugs at very low doses, far below the usual recommendations.

What do you mean, Go slow?

ADHD is not an acute illness. Less than 10% of the people I see with this disorder need to be treated very quickly. Most people who I see with this problem have had it for years. As a result, there is no need to increase the dose quickly. By going slowly, it is a lot easier to manage any side effects because things don't happen suddenly. Also, it is easier to find the lowest effective dose.

What do you mean, Monitor?

For each of the medical treatments for ADHD, there are specific side effects that need to be checked regularly. Some common ones (see individual drugs below) are monitoring weight so that people are gaining weight, watch for tics, watch for depression, checking blood pressure and pulse, checking blood tests and EKGs, and making sure parents know what the side effects are of the different medications. In This way, if there is a problem, we can pick it up early and avoid the horror stories, some of which are true, about the medical treatment of this problem.

How often do I have to see you?

At first, it is fairly frequent, but it is mostly by phone. For the drugs which do not require blood levels to figure out the dose, I have people start the medication (low) and then call me in about four days so I can do a phone check up. I then see the child in two or three weeks. Once we know the medication is working and there are no side effects, most kids only have to be seen three or four times a year. Of course, if things do not go smoothly, I will see the child as often as necessary.

How long do you have to take it for?

If there is a big benefit and minimal side effects, then I usually have people take the medication throughout the school year. In the summer I have the person go off the medicine to see what happens. Some people grow out of ADHD. If they are doing well on medicines, the only way you can tell if they still need the medicine is to see them off of it. If they seem to be no different

off the drug, I have them start school off the medicine. If there are signs during the summer or at school of relapse, then I restart it and we try again to stop it the following summer.

How fast does it work?

Stimulants work immediately, that is within hours. The full effect is seen right away. Non-Stimulants take weeks to see the full effect.

Deciding on the right medication

The medical treatment depends on a few things. From my perspective, I always want to use the drug that is easiest to use, cheapest, and works best. It turns out that about half of the children with ADHD have other neuropsychiatric problems. It is the presence or absence of these other problems that can determine which drug I use. Do they have tics? If so, certain drugs work much better. Are there signs of anxiety and depression? This means certain things will work and other will not. The first choices of drugs for ADHD are the stimulants. The other drugs are all second choice and usually reserved for children who do not respond to the stimulant drugs.

Number of dosages per day

Some of these drugs have to be administered three times a day or more. That means someone has to be very, very attentive to getting the drug in the child at school and usually after school, too. Almost no children that I see will reliably take their own medicine. Besides, some people really object to the stigma of having to go someplace at school and afterwards to get their medicines. The drugs that need to be given three times a day are short acting Ritalin and short acting Dexedrine (not Dexedrine Spansules). All the other drugs are once day or just morning and night.

Can the child swallow Pills?

Some children can crunch up short acting Dexedrine or Ritalin, but the taste is pretty bad. None of the others can be chewed. However, Adderall and Biphentin comes in a Sprinkles format, and the beads can easily be sprinkled on yogurt, apple sauce, etc.

Cost

Some of these drugs are cheap, others expensive.
A **month** of each of these drugs is roughly -

Strattera $130.00

Altertec $130.00

Adderall XR $105-115 (all doses are the same price)

Biphentin $100-120

Concerta $70-110, depending on the dose

Welbutrin $30-50

Dexedrine Spansules, Ritalin SR $30-50, depending on the dose

Short acting Ritalin and Dexedrine $20-50, depending on the dose

In Summary

Each of these drugs has some good points and some bad points. There is no perfect drug. After the description of each drug is a chart which summarizes all of this.

You can not predict which drug will work in a child and which will not.

You can not predict which drug will cause side effects in a child and which will not.

First Line drugs for ADHD: Stimulants

These are the most commonly used medications for ADHD and include Ritalin and Concerta (methylphenidate), Dexedrine, and Dexedrine Spansules (dextroamphetamine), Biphentin, and Adderall. Others are available in the USA but not in Canada. Sometimes one drug in this group will work for a person but the others will not. They all have the same side effects, but some people will tolerate one drug in the group far better than another. It is currently impossible to know which drug will work or be well tolerated in a certain child. About 90% of children with ADHD or ADD will respond to one of the stimulants. Most of these will be able to tolerate at least one of the stimulants. There is more data to support the effectiveness of stimulants as a treatment in ADHD than in any other medical treatment in medicine! So how do you decide which drug to start with?

Short acting Stimulants

These are drugs which last 3-4 hours per dose and have to be given 2-3 times a day to work. They used to be the standard drugs for ADHD. Now they are only used in special circumstances such as

- A preschooler who is just too small for the long acting pills. Since these drugs are given by weight, sometimes the smallest long acting size is still too big.
- A child can't swallow the long acting pills. The short acting pills can be crushed, but not the long acting ones.(except Adderall)
- As an add on to another ADHD drug, especially Welbutrin.

Note: Ritalin (methylphenidate) - It is confusing, as there are a number of drugs which all have the same chemical in them, but with different names. The chemical is Methylphenidate. The three pills are called Ritalin, Ritalin SR, Biphentin, and Concerta. To help keep that straight, everything with Methylphenidate in it is in blue.

Ritalin tablets (methylphenidate)

This is certainly the most frequently used drug for ADHD. It requires no special monitoring. It comes in 5, 10, and 20 mg sizes. They are easy to crush and can be given in anything sticky for children who can not swallow pills. It is usually given at breakfast, lunch, and after school. The usual dose is 1mg/kg, or half your weight in pounds. For example, a 60 lb. child would take roughly up to 30 mg a day total. However, the dose can be up to 2mg/kg, or about your weight in pounds. They are quite cheap

Dexedrine

This is the oldest drug used for ADHD. The tablets last about 6 hours at the most. That means two or three doses a day. There are some children who will respond to short acting Dexedrine and nothing else. In fact they might respond to Short acting Dexedrine but not the Dexedrine Spansules! The tablets come in 5 mg size. The dose is .5mg to 1.5 mg per kg.

Long Acting Stimulants

This is the first choice for stimulant treatment in most children with ADHD. There are two drugs in the category which last about 12 hours. There is another older drug, Ritalin SR, which lasts 6-7 hours.

Dexedrine Spansules (long acting Dexedrine)

The Spansules are tiny pills in a capsule like a cold capsule. The Spansules last about 12 hours. The Spansules come in 10 and 15 mg sizes. The drug is twice as potent as Ritalin, so you are usually taking about a quarter of your weight in pounds. That means that if you weigh less than about 40 lb., The 10 mg spansule will probably be too much to start with. However, you can make a 5 mg spansule (roughly) by pouring out the medicine into the two halves of the capsule and then dumping out one half and putting it back together. Of course the pharmacy and the Drug Company do not approve of this. They are quite cheap. The maximum dose is about 1.5mg/kg/day

Concerta (long acting Methylphenidate)

One of the problems of Ritalin is that your body gets used to it throughout the day, so that to get the same effect, the pill needs to release more, not less, drug later in the day. The old form of Ritalin (Ritalin SR - see below) didn't do this. This pill is different and actually does release the drug in a way so that it is just as effective as Ritalin tablets three times a day, but with one dose. The side effects are the same as with the short-acting Ritalin three times a day. (36) the dose is usually between .5 to 2 mg/kg/d.

It sounds Great! What is the catch??

Cost. This drug is more expensive than the other stimulants. At Lawtons, with a prescribing fee, the cost of 100 18mg Concerta is about $230.00, or $2.30 a day. One hundred of the 36 mg Concerta is about $300, or 3.00 a day. One Hundred of the 54 mg size is $370, or about $3.70 a day.

And if you need to take over 54mg a day, the cost can be even higher- for example a 150 lb child, about 75 kg, who is taking a full dose, about 75 mg a day, is going to have to take a 54 mg plus a 27 mg Concerta each day. So that is about 7-8 dollars a day!

Biphentin (another long acting Methylphenidate)

This is the newest form of methylphenidate available in Canada. It works about like Concerta,. The advantage is that it is a capsule and it ***can be sprinkled on things*** like applesauce, yogurt and ice cream. It comes in many sizes from 10 mg to 60 mg, so you would only have to take one or two pills maximum.

Although there is little data on this drug (64) which is not from the drug company, my experience over the last two years has been that it is as effective as Concerta.

Adderall XR

This is actually two different forms of amphetamine together. They are mirror images of each other. The combination has been around for about 30 years, but has only been carefully studied in the last 15 years. If you have the dose right, it should easily last 12 hours. It careful studies, it has been shown to be at least as effective as Methylphenidate. It comes in 5, 10, 15, 20, 25, and 30 mg forms. Studies on 10 year olds have shown that the 30 mg size is better than placebo for 12 hours, while the smaller sizes either don't last quite as long or take longer to start working in the morning. (37) Blood tests have shown that there is a wide variance in the blood level from the same dose, so you need to start at the bottom and work up, just like with the other drugs. (38) It can cause all the same side effects as the other stimulants. It is $105-115 a month and it doesn't matter what size the pill is, the price is the same. It ***can be taken apart and sprinkled on apple sauce*** for those who can not swallow pills. The maximum dose is usually 1.5mg/kg. The cost issue is the same for high doses. Above 30 mg a day, the cost is double, about $230 a month.

Long acting stimulants and sleeping in

If you get up every morning all week long before 8 and always have breakfast before 8:30, you don't have to worry about this. However, if you like to sleep in on weekends, holidays, snow days… there is a problem here.

If you take Dexedrine Spansules at 9am, it won't be out of your system untill 9pm, which means you probably won't fall asleep until at least 11pm. But if you don't get up until 10, and don't take your medication until after your late breakfast at 1030 am, the drug will not be out of your system until 1030 pm, and you probably won't fall asleep until 1am. This is a real problem for teenagers and adults.

Ben becomes a night owl

At 14, Ben is really happy about taking Concerta instead of Ritalin three times a day. With a school inservice on Friday, a weekend, and a snow day on Monday, he has four days in a row without school. So He stays up late Thursday night and gets up at 9am and takes his Concerta. Friday he is up even later and gets up at 10am Saturday and takes his medication. Saturday night he has trouble sleeping and doesn't get to bed until about 1am, and barely is up in

time to go to mass at 11:30 and takes his medication as he goes out the door. Sunday night he has more trouble, but falls back to sleep after school is cancelled and doesn't wake up until noon. Then he takes his medication. Tuesday morning his Dad gets up to go lobstering at 330 am. Ben greets him and tells him he hasn't been asleep yet.

Solutions:

- If you sleep in past 9am, don't take your long acting stimulant (but what if you need to take it to survive?)
- Never sleep in. (this leads to sleep deprivation and worse quality of life)
- Wake up at 7am and take your medicine and then fall back to sleep (you won't sleep long, as these are stimulants, remember?
- Never stay up late (Impossible for most of us!)
- If you sleep in, take a shorter acting version of the drug you are taking or a lower total daily dose. For example, Ben is taking 36 mg of Concerta. If he sleeps in and doesn't take his medication until 10, he should try taking just 10-15mg or short acting Ritalin, or maybe 20mg of Ritalin SR.

Ritalin SR - medium acting methylphenidate

At one time this was the state of the art for stimulants in ADHD. That time was 1965. A lot has changed for the better in the world of drugs since then. The good thing about slow release Ritalin is you can give it once a day and it works for about 6-8 hours, but not 12. The bad thing is it comes in 20mg pills and you can not cut them in half, so it is very hard to "start low". This drug has a place in these circumstances:

- A child has insomnia with Concerta, and really doesn't need to be on medication 12 hours a day to thrive. This way the medication is out of their system sooner.
- Some children will have more mood symptoms with Concerta and not with Ritalin SR
- Some people can't afford Concerta

Special Populations

Preschool

In some circumstances, drugs are used in this group. Usually it is because the child's behavior is so disruptive that he or she can not attend a structured pre-school program. It is important to get children with severe ADHD into pre-

school as it can be very helpful in building their social skills. Other times a child's behavior is so difficult, especially when combined with ODD, that people in the family are getting seriously hurt. Other times the child's behavior is causing a severe impact on parents, relationships, or siblings. Overall, these medications are safe in this age group. However there do tend to be more side effects. In recent studies of preschoolers with ADHD and other common comorbid conditions, 30% had significant side effects when they received Ritalin and 11% had to stop the medication. The most common side effects were appetite problems, sleep problems, and irritability. (20) Unfortunately, these drugs do not work as well in preschoolers as in older children. Only about 20% had a remission of their symptoms, compared to 13% on placebo. (7). Since children at this age are growing rapidly, one of the questions is whether or not these drugs keep children from growing. When this is checked carefully for a year while on medications, some children do not grow as tall as they would otherwise and some do not gain as much weight as they would otherwise. Overall, they are about ½ inch shorter and about 3 pounds lighter than they otherwise would be. (32) It turns out that even over three years, this is not really a problem with older children (65)

How to manage the possibility of reduced growth rates in preschoolers on medications.

There is a special type of growth chart that can be used to see if children are not growing properly. The usual reason in my experience is that they are not eating. Overall, if a child doesn't grow properly, we stop the medication. I have never seen a child where we had to keep him or her on medication even though they weren't growing. Remember, it is only the stimulants that cause this.

Teenagers

These drugs are very effective in this group. The biggest problem is with medications requiring multiple dosages a day. A short acting drug like Ritalin or Dexedrine tablets would have to be given three times a day. This is very hard to remember, even if you do not have ADHD. As a result, the first line choice is drugs which can be given once or at most twice a day.

Questions about abusing stimulants

The stimulant medications are closely related to certain drugs of abuse. For example, if you crush Ritalin (methylphenidate) and smoke it, you can get high. Large doses of dexedrine by mouth can be addictive. Some people try to combine these drugs with other street drugs to get high. As a result, these stimulant medications do have some street value.

How often are ADHD medications abused?

In a recent study of children and adolescents with ADHD,

11% sold their medication

22% Used too much medication

10% got high on their medication (64)

Which drugs get abused?

Not all stimulants are alike. In the study above, of those who sold or misused their medications, the only two drugs that were sold and abused were short acting Ritalin and Dexedrine. (64)

Which persons abuse them?

In the above study, all the patients who abused ADHD medications either had Conduct Disorder or a Substance abuse problem, or both. (64)

In summary –

There is **no risk** of abuse with long acting ADHD drugs.

There is **no risk** of abuse if the child does not have Conduct Disorder or Substance Abuse

There is a **very high risk** if the child is taking short acting drugs and has There is no risk of abuse if the child does not have Conduct Disorder or Substance Abuse

If my child uses Ritalin or Dexedrine now, will he be more likely to use street drugs and alcohol later?

No. In fact there is some evidence to suggest the reverse. That is, teenagers with ADHD who are treated with stimulants are less likely to end up abusing drugs than teenagers with ADHD who do not take stimulants. That is, it seems like stimulants might actually protect children from drug abuse. (24)

My son has ADHD but also abuses drugs if he can get a hold of them. Are stimulants safe?

No. The usual approach is to make sure people are clean with urine drug screens and then make sure that they do not have access to the supply of medication.

So exactly how do you give these drugs?

I start with a dose that is quite low and watch the child for a few days.

<u>One of these things will happen:</u>

1. Absolutely nothing. Then we increase the dosage
2. Amazingly better and minimal side effects. We thank God and leave things alone.
3. A little improvement and no side effects. Then we increase the dosage.
4. Lots of side effects. Then we stop the drug and consider something else.
5. Some side effects and some benefit. Then we try to figure out whether the benefit is worth the side effects.

After each dose increase I check things out and we see what happens. I am after a dosage that will control the symptoms and not cause a lot of side effects.

Once a drug is working, there is no guarantee that the dosage is going to stay the same. In fact, over 70% of children have to have their dosages adjusted over the span of a year. Of those dose adjustments, 60% were increases in dosage, 30% were decreases in dosage and a few (7%) were changes to different medication.(30). If one stimulant doesn't work, you should try the others.

Side Effects of Stimulants and their management

Remember, all the stimulants have the same side effects. Some people will have no side effects on one stimulant, and many on another. You can not predict who will have what side effect on which stimulant.

Sleep

Many children with ADHD have insomnia. Sometimes the stimulants actually improve sleep. Sometimes they don't. A child may be able to go to sleep, but awaken a few hours later ready to go. More commonly, the child just can't fall asleep. This is very serious business for a number of reasons. First, the child will become sleep deprived leading to irritability, poor concentration, and fatigue. Second, since most parents do not go to sleep before their children do,

the parents are sleep deprived with the same problems as the child. This is a very bad combination!

Management - If it is mild, sometimes attending to sleep hygiene or good sleep habits will do the trick. Things like an earlier bed time, certain foods, no TV or computer, quiet activities in the evening and no naps sometimes will do the trick. More often they do not. What to do depends on how well the child is doing on the drug at that particular dose. If the child isn't that much better anyway, I discontinue the stimulant and try another stimulant or another drug for ADHD. If the child is markedly better, often I will add one of the drugs below or a natural substance Melatonin.

The key thing is to do something. Sleep deprivation will undo every intervention you have made.

Medical Treatments for stimulant induced insomnia in ADHD

Melatonin – the perfect medicine?

A perfect medication for sleep is safe, cheap, non-addictive, has no long term side effects, no withdrawal, and can be combined with anything. Melatonin is quite close to this.

This is a hormone that every person actually makes. By giving the hormone, children will go to sleep earlier. When compared to placebo in children with sleep problems, some of which were taking stimulants for ADHD, the children fell asleep about an hour earlier, and fell asleep about 30 minutes faster. They didn't tend to sleep much later in the morning though. As a result of getting more sleep, they were healthier and felt better. The dose was 5 mg at about 7:00 pm. (55),. A more recent and larger study showed that it worked quite well and was safe and better than placebo. In that study, nearly everyone responded. (68)Melatonin has also been used for a number of years for other sleep problems in adults and children. This is not a prescription drug. It is available at all pharmacies. It comes in capsules, powders, and liquid. . The usual size is 3 mg. Starting at one pill a day, you can work up to three pills a day quickly if needed. In my experience, this substance works 50% of the time and has never caused side effects.

Clonidine (Catapress, Dixarit)

This drug was originally developed for treating blood pressure in children and it is very safe. It turns out to be useful for a lot of things. Indications for Clonidine are; tics, severe ADHD, severe aggression, sleep disturbances in ADHD, detoxifying Heroin addicts, menopausal flushing, and sometimes autism. The good thing about this is that it never aggravates tics, works well when autism is present, and works in very aggressive kids whom never sleep. It is

safe for pre-schoolers and comes in a pill called dixarit that is sweet tasting and looks exactly like smarties. As a result, kids will easily take it. It also comes in a larger size. It is a good choice when tics are present, in autism, preschoolers, and very aggressive kids with ADHD and severe insomnia.

And the bad side of Clonidine?

About one out of every 10 to 20 people who take this will get depressed. It comes on within about 3-4 days and after the drug is stopped, it can take 3-4 days to clear. However, if you are not watching for this, you might think the child is depressed for another reason, and never stop the drug, thus leaving the child depressed. With careful monitoring, that never happens. You have to check a person's blood pressure when you are starting this. It will make some children sedated, but usually by cutting back the dose you can avoid this. As it can affect the heart, I check an ECG before using it and after the child has been on it.

Trazadone (desyrel)

This drug was developed in the 1980s to treat depression. It works for that, but the reason it is used in children has nothing to do with depression. It turns out to be a very safe drug for helping children sleep. It has virtually no side effects. It is not addictive at all. The problem? In less than one in 1000 men, this drug can lead to prolonged erections (priapism) which can be so severe that it requires surgery. It has never been reported in male children, however, I have read some unofficial reports of one or two cases in the USA. It has been used for years in Autism in children. If a child has a history of depression and has stimulant induced insomnia, I use this.

Appetite

The stimulants can reduce a person's appetite. After all, these are the same family of drugs used for weight loss. Often a child will not be quite as hungry on one of these drugs. Other children are finally able to sit down long enough to eat something and actually gain weight. Problematic weight gain is very rare, but weight loss is common. I weigh children regularly who are taking these drugs. If there is substantial weight loss in an already thin child, we try something else. Some children will eat no breakfast lunch or afternoon meal but not lose weight because they spend their evenings eating. Usually, children have other complaints then like stomach ache. Sometimes with a little encouragement a child will be able to eat enough at mealtimes to not loose weight. Sometimes things like Ensure, Boost and instant breakfast can help. If this has been tried and a child is still losing weight, it doesn't matter how well they are doing. It is time to stop that particular drug.

Rebound

The short acting drugs often can cause this (regular dexedrine, regular ritalin). What this means is that as the drug is wearing off the child does not return to their usual severity of ADHD, but to a much worse state. They will stay this way for 1-3 hours before returning to their old selves. The usual story is a child who is taking Ritalin at breakfast and at lunch with great result. The drug wears off right after school and the child behaves like are a monster until evening. If this is severe, something has got to be done, no matter how well they might be doing in school. It is better to be consistently hyper than Dr. Jeckyl at school and Mr. Hyde at home. Sometimes, you can get around this by giving a small dose of the short acting drug (usually ritalin) in the afternoon.

Unwanted psychiatric signs and symptoms

Perhaps 30-50% of children will have this on stimulants to one degree or another. These signs and symptoms are all reversible when you stop the drug. Everyone involved in the medical care of children with ADHD needs to be watchful for these. It is important to remember that even if this happens with one stimulant, it does not necessarily mean it is going to happen with a different stimulant.

Decreased activity - some children will become very, very still on these drugs, especially in the first few hours after they take them. Often they are perfectly behaved, but are taking in next to nothing. This is usually due to the dose being too high, but can happen in low doses in susceptible people.

Increased hyperactivity - some children will actually become more hyper, not less with these drugs.

Mood changes - Occasionally these drugs will make a person sad, angry, and very easily upset. Irritability is also possible. The child appears to cry at the drop of the hat. Even less commonly, a child will be giddy and actually seem high.

Language - Occasionally a child who has a problem with speaking or understanding will actually go backward on one of these drugs and speak even less than usual.

Movements and compulsions - occasionally these drugs will make people have what appears to be nervous tics as in Tourette's syndrome. At times these can be compulsive, such as new onset of nail biting, licking the hand, or having to touch certain things.

The possibility of the above things happening to a child who is already having psychiatric problems is often scary to contemplate as a parent. It is another reason to start low, monitor, and go slow. These are all reversible, and most children do not have these side effects which affect the mind.

Other mild side effects

Besides these, there are sometimes some mild nuisance side effects of the stimulants. Occasionally mild head ache, abdominal pain, and other mild physical symptoms are reported by children taking these drugs. Often they go away with time and most research has found that this type of side effect is as common in ADHD children treated with placebo as with the actual stimulant drug.

Serious Side effects- Sudden Death, Stroke, Heart Attacks

Over the many years that these drugs have been around, there have been a few cases of the above things happening, not counting suicides and drug abuse. This is how frequent they are in children and adolescents:
Sudden death while taking stimulants 1.6 to 3 deaths per 10 million people who take them
Other serious heart problems while taking stimulants1.8 to 5 per 10 million (65)

The question is, is that any more than you would expect in children not taking stimulants?

The answer is, probably not. The best estimate of the chances of any child dying suddenly in a year is that close to 13 per million children will suddenly die, usually of heart problems.

As a result, the risk is very, very slight for most people. However, if you have a history of sudden death in your family or serious heart problems, you probably should not take a stimulant for ADHD.

Side effects and the school

The side effects of the stimulant medications are rarely seen at school. Studies have shown that while teachers are good at determining how effective a drug is, there are not accurate in determining side effects (29). As a result, it is not uncommon for teachers to be more enthusiastic about medical treatment or suggesting that the dose of the medication be increased.

Example

Ryan is 6. He has quite severe ADHD and it impairs him everywhere. His parents don't know of any other first graders who got suspended in October. Ryan has taken medications (Ritalin) in preschool when he was biting everyone and they helped. He lost a few pounds, was whiney, and didn't go to sleep until about 9 pm, but he was able to get through preschool without getting thrown out. During the summer we tried dexedrine and the side effects were even worse. We were able to figure out that at 10 mg a day, the side effects were mild, and he was better. Not great, but not getting thrown out. Once the dose went above that, his behavior was super at school. Except the rebound was horrible, he didn't eat and he whined all evening. Since his teacher never saw the side effects, she felt they were being too cautious. Even after discussing it with me, they still think the parents are exaggerating the side effects.

Non-Stimulant Drugs

These drugs are all second line because there have not been as many studies and there is no long term follow up data so we can not answer the question, " If my child takes this drug now, will it lead to some problems years from now?"

Strattera (Atomoxetine)

This drug has been used in the USA since 2003. It is not a stimulant. It is related to antidepressants. It increases the amount of dopamine in the front of the brain, but has less effect on the dopamine in other parts of the brain. It is quite different than the other drugs that are currently used for ADHD. A couple of advantages are:
1. One dose will last for 24 hours.
2. It is not a controlled substance and is not abusable.

How does it compare to the stimulants like Ritalin?
Strattera is not quite as effective as the stimulant drugs.
What are the side effects?
In a study of Ritalin vs. Strattera, there were no differences between the two drugs. That is, the most common side effects were the same as with stimulants: headaches, insomnia, decreased appetite, mood problems and anxiety. Overall, 5-10% of the children who were taking either drug stopped it due to side effects. (42)
Are there other side effects?
Yes, in a very few cases, children can become very agitated. Less than 1% will consider suicide, but in no drug trial has anyone ever committed suicide. (66)
Does it stop working after awhile?
After nine months of treatment, half were still doing well, and half were doing worse. (43)
Can it make tics worse like stimulants?
Yes. (41)
What is a reasonable dose?

The usual dose to start with is .5mg/kg. So if a child weighs 60lbs, that would be about 18mg a day. I will have children take that dose for a week, and then, if they are tolerating it, increase it by .5 mg/kg every week until there is an positive effect or side effects. That is actually slower than the drug company recommends. The usual top dose is 1.5 mg/kg, however it has been tested up to 1.8 mg/kg. (56) The higher doses seem to be necessary when Oppositional Defiant Disorder is also present. (57) A person needs to take it every day. You can't skip weekend days. It is available in the following sizes:10mg, 18mg, 25mg,40mg, and 60mg. You can not chew it. You have to be able to swallow pills to take this drug, at least at this point.

Is it expensive?

All the sizes are the same price - $95.00 US for 30. As long as you do not have to take more than 60 mg a day, it would probably not be any more than Adderall, Biphentin, or Concerta.

How fast does it work?

Within a week you can see a response, but a full effect may take 12 weeks.

Can it cause withdrawal if it is stopped suddenly?

No.

I have heard that it will damage your liver.

In December, 2004 the drug company said that of the two million people who have taken the drug, two have had liver damage which returned to normal after the drug was stopped. This included one adult and one teenager. Liver tests were not checked in all two million people. In a separate study, 6000 people on strattera did have liver tests done and none were abnormal. At this point, routine tests for liver damage are not necessary except in people who are at risk for liver problem already. It is important to watch for any signs and symptoms of liver disease if your child is on this drug. These include:

1. Severe Itchiness
2. Yellow skin
3. Dark urine
4. Upper right-sided abdominal tenderness
5. Unexplained "flu-like" symptoms

If there is any question, I would check the liver tests before I ever started the drug.(44)

Why isn't it a first line drug?

Because nobody knows if there are any long term side effects. The drug has only been around since about 2000. As a result, even if you have lots of money, it is a good idea to start with something that has long term follow up data, like stimulants.

Bupropion (Welbutrin)

This drug has been available in the USA for about 10 years. It is used primarily as an antidepressant. However, it affects the same chemicals in the brain (dopamine and norepinephrine) that other drugs for ADHD effect. As a result, it has been tried in ADHD in children and adults. There are only a few studies of this drug in children. However, all of them have found it to be effective. In the one study which compared it to Ritalin, it was found to be almost, but not quite, as effective as Ritalin. (3) It has been used in children who have Conduct Disorder, Substance abuse problems and Attention Deficit Hyperactivity Disorder and it has been found to be helpful. (15) It comes in a slow release form, which means there is no need for a middle of the day dosage. The average dosage is about 3-4 mg/kg. The drug is available only as a slow release preparation in Canada. It comes in 100, and 150mg sizes. The pills can be safely cut in half, but they don't last longer than 24 hours in the cut form. Usually it is given once or twice a day and it is not recommended that any dose be greater than 150mg.

Since this drug is also an antidepressant, it is a first line choice if a child has both depression and ADHD. It is also a good choice if people have had problems with depression from stimulants. A recent study has shown that in children with depression and ADHD treated with Bupropion (Welbutrin) the drug worked quite well. Depression improved in 88% of the children and ADHD in 63% of the children. In 58% of the children, the drug helped both the ADHD and the depression. (31)

Side effects

Rashes are not uncommon, about one out of 6 children can get one which usually resolves over 3-4 days. Nausea and vomiting can occur. About 1/3 of children will lose a little weight. Less common side effects include irritability, sleep problems, and head aches.

There is only one serious concern. It can cause seizures. This is most frequent in over doses and when patients also have bulimia. In adults, 4 out of 1000 people will have a seizure using the short acting form of the drug. However, the long acting form used in Canada only causes seizures in 1 in 1000 people (9). This is about the same as most of the drugs used for depression. Seizures have occurred in children, but usually at higher doses. It is still unknown if the seizure rate in children is lower, higher, or the same as in adults. There are no other long term side effects or risks. On the other hand, it has not been around a long time. Over all, the early data suggests the side effects are slightly less than stimulants, but not a lot less. (4)

Good points about Bupropion

Compared to the other non-stimulant drugs for ADHD, the monitoring necessary is minimal. No ECGs or blood tests are necessary. It can be helpful when

depression is also present. It has been used a lot in the USA for ADHD without any major problems. If a child has failed to respond or tolerate the first line drugs it is the next choice. (5)

Bad points about Bupropion

There has been some, but not a lot of research on this drug. It seems quite safe in adults, and it probably is in children. However, there is a possibility that something will come up which is a problem with this drug in the future. More importantly, it is hard to use in little children. Since the smallest amount you can give is one half of a 100mg tablet, that means if the child weighs 20 Kg (45 lbs) or less, you are going to be starting the drug at the maximal dose. This is something I always try to avoid doing, so it is not a good choice in children under 50 lbs.

Modafinil (Alertec)

This drug was released in 2004 for narcolepsy, a disease where people suddenly fall asleep in the day. Since it increases the amount of dopamine in certain parts of the brain, it has been tested in ADHD, too. It is not a stimulant. In fact, no one is exactly sure how it increases dopamine. It is been tried in adults and children with ADHD. There have now been a number of studies where it was compared to placebo. The largest found that it worked quite well, and 56% of children responded, but not as many as with Concerta. It took almost 9 weeks to see a full effect. The dose ranged from 200-400 mg a day, and the side effects were mild.(67) The side effects were sleep problems, nausea, and some mild headache. It comes in 100mg and 200mg size. It can be taken once or twice a day. (39)

The good news about Modafinil

A new, probably safe drug for ADHD that works differently than stimulants. It will certainly be a drug to consider in people who have not responded to stimulants

The Bad news about Modafinil

There has been only a few studies done. There is no information on long term effects, good or bad, and it is very expensive. It can cause problems with other medications.

Third line Drugs

All of the medications below involve more risk. That is, in rare cases, people can have serious side effects. This means that there is additional monitoring required. On the other hand, they have been around a long time so we know everything they can do to a person. Why do you use these drugs?

Because the drugs above have not worked.

Except in a few cases (comorbid severe tic disorders, some mood disorders, some substance abuse disorders) both the drugs above are tried first before considering the drugs below.

Because the risk of ADHD is far greater than the risk of the medication.

ADHD is not always a mild disorder. People with ADHD sometimes engage in very risky behaviors. These are risky to themselves and others. ADHD can totally demoralize a child and put them at significant risk for depression. The risks of things like substance abuse related accidents, motor vehicle accidents, demoralization, other psychiatric disorders and even suicide is not that small. If you look at a group of children with ADHD that go to see a pediatric psychiatrist and then see how they are doing four years later, 51% will have required tutuoring, 34% will have repeated a grade, 15% will be in special classes, and 16% will have been diagnosed with a learning disability. Compared to children without ADHD, they will be 10 times more likely to have manic-depressive disorder, 8 times more likely to have depression, and 4 times more likely to have major anxiety problems. (1) ADHD can be a very serious illness.

The risk of serious problems with the drugs below is on the order of 1 in 10,000 or less. To put that in perspective, your chance of being killed in a car accident on the way to my office is .7 in 10,000. Compared to the risks of ADHD, most people would say the risks of these medications are worth taking.

Your job is to learn about how these medications are monitored and what the risk is and then, with a pediatric psychiatrist, decide what to do.

Clonidine (Catapress, Dixarit)

This drug was originally developed for treating blood pressure in children and it is very safe. It turns out to be useful for a lot of things. Indications for Clonidine are; tics, severe ADHD, severe aggression, sleep disturbances in ADHD, detoxifying Heroin addicts, menopausal flushing, and sometimes autism. The good thing about this is that it never aggravates tics, and works in very aggressive kids who never sleep. A recent study showed that when added to a stimulant, children with ADHD and ODD or CD had a noticeable improvement in

their ODD and CD symptoms, but not their ADHD symptoms with few side effects. (35) It is safe for pre-schoolers and comes in a pill called dixarit that is sweet tasting and looks exactly like smarties. As a result, kids will easily take it. It also comes in a larger size. It is a good choice when tics are present, in autism, preschoolers, and very aggressive kids with ADHD and severe insomnia.

And the bad side of Clonidine?

About one out of every 10 to 20 people who take this will get depressed. It comes on within about 3-4 days and after the drug is stopped, it can take 3-4 days to clear. However, if you are not watching for this, you might think the child is depressed for another reason, and never stop the drug, thus leaving the child depressed. With careful monitoring, that never happens. You have to check a person's blood pressure when you are starting this. It will make some children sedated, but usually by cutting back the dose you can avoid this. As it can affect the heart, I check an ECG before using it and after the child has been on it.

How to use it

The usual full dose is .1 to .2 mg a day. It is usually given in .1 mg or 05 mg size pills two or three times a day.

Tricyclics

This is a group of medications (desipramine and nortryptiline) which were the first drugs used for depression in adults. One of them, imipramine or tofranil, has been used for years children who bedwet. They work in a slightly different part of the brain. The good thing is that they work very well in children who are also depressed or anxious. They do not wear off over the day. They can be given it at breakfast and bed time. They do not usually worsen tics.

So why aren't they used more?

Approximately 5-10 children have died suddenly while taking one of these drugs, desipramine. This turns out to be a rate of about 8 per million. Children die of unknown causes at a rate of 8 per million. To put this in perspective, the childhood suicide rate is about 8 per million. The risk of dying in an auto accident are about 70 per million. So, although there is a very slight risk, compared to the risks of the disorder, it is very small. In my practice, it would be ten times more likely that someone would die on the way to their appointment with me in a car crash than die of sudden death related to these drugs. There is still a debate as to whether this small increase in deaths is from the medication or something else. It is also unclear as to whether monitoring as below will pick out these super rare cases. It has only happened with

desipramine. A much more real risk is over dose. If children or adults take too much of these drugs accidentally or on purpose, they can die. These drugs can cause rhythm problems in the heart, blood pressure problems, and fast pulse, plus constipation and dry mouth and occasionally sweating and dizziness. It is very hard to figure out the dose.

Are they safe?

Yes, they quite safe if they are used correctly. The American Heart Association studied this issue and published their recommendations in August of 1999 (21). They suggest the following.

First I get an EKG. If it is normal, we start the drug at a very small test dose amount. For Desipramine, this is usually 1 mg/kg. The doses for Nortryptiline are half of this. Over the next few weeks I slowly increase the dose to 3-5 mg/kg for desipramine or 2-3 mg/kg for Nortryptilin . At this point we check a blood level and another EKG. It takes a week to get the result back. Based on the results of the blood test, I adjust the dose, and occasionally a person will need another EKG and blood test, but not usually. I check the blood pressure and pulse after a few weeks. The toxicity of these drugs is mostly related to the blood level and the EKG. By following these very conservative guidelines, the drug is very safe and often very effective.. BUT, it is a fair amount of hassle. Obviously if someone is dead set against having their blood drawn, they will never get this.

I heard of somebody who was taking two drugs at the same time. Why would you ever do that?

Attention Deficit Hyperactivity Disorder is sometimes so severe that one drug won't control it. It can be a life threatening disease as it makes accidents much more likely. There are certain cases where it is necessary to use two drugs to control Attention Deficit Hyperactivity Disorder. This requires even more monitoring and even a more careful approach..

The most common combinations are

For ADHD that doesn’t respond to Stimulants alone

- Welbutrin plus a Stimulant

For ADHD plus ODD or CD that doesn’t respond to a stimulant alone

- Welbutrin plus a Stimulant
- Stimulant plus clonidine
- Stimulant plus Risperidal

For ADHD plus ODD or CD that is very disabling and doesn't respond to any two drugs

- Welbutrin plus Stimulant plus risperidal

Table of Medications for ADHD

Long Acting Medications (once a day)

Brand Name	Chemical Name	Usual Dosage	Advantages	Problems
Dexedrine Spansules	**Dexedrine**	**1/2 mg /kg once a day comes in10mg, 15 mg sizes up to 1.5 mg/kg/d**	**Cheap and once a day**	**Sleeping in problem**
Adderall XR	**L&D amphetamine**	**20-30 mg once a day in any size 5-30 mg up to 1.5 mg/kg/d**	**Can be sprinkled on applesauce**	**Can't sleep in, Expensive**
Concerta	**Methylphenidate**	**1mg/kg comes in 18mg, 27mg, 36mg, and 54 mg sizes up to 2mg/kg/d**	**Once a day**	**Sleeping in problems Expensive**
Biphentin	**Methylphenidate**	**1mg/kg comes in many sizes to 60mg**	**Once a day Can be sprinkled**	**Expensive**
Strattera	**Atomoxetine**	**Start with .5 mg/kg, up to 1.6 mg/kg, many sizes**	**Lasts 24 hours**	**Expensive if over 120 lbs**

Medium acting medications (6-8 hours)

Brand Name	Chemical Name	Usual Dosage	Advantages	Problems
Ritalin SR	Methylphenidate	Up to 2 mg/kg comes in 20mg size only	Cheap, not too long acting	Only lasts 6-8 hours

Short Acting Medications (3-5 hours a dose)

Brand Name	Chemical Name	Usual Dosage	Advantages	Problems
Dexedrine Tablets	Dexedrine	3-4 times a day. Up to 1.5mg/kg/d	Can be helpful when you want to start dexedrine at a very low dose	Frequent dosing

Second Line Medications

Brand Name	Chemical Name	Usual Dosage	Advantages	Problems
Tricyclics	**Nortryptiline, Desipramine**	**Nortryptiline comes in 10mg ad 25 mg sizes, 75-150 mg a day.** **Desipramine comes in 10mg, 25mg, and 50mg , 150-300 mg a day**	**Requires blood levels and ECG**	**Also effective as antidepressant, can be added to a stimulant**
Welbutrin	**Bupoprion**	**100mg and 150 mg, max dose is about 6mg/kg in two doses**	**Also an antidepressant**	**Seizures at high doses, not as strong for ADHD**
Dixarit, Generics	**Clonidine**	**Comes in 25mcg and 100mcg size. 50-300 mg a day**	**Helps tics, helps insomnia, sometimes helps aggression**	**Depression, requires ECG, blood pressure, pulse**

The bottom line is.....

Drugs can be very beneficial. There is no free lunch; they all have side effects. If used carefully they can be lifesavers, if not, a nightmare.