All Party Parliamentary Group for Muscular Dystrophy

Newborn screening for Duchenne muscular dystrophy

April 2014
Foreword from Dave Anderson MP

There are over 70,000 people affected by muscular dystrophy or a related neuromuscular condition in the UK. These rare, mainly genetic conditions cause progressive weakening and wasting of the muscles. I myself understand the severity of these conditions having lost my brother, sister, a nephew and a niece to myotonic dystrophy.

Of the 70,000 people in the UK with a muscle wasting-condition, nearly 2,500 are affected by Duchenne muscular dystrophy, with approximately 100 boys diagnosed every year. This progressive condition almost exclusively affects boys and has a severe impact on mobility. Eventually, the progression of the condition leads to serious muscle-wasting in the heart and the lungs, significantly reducing life-expectancy. There are currently no cures or effective treatments for Duchenne muscular dystrophy but corticosteroid treatment and other forms of anticipatory care can help manage the condition, keep patients walking for longer and prolong life-expectancy.

However, research into the condition is making rapid progress with a number of new potential treatments offering the kind of hope that would not have been thought possible even 10 years ago. These potential new treatments could raise the prospect of being able to significantly reduce the severity of symptoms, thus lessening the enormous burden the condition places on those affected and their families.

One of the challenges we now face is to ensure a programme of newborn screening for Duchenne muscular dystrophy is in place in the UK should these potential treatments be made available to families after completing the clinical trials and regulatory process.

Unfortunately a range of barriers must be overcome before a screening programme can be implemented, including problems with the testing protocol for Duchenne muscular dystrophy and the strict criteria against which any application for a newborn screening programme is judged.

For these reasons, the All Party Parliamentary Group (APPG) for Muscular Dystrophy conducted an Inquiry into newborn screening for Duchenne muscular dystrophy to ascertain the current challenges facing a screening programme and to look at how these problems could be addressed.

Expert testimony was provided by scientists and clinicians, including those who led on a recent Duchenne muscular dystrophy screening application to the National Screening Committee and those who worked on the former newborn screening programme for Duchenne muscular dystrophy in Wales. We also heard from families of young men with Duchenne muscular dystrophy on their experience of diagnosis and living with the condition. I would like to pay tribute to all those who took part in our evidence sessions for their invaluable contributions, without which this Inquiry would not have been possible.

The APPG has now agreed upon a set of recommendations for the Government, the National Screening Committee and the NHS to consider.

These recommendations are an essential prerequisite for any national programme of newborn screening and we call on all those organisations named in the report to work towards implementing them as a matter of urgency.

Research into Duchenne muscular dystrophy is gathering pace; we must make sure that progress towards a newborn screening programme matches this.

Dave Anderson MP
Member of Parliament for Blaydon
Chair of the All Party Parliamentary Group for Muscular Dystrophy
The All Party Parliamentary Group for Muscular Dystrophy

Executive summary

In our evidence sessions, we heard from experts in the field of neuromuscular research who told us that this is an exciting time for research into Duchenne muscular dystrophy. Potential treatments, some of which are at advanced stages of clinical trial, are offering hope to the families of boys and young men living with the condition. This means it is now essential that work begins to develop a UK-wide screening programme before these treatments are approved, ensuring that individuals who could benefit from them are identified.

It was against this backdrop that the All Party Parliamentary Group (APPG) for Muscular Dystrophy launched an Inquiry into screening for Duchenne muscular dystrophy. The Inquiry looked closely at the experiences of families of boys with Duchenne muscular dystrophy and examined in detail the barriers facing the implementation of a national screening programme in the UK for the condition.

We heard moving testimony during evidence sessions and in written submissions from families of boys with Duchenne muscular dystrophy. Some of these were parents of a child who had received a diagnosis through the newborn screening programme in Wales. The experiences of these families varied. Some felt early diagnosis was positive; allowing them to plan for the future and ensure their child received earlier treatment. However, others felt they had not been fully informed when they made the decision to accept screening for Duchenne muscular dystrophy and were not supported following their son’s diagnosis. We also heard from several parents who said their sons’ diagnoses were delayed, as their condition had not initially been recognised. This delay had a major impact on their ambulation and life-expectancy.

Leading scientists and clinicians gave comprehensive evidence and we heard about existing obstacles to a national screening programme for the condition, including problems with the use of the creatine kinase (CK) test as well as Duchenne muscular dystrophy’s incompatibility with some of the National Screening Committee’s current criteria for newborn disease screening. However, experts also focused their remarks on anticipatory care and the treatments that could be administered at an early stage of disease progression if a newborn screening programme for the condition were in place today.

Current medical provision for boys and young men with Duchenne muscular dystrophy must be considered. The APPG for Muscular Dystrophy is concerned that in its latest external review on Newborn Screening for Duchenne muscular dystrophy, the National Screening Committee did not fully recognise either the benefits that early anticipatory care can bring about or the significant number of boys with the condition in the UK who are not currently receiving treatment until their symptoms are advanced.

Very recently the APPG was encouraged to see that, in its Statement of Intent on the UK Strategy for Rare Diseases, NHS England highlighted the need to ensure the role of screening in achieving earlier diagnosis is appropriately considered. We welcome this focus and believe the recommendations in our report will help the National Screening Committee take this forward for Duchenne muscular dystrophy.

The APPG for Muscular Dystrophy is calling for:

- the National Screening Committee to take full note of this report in its current review of its appraisal criteria on newborn disease screening. We are particularly concerned about criteria which require treatments to be administered or shortly after birth and for the child to be symptomatic at or shortly after birth. We believe this unfairly disadvantages boys with Duchenne muscular dystrophy; it neither reflects the benefits of early, anticipatory care, nor the big gap that often exists between a child becoming symptomatic and receiving a diagnosis.
- the scientific and clinical community to continue its vital work in developing an effective newborn screening protocol for Duchenne muscular dystrophy.
- the National Screening Committee to work towards implementing a UK-wide screening programme for Duchenne muscular dystrophy, following a change in criteria and the development of a revised test, ensuring that a screening programme is in place should new treatments become available.
- NHS England, NHS Scotland, NHS Wales and Health and Social Care Northern Ireland to ensure the process of informed consent is as strong and robust as possible so parents are able to make a truly informed decision about whether or not to screen their children for Duchenne muscular dystrophy.
- NHS England, NHS Scotland, NHS Wales and Health and Social Care Northern Ireland to ensure increased provision of specialist neuromuscular nurses and care advisors to provide families with practical, emotional and psychological support following diagnosis. We believe high standards of care and support for children and families must be firmly in place if a newborn screening programme is to be implemented in the future.

The All Party Parliamentary Group (APPG) for Muscular Dystrophy wishes to thank the Muscular Dystrophy Campaign for its administrative support in the organising and staging of evidence sessions and for gathering written evidence and producing a draft of this report.
Recommendations

1. A safe and effective method of testing
   a. While the CK assay provides a means for testing for Duchenne muscular dystrophy in baby boys, we are concerned that current limitations of the test may have an impact on the effectiveness of a national screening programme, and could also undermine public confidence. For example, in Wales, one in five boys with Duchenne muscular dystrophy was diagnosed as not having the condition when initially tested. We welcome the ongoing efforts of the scientific community to look at revised ways of conducting the test and believe this is an essential prerequisite to a national Duchenne muscular dystrophy screening programme.

   b. In Wales, newborn screening for Duchenne muscular dystrophy came to a halt following the withdrawal of the external quality assurance programme in America. In order for any national programme of newborn screening to operate effectively, it is crucial that a diagnostic organisation be identified to validate the test. We are encouraged that work is underway to engage such a body and we urge further international collaboration in this area.

2. A full review and updating of the National Screening Committee criteria, ensuring Duchenne muscular dystrophy does not continue to be disadvantaged when considered for a national screening programme
   a. Current National Screening Committee criteria include a requirement – ‘detectable early symptomatic stage’ – at or very shortly after birth in order for a condition to be considered for a newborn screening programme. Even though some studies show a neuro-cognitive developmental delay in boys as young as six to twelve months, this criterion may always be particularly hard for Duchenne muscular dystrophy to meet.

   b. Assessment criterion 10 states that ‘there should be an effective treatment or intervention for patients identified through early detection, with evidence of early treatment leading to better outcomes than late treatment’. Corticosteroid treatment and other means of anticipatory care can be effective at maintaining muscle strength for longer. However, the relatively advanced age at which such treatment would usually be administered means that, unless treatments emerge that could be given at or shortly after birth, the strict application of this criterion may prevent the approval of a newborn screening programme for Duchenne muscular dystrophy.

   c. The National Screening Committee announced on 15 April 2014 that it was carrying out a review of its appraisal criteria. During its review, we call on the Committee to take full note of the recommendations of this report. We believe that current appraisal criteria may pose a major obstacle to the implementation of a newborn screening programme for Duchenne muscular dystrophy, should potential new treatments for the condition emerge.

3. Subsequent implementation of newborn screening for Duchenne muscular dystrophy
   a. Effective potential treatments for Duchenne muscular dystrophy in the foreseeable future are now a real possibility. We believe a national programme of newborn screening for this condition is required before these treatments become available, so patients who could benefit from them are identified in time. Some scientists believe emerging treatments would also require maximum muscle strength in order to have the greatest effect. Consequently, as soon as concerns over the CK assay are addressed, and robust standards of care and support for patients and families are in place, we call on the National Screening Committee to recommend a national programme of Duchenne muscular dystrophy screening in baby boys, and the Committee and Governments in the four UK countries to work towards the implementation of such a programme.

   b. While treatments currently in clinical trial strengthen our call for a Duchenne muscular dystrophy screening programme, there are already benefits to early corticosteroid treatment and other methods of anticipatory care. For maximum impact, optimal care must be administered early; however, in many cases this does not happen soon enough. Currently, the average age for a diagnosis of Duchenne muscular dystrophy is five, by which point a child will already have lost 30 to 40 percent of muscle mass, with even more severe deterioration seen in boys diagnosed at a later stage. Additionally, some UK families have had multiple children affected by the condition. A newborn screening programme for Duchenne muscular dystrophy would enable families to make more informed family planning choices.

   c. We believe the benefits of an early diagnosis are such that, even in the current absence of effective new treatments, they could warrant a programme of newborn screening.

4. Informed consent and post-diagnosis support
   a. The APPG is concerned that some families who received a diagnosis from the newborn screening programme in Wales had cause to feel they were not fully informed about Duchenne muscular dystrophy when they gave consent for their infant son to be tested. This may also be reflected in the low number of parents declining the test between 1990 and 2011. We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme in the UK. An emphasis on information at the prenatal stage is especially important in ensuring that parents are fully aware of the severity of Duchenne muscular dystrophy and of the treatment and care options available, especially in the current absence of curing or effective treatments.

   b. Having support in place is essential for parents whose infant son has just been diagnosed with Duchenne muscular dystrophy. Families face huge challenges in coming to terms with their child’s diagnosis; they may encounter psychological difficulties and will need to know what support is available and where to find it. Appropriate and robust support for families will be a crucial component of any newborn screening programme in the UK. To this end, we call on the NHS in England, Wales and Scotland, and the HSC in Northern Ireland, to ensure provision of a national network of neuromuscular care advisors and specialist nurses, who play an important role in providing this kind of support to families at these difficult times. Parents should also be offered genetic counselling and psychological support following a child’s diagnosis as well as in subsequent years if needed.
About screening for Duchenne muscular dystrophy

Screening for Duchenne muscular dystrophy has been carried out in 17 countries and states around the world since 1977. However, the majority of these programmes have been pilot studies and there is no evidence to suggest a truly national screening programme for Duchenne muscular dystrophy has ever been in place.

The test for Duchenne muscular dystrophy looks for the presence of creatine kinase (CK) in dried blood spots collected on Guthrie cards. CK is a protein found in muscle but when the muscles are damaged, owing to disease or injury, it leaks into the bloodstream. Once a positive CK result has been obtained from the original Guthrie card test, it is repeated six to eight weeks later as there is a risk of false positives as a result of the natural trauma associated with some births. If the levels are still high in this repeated test, this could indicate muscle damage. Genetic testing is then used to confirm or reject a diagnosis of Duchenne muscular dystrophy.

In the UK, a screening programme was in place in Wales from 1990 but was withdrawn in 2011 owing to difficulties with the test and the withdrawal of the external quality assurance programme. Following an external review in 2012, the UK National Screening Committee did not recommend the introduction of a UK-wide screening programme for Duchenne muscular dystrophy. Currently, only five conditions are screened for at birth in the UK. These are: cystic fibrosis, phenylketonuria, congenital hypothyroidism, sickle cell disease and medium-chain acyl-CoA dehydrogenase deficiency.

During the National Screening Committee’s consultation in 2011-12, the Muscular Dystrophy Campaign carried out a survey on newborn screening for Duchenne muscular dystrophy. This survey found that 96 percent of parents said they would support newborn screening if an effective treatment were in place, while 82 percent were supportive of a newborn screening programme even without effective treatments being available. However, many respondents gave powerful evidence about the lack of support available to their family at the time of their child’s diagnosis. Support at and following diagnosis would be an essential aspect of any newborn screening programme for Duchenne muscular dystrophy.

It is evident that newborn screening for Duchenne muscular dystrophy has been an area fraught with difficulties and challenges. However, as potential treatments advance, now is the time to address these challenges to ensure such a programme of newborn screening for Duchenne muscular dystrophy is in place before new treatments reach the market.

Summary of evidence

As part of the Inquiry, we heard evidence from leading scientists and clinicians in the field of neuromuscular care and research. These experts outlined the current barriers to a newborn screening programme for Duchenne muscular dystrophy and discussed what could be learnt from the newborn screening programme in Wales.

Professor Dame Kay Davies submitted written evidence supporting the introduction of a newborn screening programme:

“Research into effective treatments for Duchenne muscular dystrophy has made significant progress in recent years. I, and other colleagues specialising in research into the condition, have developed potential new treatments which are in or entering clinical trial.

“Anyone on these potential new therapies is going to have to be treated at an early age. With many children being diagnosed late, there is currently a significant risk that some boys may be diagnosed at too advanced a stage to benefit should these treatments reach the market. However, detecting the condition very shortly after birth would allow us to identify boys in time for them to access any emerging new therapies.

“This means that planning and piloting for a programme of newborn screening must begin now, so that a programme is in place the moment any potential treatments start to come through.

“For these reasons, I am delighted to be able to support the work of the All Party Parliamentary Group for Muscular Dystrophy and the Muscular Dystrophy Campaign in raising these issues at such an important time. I now urge the Government and the Newborn Screening Committee to work towards the implementation of a newborn screening programme for Duchenne muscular dystrophy so that we are ready in the event that new treatments become available.”
Barriers to newborn screening for Duchenne muscular dystrophy in the UK

Dr Juliet Ellis, Freelance Biochemist and Honorary Senior Lecturer, The Randall Division, King’s College London, along with Professor Francesco Muntoni, Chair of Paediatric Neurology, Institute of Child Health, Dubowitz Neuromuscular Centre, University College London, submitted an application to the National Screening Committee in 2009 for the newborn screening of Duchenne muscular dystrophy. Dr Ellis outlined the process to the committee and explained.

"On the evidence presented to them, at the moment, they do not recommend that we should introduce newborn screening in a national capacity...essentially it doesn’t meet their very strict criteria for newborn screening for disease." 7

Dr Ellis then went on to comment on these criteria and how they disadvantage newborn screening for Duchenne muscular dystrophy:

"They have five very strict criteria which apply to all diseases...There has to be a cure, applicable from birth. The child also has to be symptomatic from birth, so Duchenne muscular dystrophy is automatically ruled out on those two points. In addition, treatment has to be administered from the point of diagnosis and then there is the whole cost issue e.g. does it cost more to do the test than it would to carry out care? So Duchenne muscular dystrophy actually falls down in that generalized category." 8

The National Screening Committee announced on 15 April 2014 that it was carrying out a review of its appraisal criteria. During its review, we call on the Committee to take full note of the recommendations of this report. We believe that current appraisal criteria may pose a major obstacle to the implementation of a newborn screening programme for Duchenne muscular dystrophy, should potential new treatments for the condition emerge.

While a test for newborn screening was in place in Wales for 22 years, it was discontinued in 2011. Dr Stuart Moat, Director of the Wales Newborn Screening Laboratory at the University Hospital of Wales in Cardiff, explained to the committee the reasons behind this decision:

"We had no option other than to stop the screening programme...the decision was already made for us by the Clinical Laboratory Accreditation Organisation because following the withdrawal of the external quality assurance programme for this test from the Centre of Disease Control in America, it was deemed that we could no longer reliably validate and quality assure the test results." 9

Dr Moat went on to explain how important it is to have a high-quality and reliable screening test in order to ensure that we have a safe and sustainable newborn screening programme for Duchenne muscular dystrophy:

"Despite the fact that bloodspot screening samples are collected as part of the routine newborn screening programme here in the UK, the current methods for bloodspot CK testing are not amenable to widespread screening. Until we have a safe and sustainable test provided by a commercial diagnostic company, we are unable to provide a safe and effective screening test. At the moment we are a long way off." 10

We are encouraged that work is underway to engage a commercial partner and we urge further international collaboration in this area.

Dr Moat drew further on his own experiences of working on the previous newborn screening programme in Wales to outline some of the problems they encountered with the test:

"From the 343,170 boys that were screened, 145 had a raised CK level. Of these, 66 boys had a confirmed raised CK level and 79 boys had a normal blood CK level at the six to eight-week follow-up appointment (Moat et al 2013). Therefore, the test had a positive predictive value of ~40 percent. Of those boys in the confirmed elevated CK group, 56 were diagnosed as having Duchenne muscular dystrophy, five boys as having Becker muscular dystrophy and five boys with other rarer forms of dystrophy. Obviously it was not the aim of the programme to identify those boys with Becker muscular dystrophy and other forms of dystrophy. I suppose what is most worrying is that there were 13 false negative cases during this 21-year period of screening, which means that we have missed one in five boys with Duchenne muscular dystrophy." 10

Professor Muntoni acknowledged current difficulties with the test and stressed the need to work to address these:

"If you ask me, would you be happy for a screen test to be implemented in July 2012? I’d think no...but, at the same time...things are moving very fast and I think this is the time to discuss what the bottlenecks are and how we address these bottlenecks so that, within a reasonable period of time, we can produce a credible, deliverable programme." 10

We welcome the ongoing efforts of the scientific community to look at revised ways of conducting the test and believe this is an essential prerequisite to a national screening programme for Duchenne muscular dystrophy.

What treatment could be administered if Duchenne muscular dystrophy were detected very shortly after birth?

Professor Muntoni dedicated some of his evidence to outlining how dramatic muscle-wasting in an individual with Duchenne muscular dystrophy can be, even at a relatively early age.

"In a child at around the age of five, already between 30-40 percent of the muscle mass has been lost. At the age of 12, normal individuals will have approximately 30 kilograms of muscle; an individual with Duchenne muscular dystrophy will have 1.5 kilograms of muscle." 10

He then went on to explain the benefits of a diagnosis at a very early stage of life:

"You need to offer anticipatory care. You don’t wait until there is a big problem and then start finding a way to patch it. When children are diagnosed, they already have been symptomatic. They really have lost a lot of ground...the later you start steroid treatment the less likely the steroid will have an effect. So if you start the steroid the day before, for example, or a week before you are going to stop walking, it will have no effect. If you start much earlier, they will prolong the ability to walk for four to five years, which makes a huge difference to life-expectancy." 10

We believe the benefits of an early diagnosis are such that, even in the current absence of effective new treatments, they could warrant a programme of newborn screening for Duchenne muscular dystrophy.

While stressing that research into this area was not comprehensive, Professor Muntoni suggested an early diagnosis could also aid cognitive development.

"Not everybody with the condition [of Duchenne muscular dystrophy] has behavioural difficulties but certainly they are quite common; a minimum of 30 percent of the boys are affected. And again, that adds to the misery of the families who go to a GP because they have a naughty child, a child who is not very active, is a bit clumsy. The reasons for this are not recognised and the child is not given the appropriate support early on, which would give them an advantage in terms of cognitive and behavioural development." 10

Dr Ellis felt there was not much recognition by the NSC of the benefits of early treatment and a more comprehensive body of published evidence was needed to make a persuasive case:

"There is not much in the feedback from them that suggests that they had taken on board what Francesco has just said, which is that there are all these current treatments that could be applied earlier. One problem is that, I think I am right in saying, there aren’t huge numbers of publications on anticipatory care in Duchenne muscular dystrophy and they (the NSC) base their decisions on reference..." 10
Informed consent and post-diagnosis support

A robust process of informed consent is needed for a screening process to work effectively, with parents knowing fully what they are agreeing to and with comprehensive information on Duchenne muscular dystrophy. Dr Moat highlighted how important it was for healthcare professionals involved in offering these tests to be educated:

“It’s about regular education and training of midwives and health visitors who take these tests...the likelihood is that within my working lifetime we will be screening for a whole host of different disorders from a newborn bloodspot test. It is important that these health professionals make the parents aware of the consequences of these tests.”

Dr Moat presented statistics from Wales on the percentage of tests declined, and suggested the information provided to parents could have been more comprehensive:

“Six percent of parents declined to have their boys screened. I think that this figure does not truly reflect an informed consent process. I think that if the parents were truly informed I would expect see more tests declined … I have received a few heartfelt letters from parents, saying that if they really knew what they were signing up to when they consented, they would not have agreed to have the test taken. Some parents felt that they had been robbed of this valuable time of bonding with their baby boy … Clearly there are issues around consenting for this test and I feel this is one of the major issues that we need to learn from the newborn screening programme in Wales.”

Dr Moat highlighted how important it was for healthcare professionals involved in offering these tests to be educated:

“Six percent of parents declined to have their boys screened. I think that this figure does not truly reflect an informed consent process. I think that if the parents were truly informed I would expect to see more tests declined … I have received a few heartfelt letters from parents, saying that if they really knew what they were signing up to when they consented, they would not have agreed to have the test taken. Some parents felt that they had been robbed of this valuable time of bonding with their baby boy … Clearly there are issues around consenting for this test and I feel this is one of the major issues that we need to learn from the newborn screening programme in Wales.”

Professor Muntoni believed much of the anger and distress felt by parents whose babies had received a diagnosis of Duchenne muscular dystrophy:

“Professor Muntoni believed much of the anger and distress felt by parents whose babies had received a diagnosis of Duchenne muscular dystrophy following screening was caused by a lack of information at the point of consent:

“I think that part of the anger comes from not having fully understood the mechanism of the informed consent. So these were families that were not aware that this was going to be done to them and I think that part of that reaction is, ‘Why have you done that to me? I never really asked you to do it’. So that I think was a big part of that complaint. I think that it comes back to the point that perhaps the post-natal moment is not the best time to introduce that concept (the effects of Duchenne muscular dystrophy).”

Family perspectives

In the second of the APPG’s evidence sessions, we heard from four families whose sons have Duchenne muscular dystrophy. Two of these families had been informed of their child’s diagnosis through the newborn screening programme that was then in place in Wales.

Jeanette George, whose son, Alex, was diagnosed with Duchenne muscular dystrophy through the screening programme, described how her family coped with the early diagnosis:

“Having a very early diagnosis was a positive … because it has allowed us to plan. We can take holidays that we wouldn’t be able to take with an older boy. We can move into accommodation. We have a nice family home with plenty of space, but if we have to have a purpose-built area for Alex, we can do that before Alex begins to think that we are moving out because of him. We can plan and put things in place; I changed my career. I think with an early diagnosis, we can try and spend more time at home, taking the positive out of it. Alex gets assessed every six months, so any change in his wellbeing will be picked up immediately. He will take steroids from the age of four.”

We also heard from Jane Field, whose son, Murray, was initially misdiagnosed with dyspraxis and dyslexia, and how they missed out on vital treatment as a result:

“My son, when he was diagnosed, was seven-and-a-half years old. Therefore he missed out on essential steroids which would have given him on average 55 months of extra walking life – not really bringing into it the enormous distress that was caused by the lack of diagnosis within his schooling and everything else … I can only speak from my own point of view, and having a son diagnosed at seven-and-a-half is horrific. Not only does your son see you cry in front of a lot of people, he gets pretty upset about things himself.”

Phillippa Farrant, whose son, Daniel, was diagnosed with Duchenne muscular dystrophy at the age of eight months, also spoke of the positive aspects of having received an earlier diagnosis:

“The paediatrician came to our house and told us the diagnosis. We then went to multi-disciplinary meetings every week with support from occupational therapists and physio and then, because of the early diagnosis, his learning difficulties were also picked up at an early stage. He was statemented pre-school, so he has had educational support from the time of nursery right through. He turned 20 on Thursday.”

However, we also heard from John Burke, whose son, Seth, was diagnosed through the Welsh newborn screening programme. His family’s experience of receiving an early diagnosis through newborn screening was dramatically different from the Georges’:

“My son was picked up as part of the newborn screening testing in Wales. We had no information about the screening process before the test being done. We were in hospital for one day; it was our first child and we were offered it under the premise that it always comes back negative … It is the worst thing that we have done to sign the consent form for the test. It is a cruel and unusual torture. The test has no backbone to it; it is performed by one professional, early diagnosis is given by a different set of professionals; there is no overriding person who sees you through the process … You get an early diagnosis at six weeks but we can only get an appointment with a neuromuscular consultant once Seth starts to become symptomatic. We have a diagnosis but we can’t do anything with it. We have a boy running around, who may be running around and tripping up over the carpet, and we are waiting for the onset of the disease.”

We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme. His family’s experience of receiving an early diagnosis through newborn screening was dramatically different from the Georges’:

“My son was picked up as part of the newborn screening testing in Wales. We had no information about the screening process before the test being done. We were in hospital for one day; it was our first child and we were offered it under the premise that it always comes back negative … It is the worst thing that we have done to sign the consent form for the test. It is a cruel and unusual torture. The test has no backbone to it; it is performed by one professional, early diagnosis is given by a different set of professionals; there is no overriding person who sees you through the process … You get an early diagnosis at six weeks but we can only get an appointment with a neuromuscular consultant once Seth starts to become symptomatic. We have a diagnosis but we can’t do anything with it. We have a boy running around, who may be running around and tripping up over the carpet, and we are waiting for the onset of the disease.”

John went on to talk about the huge impact the diagnosis had had on his wife and the difficulties this caused in the bonding process between her and Seth:

“My wife cries every night because she wants her three years back. She wants the time to bond – she is ridden with guilt that she has not bonded the way that she would have liked to have bonded with our son, Seth, because of this diagnosis. We ended up in the acute admissions of the local psychiatric hospital because nobody knew how to address my wife’s grief … We are sat at 8pm in the local mental health unit with my wife being interviewed with the possibility of discussing whether she should be admitted or not, just because there was nobody there who could understand what she was going through.”

We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme in the UK. An emphasis on information at the prenatal stage is especially important in ensuring that parents are fully aware of the severity of Duchenne muscular dystrophy and of the treatment and care options available, especially in the current absence of curative or effective treatments.

We ended up in the acute admissions of the local psychiatric hospital because nobody knew how to address my wife’s grief … We are sat at 8pm in the local mental health unit with my wife being interviewed with the possibility of discussing whether she should be admitted or not, just because there was nobody there who could understand what she was going through.”

We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme in the UK. An emphasis on information at the prenatal stage is especially important in ensuring that parents are fully aware of the severity of Duchenne muscular dystrophy and of the treatment and care options available, especially in the current absence of curative or effective treatments.

John went on to talk about the huge impact the diagnosis had had on his wife and the difficulties this caused in the bonding process between her and Seth:

“My wife cries every night because she wants her three years back. She wants the time to bond – she is ridden with guilt that she has not bonded the way that she would have liked to have bonded with our son, Seth, because of this diagnosis. We ended up in the acute admissions of the local psychiatric hospital because nobody knew how to address my wife’s grief … We are sat at 8pm in the local mental health unit with my wife being interviewed with the possibility of discussing whether she should be admitted or not, just because there was nobody there who could understand what she was going through.”

We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme in the UK. An emphasis on information at the prenatal stage is especially important in ensuring that parents are fully aware of the severity of Duchenne muscular dystrophy and of the treatment and care options available, especially in the current absence of curative or effective treatments.

John went on to talk about the huge impact the diagnosis had had on his wife and the difficulties this caused in the bonding process between her and Seth:

“My wife cries every night because she wants her three years back. She wants the time to bond – she is ridden with guilt that she has not bonded the way that she would have liked to have bonded with our son, Seth, because of this diagnosis. We ended up in the acute admissions of the local psychiatric hospital because nobody knew how to address my wife’s grief … We are sat at 8pm in the local mental health unit with my wife being interviewed with the possibility of discussing whether she should be admitted or not, just because there was nobody there who could understand what she was going through.”

We call on Health Services in all four UK countries to ensure a robust process of informed consent is in place for any Duchenne muscular dystrophy screening programme in the UK. An emphasis on information at the prenatal stage is especially important in ensuring that parents are fully aware of the severity of Duchenne muscular dystrophy and of the treatment and care options available, especially in the current absence of curative or effective treatments.
While Jane Field felt a very early diagnosis could have posed difficulties in her bonding with her son, she also felt it would have relieved some of the enormous burden placed on the family before Murray’s diagnosis:

“I do worry a little that being my first child and having him by Caesarean section – with C-sections you are less likely to bond with your baby anyway – I wonder whether I wouldn’t have done that and I would have tried hard not to get too close to him. That is my real worry about early testing. On the other hand, it would have enabled us to have other children, knowing that it was a spontaneous thing much more quickly. I would have had more support in dealing with the problems that he had … we didn’t know that he couldn’t walk down the stairs fast enough; the dyslexic problems; the behavioural problems … were unutterably awful.”

Jeanette raised the issue of multiple affected siblings and the positive implications for family planning that a newborn screening programme could bring:

“I’ve worked in a fundraising capacity with grandparents; they have two grandsons who live in Oxford. The parents had one son, he was well; they went on and had a second son, and subsequently both sons have been diagnosed with Duchenne muscular dystrophy. There are families across the UK with two or three boys with Duchenne muscular dystrophy. If that family had been screened, they wouldn’t be facing a future of caring for two adult males in a normal family home with all the requirements for powered wheelchairs, hoists and round-the-clock care.”

The panel all agreed on the importance of post-diagnosis support, and we heard the very different experiences Jeanette and John had had in Wales. Jeanette explained the support her family received:

“We had a very proactive health visitor who did an outstanding job in putting in place the support network around us. We didn’t necessarily need to use it but we had the numbers there and we could put a name and face together and reach out to them if we needed them … I have written down my appointment dates. He was diagnosed on 6 January – that was the first CK test; on 7 January the health visitor was at our house; on 18 January we had a special needs health visitor at our house to give us support; on 27 January we were with medical genetics and they did some more blood tests; on 4 February we had the genetic results; on 17 February we saw Louise Hartley and an hour-long consultation; on 18 February we saw medical genetics again.”

John, however, felt the support his family was given was far from comprehensive:

“The test is well-meaning and good-natured, from the midwife to the health visitors, who were all very nice people individually, but when it came to knowledge about Duchenne muscular dystrophy they didn’t have any, and they held their hands up to say so. These are the people who are giving us life-changing and earth-shattering results … Our health visitor found it an incredibly difficult process in giving us the diagnosis. She did go on long-term sick leave. I don’t know the ins and outs of that but it did mean that we were dealing with different professionals. It goes back to my earlier comment, which is because there is no overriding person who arches over everything to pull it all together. The person who gives you the test, and we received misinformation which had a devastating and domino effect.”

Philippa Farrant stressed how, if newborn screening were to be introduced, support mechanisms would need to be in place:

“I represent about 500 families around the country as part of the Duchenne Family Support Group. Every family will take the news differently and will cope with it differently. If we are going to move forward, we need to make sure that the psychological support and emotional help is there. It is why we supported the Walton Report, because if you are going to diagnose at an early age, you need to have everything else in place.”

Jane Field believed care advisor support and other specialist support in this area was vital:

“The one thing that really comes out of this is the lack of care advisors, and that there is no real money that has been put into muscular dystrophy. That is why we are where we are. In the West Midlands we managed to secure in 2009 £400,000 which has been translated into three care advisor posts for 6,500 people across the West Midlands. Before that we had half a care nurse post. You can say that GPs know nothing, but it is a rare disease, and you wouldn’t expect them to know. This comes back to another thing out of the Walton Report: respiratory care. There is no point going to any respiratory consultant, they have to be specialists. We need money into the system, both at paediatric and adult level. I am really for this test, but it is not good enough to have that, and to expect a genetics nurse to do that counselling. It has to be done properly by a specialist care advisor.”

We call on the NHS in England, Wales and Scotland, and on the HSC in Northern Ireland, to ensure increased provision of a national network of neuromuscular care advisors and specialist nurses. Parents should also be offered genetic counselling and psychological support following a child’s diagnosis as well as in subsequent years if needed.

Survey on newborn screening for Duchenne muscular dystrophy

In 2011, during the consultation period on newborn screening for Duchenne muscular dystrophy, the Muscular Dystrophy Campaign, in partnership with the Duchenne Family Support Group and Action Duchenne, conducted a survey to ask the opinion of families affected by Duchenne muscular dystrophy.

In total, 255 people from the UK participated in the survey, 17 of whom were from Wales and had participated in the newborn screening programme for Duchenne muscular dystrophy.

Support for newborn screening?

The three charities sought to find out if people supported the introduction of a newborn screening programme now, in the absence of effective or curative treatments. The charity also wished to see what effect the introduction of such treatments for Duchenne muscular dystrophy might have on support for a newborn screening programme.

The survey results showed that:

- 82 percent were in favour of a newborn screening programme even without an effective treatment to prevent the development of symptoms
- 97 percent of people were in favour of newborn screening if effective treatments were available.

Comments from respondents included:

“[I would support it] wholeheartedly. Currently knowing there is no treatment for Duchenne muscular dystrophy is similar to telling parents their child has an incurable cancer. Whereas if there is a known treatment then the sooner diagnosis is made the quicker treatment can start.”

“I would support it regardless of current available treatments. Newborn screening would prevent boys from falling through the net and [would] ensure that they could get the help they need as soon as possible.”
When to screen?

Current steroid treatment for Duchenne muscular dystrophy is not administered before the age of two and new treatments may not be given to babies. Therefore, the survey looked to find out parents’ views on the time at which they would have preferred to learn of their child’s diagnosis:

- 53 percent of parents said they would prefer to know soon after birth
- 28 percent of parents said they would prefer to know once their child started showing symptoms
- 19 percent of respondents didn’t know when a preferred time would be.

Those in favour of knowing soon after birth felt it would have helped them to plan for the future, plan future pregnancies and access the full range of therapies. Comments included:

“As soon as possible would be best because you can be prepared for what changes you will have to make for your family life.”

Some felt they could have been better parents had they known earlier:

“Speaking to other mums who did not have the diagnosis early, they felt guilty, thinking their child was lazy when they were tired due to their condition and sorry that they reprimanded him at times when he was not at fault.”

Others would have liked to have known at birth because they found getting a diagnosis later on very stressful:

“I personally would have liked to have known soon after birth because for me, feeling something was wrong and always pressuring my GP and health visitor for a referral was a very difficult time.”

“If screening had been available when my son was born, an early diagnosis could have been made. I could have made better choices about health and education. I could also have found a more suitable home location and secured better support from social services.”

For those who would have preferred a diagnosis when symptoms arose, their view was largely informed by the stress-free time they would have had prior to diagnosis:

“We had six wonderful years of blissful ignorance in which to enjoy our two young boys.”

Several people commented that they felt the timing of newborn screening was wrong:

“I feel newborn is too early and at signs of symptoms it is too late, if steroid treatment can be given as early as two to three years old, then testing may be better around then,” and “knowing soon after birth could rob a child of some ‘normal’ interaction and bonding with family.”

Informed consent and post-diagnosis support

Parents reiterated their concerns about the necessary support being available at diagnosis. This was mirrored in the responses from families in Wales who participated in newborn screening for Duchenne muscular dystrophy, many of whom said there was a lack of support and information throughout the diagnostic process:

- only two in five respondents felt they received enough information about the heel prick test when making a decision to participate in the screening
- nearly a third of respondents were unaware their baby had been screened for Duchenne muscular dystrophy
- half of respondents said the consent process could be improved
- only one in three parents felt they received enough professional support during the diagnosis process, with many being left to seek out information themselves on the Internet and from charities.

Several respondents, however, praised the help they received:

“I cannot fault the support that we had at the time, or the support since.”

To follow up on this, we asked respondents from all over the UK what information they thought should be provided to parents to help them make the decision to take part in Duchenne muscular dystrophy newborn screening programme if it were offered, and by whom, when and how. Almost all respondents wanted a full and comprehensive description of the effects of Duchenne muscular dystrophy and of which treatments could be administered if their child were diagnosed shortly after birth. Respondents differed in their view of who should deliver this information, but common responses included specialists on Duchenne muscular dystrophy, as well as neuromuscular care advisors.
Summary

While the survey demonstrated that families would almost unanimously support newborn screening if effective treatments for Duchenne muscular dystrophy were available (with a strong majority still supporting screening without these treatments being in place), a number of findings gave cause for great concern.

For example, there were numerous instances of professional support not being in place for families with a newly-diagnosed child, with many being left to rely on charities and what they could find out for themselves on the Internet. There was also worrying evidence suggesting families in Wales had not been fully informed when agreeing to their child’s being tested for Duchenne muscular dystrophy, with some not even being aware their child was being tested at all. These are all crucial aspects of a newborn screening programme and the survey serves to underline their importance even further.

For more information on the survey, please contact the Muscular Dystrophy Campaign on 020 7803 4800 or by email at campaigns@muscular-dystrophy.org

About the Muscular Dystrophy Campaign

The Muscular Dystrophy Campaign is the leading UK charity fighting muscle-wasting conditions. The charity is dedicated to beating muscular dystrophy and related neuromuscular conditions by finding treatments and cures and by improving the lives of everyone affected by them. Founded in 1959, the Muscular Dystrophy Campaign takes the lead in investing in world-class research to find treatments and cures. People also rely on the charity to provide expert information, advocacy and community support, and to signpost them to effective specialist services.

The charity also campaigns and works with parliamentarians and clinicians across the UK to ensure all people living with neuromuscular conditions have equal access to high-quality health and social care services.

What is muscular dystrophy?

There are approximately 60 forms of muscular dystrophy and related neuromuscular conditions. The conditions cause the muscles to weaken and waste over time, leading to increasing disability. The conditions may affect not only the muscles in the limbs, but also those of the heart and lungs, sometimes significantly shortening life-expectancy.

Many of the conditions are low incidence, rare conditions, with some regarded as very rare or ultra-orphan. Muscular dystrophy and related neuromuscular conditions can be genetic or acquired and, with the exception of some conditions, there are currently no known effective treatments. There is currently no cure.

Clinical trials in some forms of muscular dystrophy are now underway and it is hoped that these may lead to the introduction of new treatments that can slow or arrest the progressive nature of these often devastating conditions.
Terms of reference

The terms of reference for the Inquiry were as follows:

“To determine the barriers to a programme of newborn screening for Duchenne muscular dystrophy in the United Kingdom.”

Appendix 1

Witnesses

Wednesday 25 January – first Inquiry session

Oral evidence was provided by:

Dr Juliet Ellis – Freelance Biochemist, Honorary Senior Lecturer, The Randall Division, King’s College London

Dr Stuart Moat – Director, Wales Newborn Screening Laboratory, University Hospital of Wales, Cardiff

Professor Francesco Muntoni – Chair of Paediatric Neurology, Institute of Child Health, Dubowitz Neuromuscular Centre, University College London

Tuesday 13 March – second Inquiry session

Oral evidence was provided by:

John Burke, whose son has Duchenne muscular dystrophy

Phillippa Farrant, whose son has Duchenne muscular dystrophy

Jane Field, whose son has Duchenne muscular dystrophy

Jeanette George, whose son has Duchenne muscular dystrophy
### References

2. Evidence session, 25 January 2012
3. Evidence session, 25 January 2012
4. Evidence session, 25 January 2012
5. Evidence session, 25 January 2012
7. Evidence session, 25 January 2012
8. Evidence session, 25 January 2012
11. Evidence session, 25 January 2012
15. Evidence session, 25 January 2012
17. Evidence session, 25 January 2012
18. Evidence session, 25 January 2012
22. Evidence session, 25 January 2012
23. Evidence session, 25 January 2012
25. Evidence session, 25 January 2012

### Written evidence and additional evidence


ENMC Conference (*Screening for Muscular Dystrophy*, 1992)

Kleiderman, E., Knoppers, B M., Fernandes, C V., Boycott, K M., Outlette, G., Wong-Rieger, D., Adam, S., Richer, J., Avar, A. *Returning incidental findings from genetic research to children: views of parents of children affected by rare diseases*, Journal of Medical Ethics, December 2013,


Professor Dame Kay Davies, Department of Physiology, Anatomy and Genetics University of Oxford


Welsh Implementation Plan for Rare Diseases, Welsh Government, February 2014

UK National Screening Committee. *Newborn Screening for Duchenne Muscular Dystrophy: External review against programme appraisal criteria for the UK National Screening Committee (UK NSC)*, Bazian Ltd, October 2011

UK Strategy for Rare Diseases, Department of Health, November 2013

UK Strategy for Rare Diseases: NHS England Statement of Intent, February 2014

255 patient and family testimonies, provided to the Muscular Dystrophy Campaign in 2011
All Party Parliamentary Group for Muscular Dystrophy

Newborn screening for Duchenne muscular dystrophy

April 2014