



# An Introduction to MDS and MDS-related Anemia

**A guide for patients and caregivers**

MDS=myelodysplastic syndromes.

# An introduction to MDS

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The Myelodysplastic Syndromes (MDS) Foundation, Inc., a nonprofit international organization devoted to the support and education of patients and healthcare providers, defines MDS as a bone marrow failure disorder and a type of blood cancer. It is estimated that 60,000 to 170,000 people in the United States have MDS, with an estimated 87,000 new cases each year worldwide.

Every person has a different journey to diagnosis. We understand that you may feel overwhelmed and nervous about the future. One of the most helpful things you can do is to learn about your disease. This will help you better understand MDS and what you might expect over time.

The goal of this guide is to provide an introduction to MDS and answer some of the questions you may have. Knowledge can be empowering. It is important to work with your healthcare team to understand your treatment journey and the support available to you.



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# What MDS is

**Myelodysplastic syndromes** [my-el-odys-plastic sin-dromes] (**MDS**) are a group of disorders in which the **bone marrow** fails to make enough healthy **red blood cells (RBCs)**, **white blood cells (WBCs)**, or **platelets (PLTs)** and is considered a **blood cancer**. MDS is a type of blood cancer in which newly formed **blood cells** become abnormal and do not grow (or mature) correctly. It is more common in adults older than 65. It can also occur in younger adults.



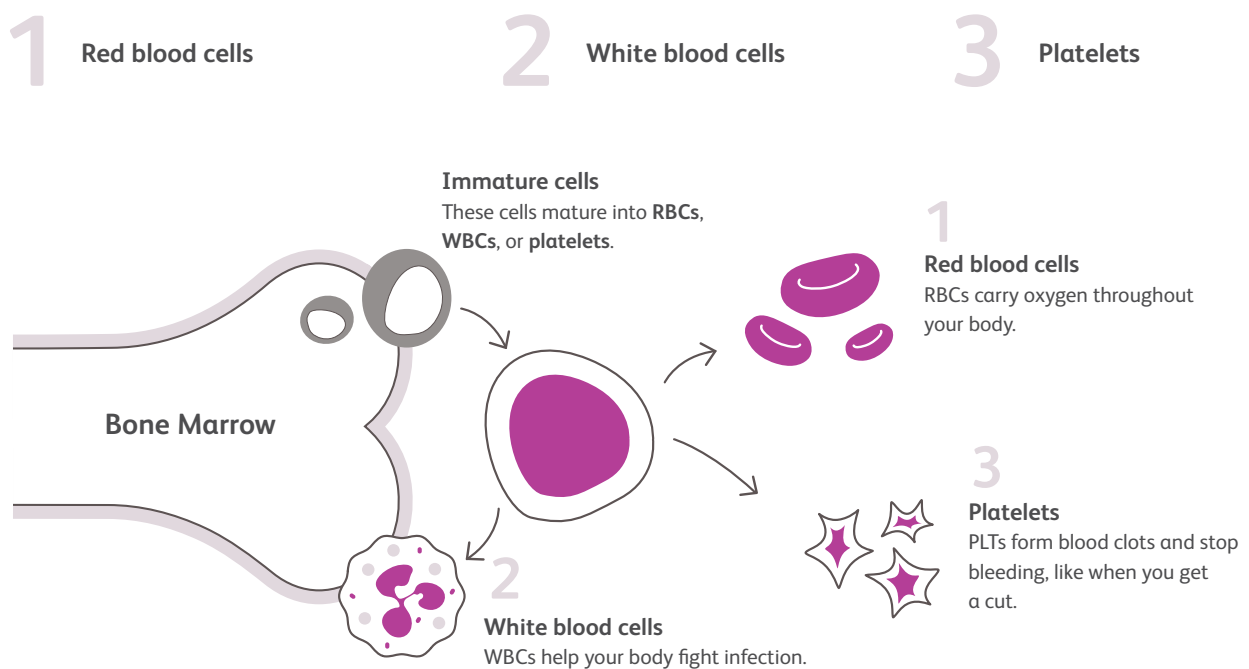
## What causes MDS?

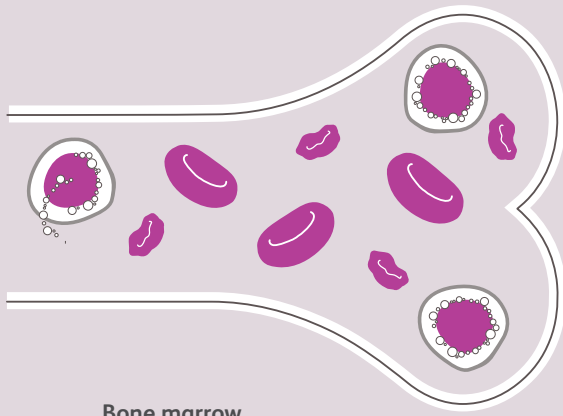
MDS may be caused by changes to **DNA** called **mutations**. These mutations change the way the cells grow and function. With MDS, newly formed blood cells become abnormal and do not grow (mature) correctly. These abnormal blood cells do not enter your bloodstream to do their jobs. They pile up in the bone marrow instead.

The abnormal blood cells take space your bone marrow needs to function normally. This can lead to your body making too few mature blood cells.

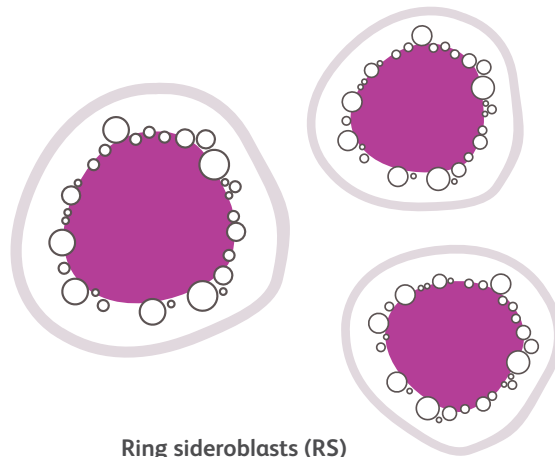
The pile-up in the bone marrow keeps immature RBCs from growing into mature RBCs. With fewer mature blood cells in your body, you can develop **anemia** (low RBCs). You can also develop other low blood counts (**cytopenias**).

**Bone marrow makes immature blood cells. These cells then mature into 1 of 3 types:**





In a type of MDS called **MDS-RS**, immature red blood cells pile up in the bone marrow. Many of these piled-up RBCs are **ring sideroblasts (RS)**.



## What is the role of ring sideroblasts (RS) in MDS?

RS are not-fully-grown, or immature, RBCs that have a ring of small circular iron clumps around the center structure of the cell where most cells store DNA. RS contribute to having low (red) blood cell counts. How many RS you have is part of diagnosing your type of MDS. You can be diagnosed with MDS-RS if at least 15% (15 out of every 100) of your red blood cells are ring sideroblasts.

### What is SF3B1?

**SF3B1** is a kind of specific gene mutation that is common in MDS. If blood test results identify that you have this specific gene mutation in your blood cells, you only need an RS percentage of 5% for your MDS type to be MDS-RS. The SF3B1 mutation is very common and seen in as many as 80% of people with MDS-RS.

## What are the different types of low blood cell counts?



Low blood cell counts—referred to as cytopenia—are a key sign of MDS. Your healthcare team will look to see what type of cytopenia you have, but each one has its own set of **symptoms**.

# 1

**Anemia:** Too few red blood cells (RBCs)—these are the blood cells that carry oxygen through your body.

Possible symptoms:

- Problems with memory or thinking
- Feeling tired
- Weakness
- Dizziness
- Chills
- Lightheadedness
- Pale or yellowish skin
- Headaches
- Shortness of breath
- Muscle cramps and bone pain



Anemia is the most common type of low blood count in people with **lower-risk** MDS. **In fact, anemia occurs in up to 9 OUT OF 10 PEOPLE who have MDS.**

# 2

**Neutropenia:** Too few white blood cells (WBCs)—these are the blood cells that help fight infection. 50% of people with MDS have neutropenia.

Possible symptoms:

- Frequent infections, fevers, and swollen lymph nodes

# 3

**Thrombocytopenia:** Too few platelets (PLTs)—these are the blood cells that help stop bleeding, like when you get a cut. Between 40% and 65% of people with MDS have thrombocytopenia.

Possible symptoms:

- Easy bruising and bleeding
- Frequent nosebleeds
- Bleeding gums

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## How can MDS impact my life?

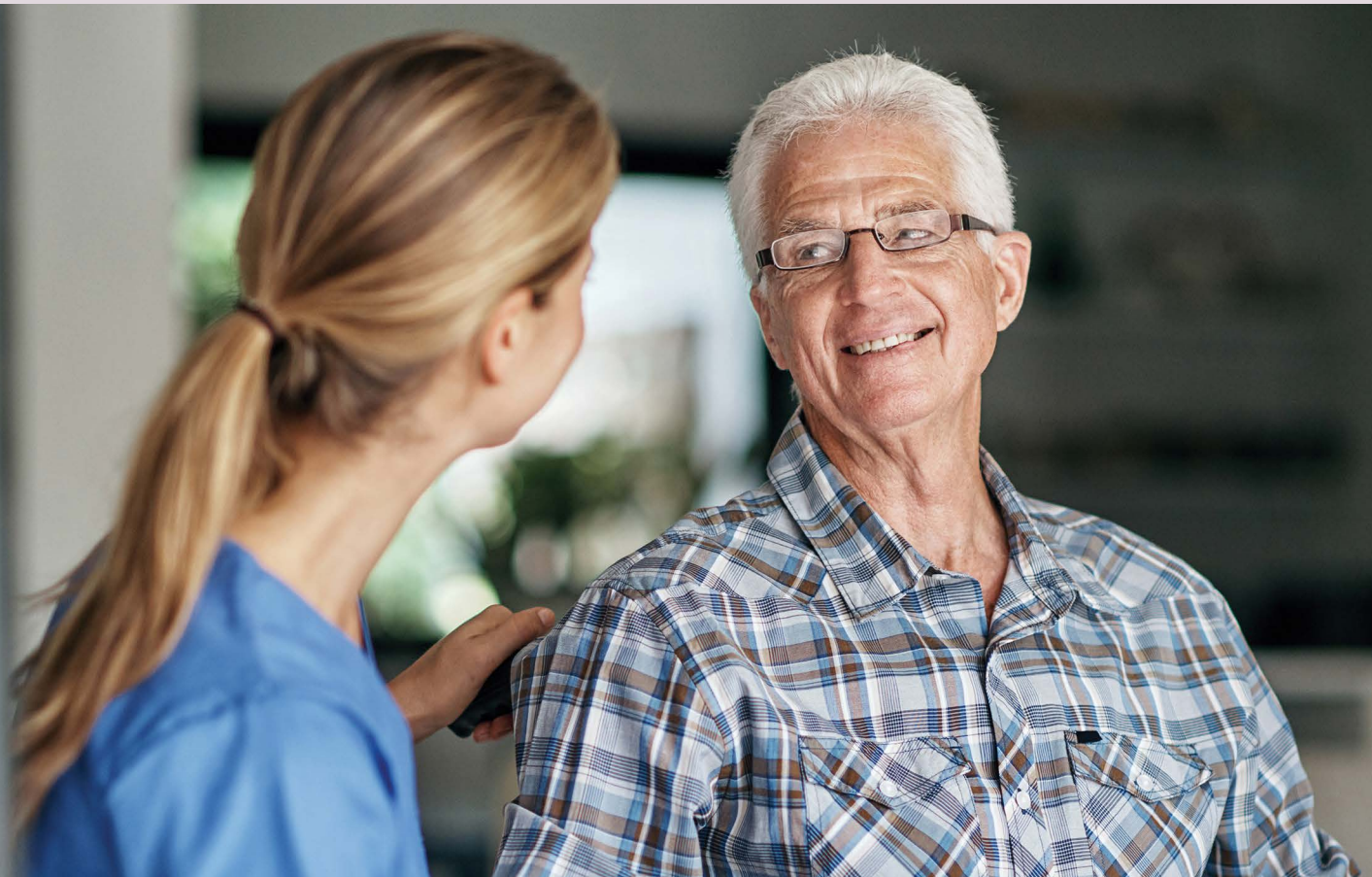
An MDS diagnosis may affect a person's life in many ways. Although MDS is a disorder that affects the blood and bone marrow, it also affects the whole body.

MDS may happen gradually and may affect each person differently. Being unable to fight infections or control bleeding may have negative effects on your body. Because of this, you may receive treatment to control symptoms related to a specific cytopenia, like anemia.



In addition to the physical symptoms of MDS, you may also experience emotional changes. For example, people with MDS who experience anemia may feel frustrated because they are very tired, which keeps them from doing the things they enjoy.

**Understanding your symptoms and sharing how they make you feel is an important part of your journey. It may be helpful to track your symptoms so you can talk to your healthcare team about how they are affecting you.**



# How MDS is diagnosed



Your healthcare team can diagnose MDS by running various tests on, among other things, your bone marrow and blood samples. These tests help your healthcare team diagnose your type of MDS by answering the following questions:

- Do you have cytopenias?
- Do the cells in your bone marrow look normal or abnormal?
- How many abnormal cells are present in the bone marrow?
- How many immature or early forms of blood cells (**blast** cells) are present in the bone marrow?
- What are the types of blood cells that look abnormal?
- Are there cells with rings of iron, often called **ring sideroblasts (RS)**?
- Do the cells in your bone marrow have gene mutations, like SF3B1?

## What are the normal ranges for a complete blood count?

### Hemoglobin (Hgb) normal range:

Male (ages 15+): 13.0–17.0 g/dL

Female (ages 15+): 11.5–15.5 g/dL

### Hematocrit (Hct) normal range:

Male: 40%–55%

Female: 36%–48%

### Platelet (PLT) count normal range:

Adult: 150,000–400,000/mL

### White blood cell (WBC) normal range:

Adult: 5,000–10,000/mL

## What happens after I'm diagnosed with MDS?

After your healthcare team has confirmed that you have MDS, they will give you a **risk score**.

Your risk score is one important factor in predicting how your MDS might affect you as time goes on.

It may also help your healthcare team create a treatment plan, though this is not the only factor.

Your doctor will look at other factors, such as your age, your ability to perform daily tasks, the severity of your symptoms, and your recent blood test results.



If you're worried about your risk score or the severity of your symptoms, consider talking about your concerns with other people who have MDS, your healthcare team, or even a counselor.



## How does my doctor assign a risk score?

Risk scores are based on a number of factors, including:

- The number of blasts (immature or very early forms of blood cells) in the bone marrow compared with normal mature cells
- The type and number of mutations in your DNA
- The number of RBCs, WBCs, and platelets in your blood

Scores are given to each factor and then added up for an overall risk score. Below is a guide to general therapy strategy based on one's risk score:

Risk Group	Risk Score	General Guidelines
Very Low	<1.5	<ul style="list-style-type: none"><li>• Watch and wait</li><li>• Supportive care</li><li>• Erythropoiesis-stimulating agent (ESA)</li><li>• Erythroid maturation agent (EMA)</li></ul>
Low	>1.5 to 3	<ul style="list-style-type: none"><li>• Supportive care</li><li>• MDS treatments</li><li>• Erythropoiesis-stimulating agent (ESA)</li><li>• Erythroid maturation agent (EMA)</li></ul>
Intermediate	>3 to 4.5	
High	>4.5 to 6	<ul style="list-style-type: none"><li>• Supportive care</li><li>• MDS treatments</li></ul>
Very High	>6	



If you're changing your daily routines because you're not feeling good, bring it up with your healthcare team. This information, along with risk score, may impact your doctor's approach to treatment.

# How MDS is treated

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There are a number of different treatment options for MDS, and because every person is unique, there's no one-size-fits-all approach. You can talk to your healthcare team about finding a treatment plan that fits your individual needs.

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## How will my treatment journey start?

At the start of your journey, and possibly at other points along the way, you and your healthcare team may use the watch-and-wait method.

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## Watch-and-wait method

Watch-and-wait means working with your healthcare team to monitor your symptoms and bloodwork for any changes.

### What to know about watch-and-wait:

- You can expect to meet occasionally with your healthcare team
- Track and share any new or changing symptoms with your healthcare team to help them know how this approach is working
- Undergo blood testing a few times a year to help your healthcare team know if your MDS and your anemia are getting better, staying the same, or getting worse
- If your healthcare team thinks your MDS or your anemia is getting worse, you'll work together to determine what can be treated and what your treatment options may be

**You are your own best advocate.** Ask questions to make sure you understand your treatment plan, and listen carefully to what your healthcare team has to say. The resources and advice they share can help you on your treatment journey.



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## What are some common MDS treatments?

Depending on your risk score and the severity of your symptoms, your healthcare team may suggest treatments to help manage your MDS.

Before using these treatments, your healthcare team must decide that they are right for you. These treatments are available if you are in the low- to very high-risk score range.

Examples include:

- **Chemotherapy:** A type of medicine that destroys cancer cells. It works by killing abnormal cells. It can also affect normal cells. There are many different types of chemotherapy drugs
- **Immunotherapy:** A type of medicine that fights cancer cells by using your immune system
  - **Immunosuppressive therapy:** A medicine that lowers your immune system and stops it from attacking your bone marrow
  - **Immunomodulators:** A medicine that adjusts different parts of your immune system. This type of therapy boosts the immune system and also helps kill abnormal cells
- **Stem cell transplant:** A process where you receive healthy blood **stem cells** from a donor to replace your abnormal cells

### Clinical trials

There are also clinical trials, which are research studies where patients can volunteer if they meet certain requirements. These studies involve medicines that are not yet approved by the FDA for MDS. A clinical trial may be a treatment option for some patients with MDS.



## What can I expect on my treatment journey?

As you start exploring treatment options for MDS-related anemia, here are some questions you can ask your healthcare team to help you understand what to expect:

- How does MDS-related anemia affect my future?
- What might my symptoms mean?
- What are the pros and cons of each treatment?
- What are the common side effects of these treatments?
- How will we know if a treatment is working?
- How might my treatment change in the future?
- How might not getting treatment impact my symptoms?
- How often should I have appointments with you?
- Are there any other doctors I should see in addition to you?

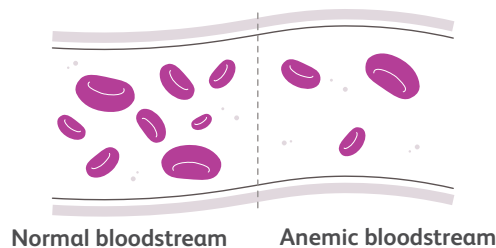
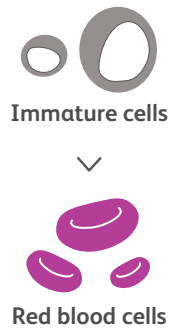
# The role of anemia in MDS

## What is anemia?

**Anemia** is a type of low blood count that happens when you don't have enough working **red blood cells (RBCs)**. People with anemia can have low hematocrit, low levels of hemoglobin, or sometimes both.

## What causes anemia?

**Erythropoiesis** [ih-rith-roh-poi-ee-sis] is the process of immature blood cells maturing into healthy RBCs. When something goes wrong with this process and it doesn't work, it is called **ineffective erythropoiesis (IE)**. In MDS, IE leads to immature, nonworking RBCs piling up in your bone marrow. This happens because they are unable to fully mature and enter the bloodstream, so you have fewer mature, working RBCs doing their job. This is a cause of anemia.



To make it simpler, imagine your bloodstream as a mail system.

- Think of your RBCs as the mail carriers. They deliver boxes (hemoglobin) full of mail (oxygen) to various parts of your body
- Think of your bone marrow as the post office where your RBC mail carriers get their training
- In MDS, that training is not very good, and your post office (bone marrow) has too few trained (mature) RBC mail carriers. Instead, the post office is overstaffed with mail carriers-in-training (immature RBCs) that aren't ready to go out and deliver boxes (hemoglobin) of mail (oxygen)
- Anemia happens when there are not enough trained (mature) RBC mail carriers out there delivering oxygen packages. Anemia leaves some parts of your body waiting for oxygen packages that never arrive

If your healthcare team is **monitoring you for anemia**, they may tell you that your blood cell count is low. This may seem alarming at first, but **there are options to help you manage the symptoms**. Your healthcare team will help you identify what type of low blood count you are experiencing and **next steps to take**.

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## What can anemia feel like?



There are many symptoms of anemia, and it can feel different from person to person. Sharing what you're feeling with your healthcare team can help them understand what might be causing your symptoms. These conversations can also help you understand if what you're feeling comes from anemia or aging.

### Some common symptoms of anemia include:

- Problems with memory or thinking
- Feeling tired
- Feeling weak
- Dizziness
- Lightheadedness
- Headaches

### Other symptoms can include:

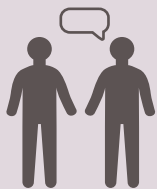
- Chills or cold hands and feet
- Irregular heart rate
- Chest pain
- Pale or yellowish skin
- Shortness of breath
- Muscle cramps, bone pains, and body aches

Some of the most common symptoms of anemia are often overlooked. It can be hard to know the cause of symptoms like exhaustion, weakness, dizziness, and body aches. That's why tracking and talking about these symptoms with your healthcare team is so important.

Living with anemia symptoms can be frustrating and discouraging. These symptoms can get in the way of your daily activities.



It's important to manage and treat your anemia. Symptoms from untreated anemia may impact your daily routine. Untreated anemia can also cause more health problems over time. For example, it may affect how well your brain, heart, and lungs work.



## When should I speak up to my healthcare team about anemia?

If you're feeling any anemia symptoms more often, it's important to speak up honestly with your healthcare team. Speaking up will give them a better idea of your current health, and help them discuss with you any changes that may be needed in your treatment.

# Treating anemia in MDS

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## What are some common treatments for MDS-related anemia?

It's important to know your options when it comes to treating your MDS-related anemia. The right treatment option for you will depend on how anemia affects you, what treatments you've tried before, and what your body responds well to.



### Red Blood Cell (RBC) Transfusions

RBC transfusions add donated RBCs to your body.

#### What to know about RBC transfusions:

- Your healthcare provider may recommend treating your anemia with RBC transfusions based on how severe your symptoms are and the amount of hemoglobin (Hgb) in your blood. The amount of Hgb in your blood is sometimes called your “blood count” or “Hgb level”
- How often you'll need RBC transfusions will depend on your symptoms and your blood count. **Your healthcare team can tell you if RBC transfusions are right for you and give you a better idea of how frequently you might need transfusions**

#### How RBC transfusions may affect your anemia:

- RBC transfusions help with anemia by giving your body a fresh batch of mature, working RBCs with Hgb to carry the oxygen your cells need
- You may feel relief from some of your anemia symptoms after a transfusion. This relief will likely wear off as time passes between transfusions

#### What to expect over time with RBC transfusions:



- The number of RBC transfusions you receive may change over time, depending on how long it takes for your symptoms to worsen and for your Hgb to drop after each transfusion
- As time passes, many people may need RBC transfusions more often
- When used over time, RBC transfusions can cause problems such as **iron overload**. Iron overload happens because **the transfused RBCs contain iron that your body can't get rid of on its own, causing iron to build up**. Iron overload can damage organs like the heart and the liver. It is treatable, but make sure to discuss this with your healthcare team so you can monitor for it together

Keeping track of important transfusion details like dates, RBC units, and Hgb levels and sharing them with your healthcare team will help them to help you.

## Erythropoiesis-stimulating agents (ESAs)



ESAs are man-made **hormones** (sometimes called “growth factors”) given by injection that may help raise blood cell counts. A few examples of ESAs are Aranesp® (dabepoetin alfa), Epogen® (epoetin alfa), and Procrit® (epoetin alfa).

### What to know about ESAs:

- Many patients start ESA injections as part of an anemia treatment plan that also includes some RBC transfusions
- If you and your healthcare team decide to include an ESA in your treatment plan, you may receive injections every 1 to 3 weeks

### How ESAs may affect your anemia:

- ESAs work to treat anemia by raising blood cell counts
- ESAs may help your body produce more immature RBCs, possibly helping with your anemia and decreasing the number of transfusions you need

### What to expect over time with ESAs:



- ESAs work well for some of the people who receive them, but their effect can wear off over time
- Depending on how your body is responding, your healthcare team may change your dose or even stop ESAs, so you can try another treatment

### What you can do:

After 6 to 8 weeks of receiving an ESA, talk to your healthcare team about how you’re responding to treatment. **Some people taking ESAs may not respond to them. Tracking and sharing your symptoms, test results, and any transfusion information with your healthcare team is going to help you understand if ESAs are working for you, or if you need to take a different treatment approach.**

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## Erythroid maturation agents (EMAs)



An EMA is a treatment that helps your body’s immature RBCs mature.

### What to know about EMAs

- Many patients who receive EMAs have used or are currently using other anemia treatments, like RBC transfusions
- EMAs are given as injections by a healthcare provider once every 3 weeks

### What you can do:

**You can track and share your symptoms, test results, and any transfusion information with your healthcare team.** When you track and share this information, your healthcare team can better understand how well the EMA is working for you.

Wherever you are on your treatment journey, **make sure you’re talking to your healthcare team about any changes to your symptoms, the number of transfusions you need, and your Hgb levels during every appointment.**

# Support for people living with MDS

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When it comes to matters of your health, it's important to be an advocate for yourself. This means knowing what treatment options are available to you. It also means making sure that any decisions are made with you and your needs in mind.

Here are some helpful ways to be an advocate for yourself and get the support you need:



## **Get a support person involved in your care.**

Whether it's your caregiver or friend, bring someone you trust along with you to appointments for support. They can also listen and take notes while you and your healthcare team are talking about your care.



## **Ask questions to anyone on your healthcare team, including your doctor.**

Start a list of questions that you have. If you don't understand something, don't be afraid to ask for an explanation—or for a second opinion from another healthcare provider.



## **Keep records of your medical information.**

Be sure to ask your healthcare team for copies of all your medical reports or doctor's notes. Keep your records organized, and bring them with you to your appointments.



## **Talk to others who have been diagnosed with MDS.**

It's important to know that you are not alone. By sharing your experience with others who have MDS, you can help each other learn more and provide support.



## **Learn about financial support resources.**

There are programs and support available to people who need help with gaining access to certain medications. Talk with your healthcare team about what support may be available to you.





### Let your family and friends know.

They are a great support system for you. They are probably eager to help you but may not know how. After telling them about your diagnosis, make a list of those who have offered to help. When something comes up, don't be afraid to call on them for help with certain things. You may not need someone to do an entire task for you; you may just want a little help or company while you do it.

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For additional support and resources, [click here](#).

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Reaching out to others for support isn't always easy, but it can really make a difference throughout your treatment journey.



# The role of a caregiver

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Whether a spouse, family member, or friend, a caregiver plays a major role in supporting someone living with MDS. Here is some helpful information specific for your role as a caregiver.



## What is my role as a caregiver?

Caregivers often have many roles. Many caregivers travel with their loved ones to and from medical appointments, work with healthcare teams, ask questions, and take notes. You may also administer medication, help with daily activities, and provide emotional support.

Your role as a caregiver to someone with MDS can change from day to day, depending on your loved one's needs and the symptoms they are experiencing.

Some ways you may help include:

- Providing emotional support
- Helping with daily activities
- Helping your loved one stay organized and tracking their treatment and transfusions
- Listening and taking notes during doctor's appointments
- Setting up virtual telemedicine appointments
- Arranging for a translator or translating yourself, if needed
- Communicating openly with your loved ones to hear their concerns and how they feel
- Working with the healthcare team





## How can I work with my loved one's healthcare team?

Communicating with your loved one's healthcare team is one of your most important roles as caregiver. Talk openly with them, and ask questions if you don't understand something. If what they say is not clear, ask the doctor or nurse to explain it another way.



### Here are some questions you may want to ask at the next appointment:

- What are the results of previous tests, and what do they mean?
- What are the next steps, and how can we prepare for them?
- What treatment options are available, and what future treatments might be right?
- Who should we contact outside of office hours or if there is an emergency?
- What situations should we call about immediately, and what can wait?
- Who can we go to for questions when the doctor is unavailable?
- How soon will test results be available, and where can we get them?



## What can I do to take care of myself?

Caregivers can sometimes become so focused on taking care of their loved ones that they forget about their own well-being. It's easier to take care of your loved one if you are taking care of yourself.

Here are some easy and effective ways to take care of yourself:

- Take time to walk outside, read a book, watch TV, or take part in your favorite hobby
- Be open to talking with other caregivers, as they can relate to how you are feeling
- Stay healthy
- Get enough sleep
- Maintain a balanced, healthy diet
- Exercise regularly
- Visit your doctor
- Monitor your own health and medical conditions
- Balance time between work, helping your loved one, and taking care of yourself



## What if I need others to support me?

Being a primary caregiver can be overwhelming. It's normal to sometimes feel scared, lonely, sad, or as if you're handling everything yourself. Don't feel guilty if you need to reach out for support from friends or family. Sharing caregiving responsibilities can help both you and your loved one.



### Don't be afraid to ask for help

- Know your limits—be honest about what you are able to do and what you might need help with
- Ask others for help, but be specific about what you need
- Be willing to accept help from others, no matter how big or small the offer
- Make a plan with friends or family, and organize the tasks that need to be done



### Tasks others can help with

- Chores such as shopping, cooking, cleaning, and childcare
- Spending time or talking with your loved one if they are feeling sad or anxious
- Running errands
- Researching MDS



### Communicate with your loved one

Be honest with your loved one, and talk openly about your role as the caregiver. Spending time together and having regular conversations can make it easier for you to understand what your loved one needs from you and help them understand what you're able to do.

**No matter how you're helping your loved one, make sure you take the time to care for yourself and to get the support you need as well.**



# Organizations for patients and caregivers

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The following websites provide disease education, additional support, and expert opinions on MDS.

**American Cancer Society**

[www.cancer.org](http://www.cancer.org)

**Aplastic Anemia and MDS  
International Foundation**

[www.aamds.org](http://www.aamds.org)

**Cancer Support Community**

[www.cancersupportcommunity.org](http://www.cancersupportcommunity.org)

**Caregiver Action Network**

[www.caregiveraction.org](http://www.caregiveraction.org)

**The Myelodysplastic Syndromes  
(MDS) Foundation, Inc.**

[www.mds-foundation.org](http://www.mds-foundation.org)

**National Alliance for Caregiving**

[www.caregiving.org](http://www.caregiving.org)

**National Cancer Institute**

[www.cancer.gov](http://www.cancer.gov)

**Well Spouse Association**

[www.wellspouse.org](http://www.wellspouse.org)

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This list of independent organizations is provided as an additional resource for obtaining information related to MDS. This list does not indicate endorsement by Bristol Myers Squibb of an organization or its communications.

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# Common words used with MDS

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Below is a list of words and phrases from this guide and their definitions. You can use this list as search terms to learn more about these topics online, to talk to your support groups, or ask your healthcare team about them.

**Anemia** – Low red blood cell count

**Blast** – Immature blood cell

**Blood cells** – Blood cells begin as stem cells in the bone marrow. Stem cells grow and mature into different types of cells: red blood cells, white blood cells, and platelets. After the cells have matured in the bone marrow, the red blood cells, white blood cells, and platelets enter the bloodstream

**Bone marrow** – The soft interior of the bones where new blood cells are created

**Chemotherapy** – A type of treatment that kills or stops the growth of abnormal cells in the body. It is often used to treat cancer

**Cytopenia** – Lower than normal number of blood cells

**DNA** – The information inside your cells that is responsible for how you look and behave

**Erythroid cells** – An immature red blood cell

**Erythroid maturation agent (EMA)** – Treatment that helps red blood cells to mature

**Erythropoiesis-stimulating agent (ESA)** – A manufactured hormone given to people to help with anemia

**Hematocrit** – A measure of the body's red blood cells

**Hemoglobin (Hgb)** – Oxygen-carrying protein found in red blood cells

**Hormone** – A chemical made by your body that travels in the bloodstream to send messages throughout your body

**Immunomodulators** – A type of medicine that changes part of the immune system

**Immunosuppressive therapy** – A type of treatment that decreases the body's immune response

**Immunotherapy** – A type of treatment that modifies your immune system to help the body fight cancer

**Ineffective erythropoiesis (IE)** – The inability of immature red blood cells to mature

**Iron overload** – Too much iron stored in the body, which may affect organs such as the heart and the liver

**Lower-risk** – A lower chance of your MDS progressing to a more serious condition

**Mutation** – An abnormal change within a gene

**Myelodysplastic syndromes (MDS)** – MDS is a group of disorders in which the bone marrow does not make enough healthy blood cells

**Myelodysplastic syndromes with ring sideroblasts (MDS-RS)** – A type of MDS where a certain number of immature red blood cells in your bone marrow are ring sideroblasts

**Neutropenia** – A low number of neutrophils, a type of white blood cell

**Platelets (PLTs)** – Blood cells that help with clotting

**Red blood cells (RBCs)** – Blood cells that carry oxygen from the lungs to all cells in the body

**Red blood cell transfusion** – A process that adds red blood cells into the bloodstream

**Ring sideroblasts (RS)** – Cells containing rings of iron deposits

**Risk score** – Your risk score is a score given by your healthcare team. Your risk score helps them understand the chances of your MDS progressing to a more serious condition. Risk scores can range from “very low” to “very high”

**SF3B1** – Splicing Factor 3B Subunit 1 (SF3B1) is a gene that can have mutations as part of your MDS. This mutation can be tested for as part of your MDS diagnosis

**Stem cell** – All immature cells before they mature and develop a specific role

**Stem cell transplant** – A type of treatment that replaces your abnormal cells with healthy stem cells from a donor

**Symptom** – A physical or mental sign of a condition or disease

**Thrombocytopenia** – Lower than normal number of platelets in the blood

**Transfusions** – Procedures that add parts of the blood or whole blood into the bloodstream

**White blood cells (WBCs)** – Blood cells that help the body fight infection as part of the body’s immune system



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HE-US-2300299 06/23