

The JUNIOR DISEASE DETECTIVES

OPERATION: OUTBREAK



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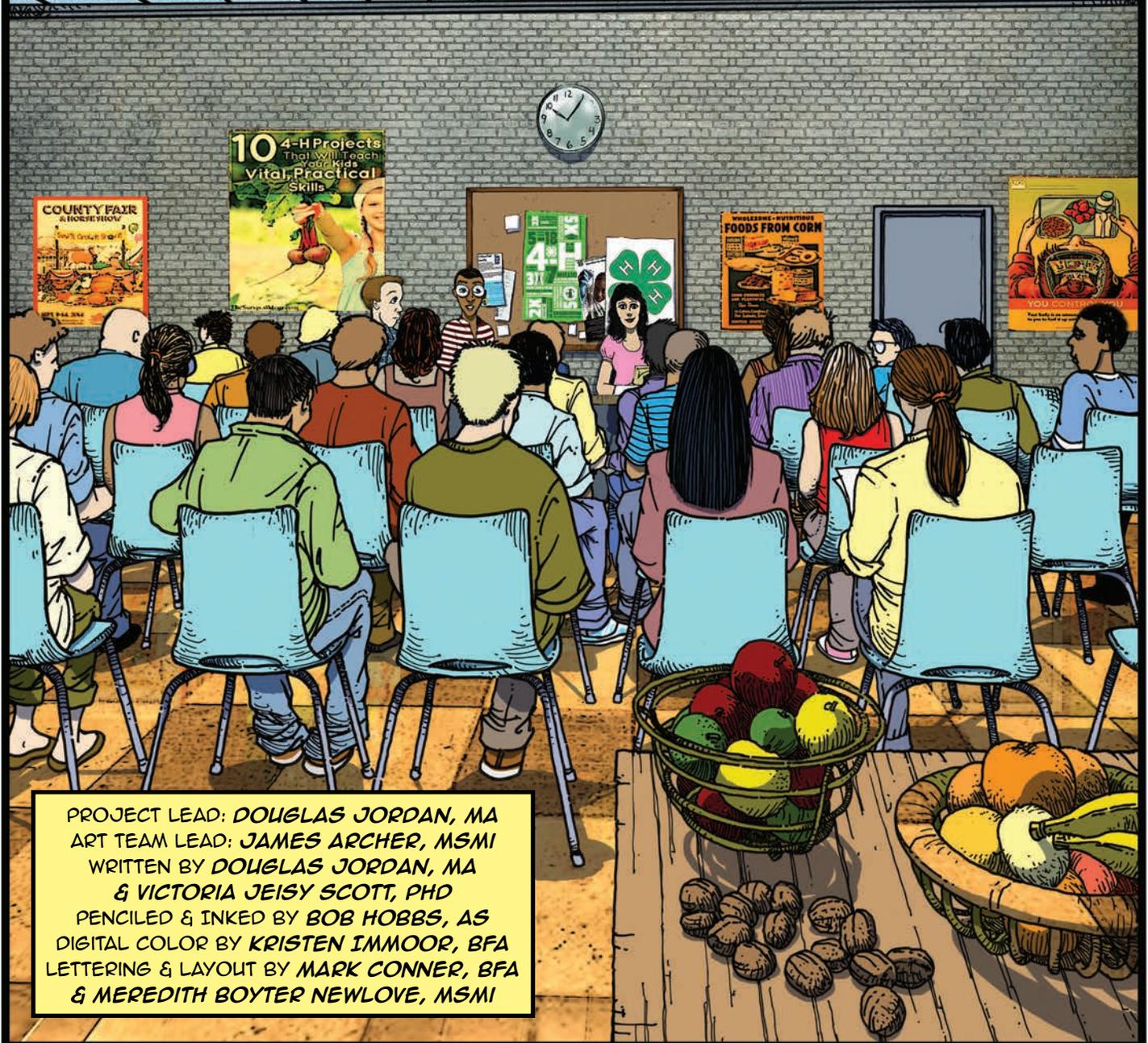
Foreword

The following story is a work of fiction, but real public health threats and diseases are presented. CDC hopes that this story raises youth awareness of infectious diseases and the public health risks they pose. In addition, CDC hopes that this story helps to encourage youth interest in the many different career paths available in public health at the local, state and federal levels.

Lastly, CDC hopes that this story promotes youth education and interest in science and public health. We at CDC hope that readers are inspired to become the next generation of real life disease detectives and public health superheroes.

This graphic novel is the result of a partnership between the Centers for Disease Control and Prevention (CDC), 4-H, and the U.S. Department of Agriculture (USDA). 4-H is the nation's largest youth development program. 4-H is a public-private partnership with federal, state, local and non-profit support. Youth and their families access 4-H programs at a community or county level through the cooperative extension division of their land-grant university. 4-H offers a youth development experience for all youth ages 5-19. For more information, please see <https://nifa.usda.gov/program/4-h-positive-youth-development>.

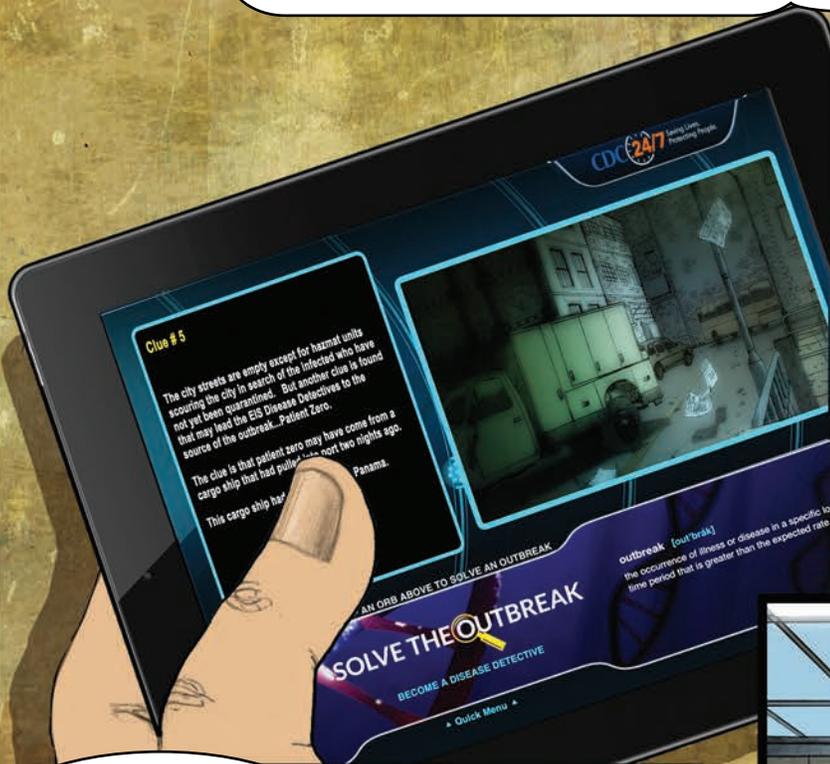
OPERATION OUTBREAK



PROJECT LEAD: DOUGLAS JORDAN, MA
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WHAT ARE YOU DOING, EDDIE?

OH, I'M PLAYING THIS COOL CENTERS FOR DISEASE CONTROL AND PREVENTION APP THAT LETS YOU SOLVE THE SOURCE OF DIFFERENT OUTBREAKS AND I'M STUMPED ON THIS CURRENT OUTBREAK SCENARIO.



Eddie
Treasurer

R.J.
Secretary

OH... NICE, MAN. RIGHT IN TIME FOR OUR THREE DAY TRIP TO CDC AFTER THE FAIR FOR DISEASE DETECTIVE CAMP.

YES, EXCELLENT TIMING! I'M REALLY LOOKING FORWARD TO IT!



Emily
President

YEAH! I CAN'T WAIT! SO LET'S START THIS 4-H MEETING OFF WITH A DISCUSSION OF THE CDC CAMP AS WELL AS WHAT WE ARE DOING FOR THE COUNTY FAIR.



I HAVE AN *IDEA* TO MAKE THINGS *INTERESTING!* LET'S EACH *IMAGINE* THAT WE ARE FACING A MAJOR *PUBLIC HEALTH THREAT* AND WE ARE THE *HEROES*. EDDIE, LET'S START WITH YOU!



HMM... OK. WELL, I'M PICTURING AN *OUTBREAK* OF A NEW *SCARY DISEASE* THAT HAS ALREADY INFECTED HALF OF THE CITY'S *POPULATION!*



...AND I'M *GERM SLAYER*. THE *GERM-FIGHTING SUPERHERO* WHO HAS THE *CURE!*

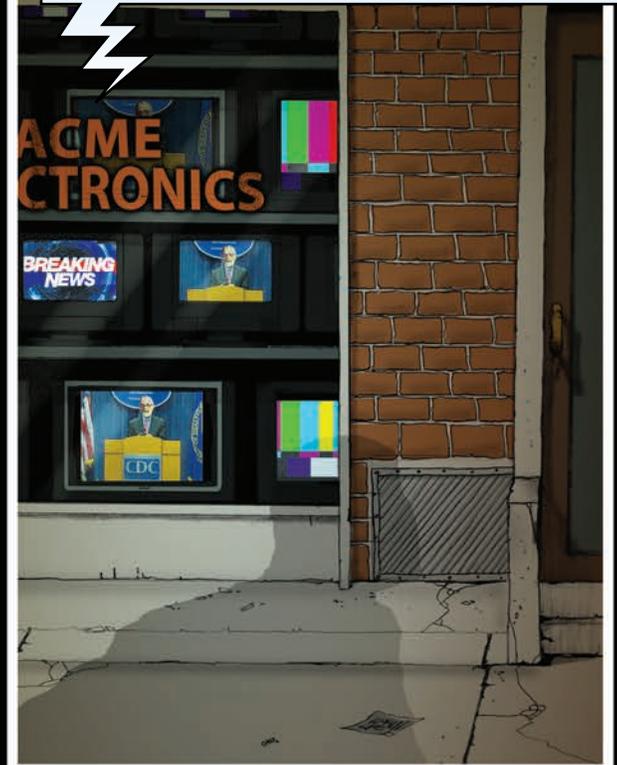


I'M THE ONLY *HOPE TO DELIVER IT ON TIME!*

I REMAIN *CLOAKED* TO MOVE QUICKLY *UNNOTICED* ... I CAN'T RISK BEING *STOPPED* OR *SLOWED DOWN*.



Hospitals and clinics are currently overwhelmed and in some cases people are actually being turned away...



City streets are largely deserted with the exception of locations near medical facilities.





AND HERE I AM!
JUST IN TIME
TO DELIVER THE CURE
FROM THE CDC!



FUN, EDDIE!
...ERR ... I MEAN
GERM SLAYER!
I LIKE IT!

NEXT, IT'S YOUR
TURN, R.J.

I'M A
MEDIEVAL ARCHER
AND YOU GUYS ARE
THERE WITH ME!



OK,
I'VE GOT THIS!





HEY GUYS,
IT'S EDDIE! WOW...
I'M IN A SUIT
OF ARMOR. ISN'T THIS
SUPPOSED TO BE
PUBLIC HEALTH
RELATED, R.J.?

WHERE ARE YOU
GOING WITH THIS?

OH R.J., HA!
THIS IS NERDY,
BUT I LIKE
MY OUTFIT!



YEAH...
WHAAAAAT?



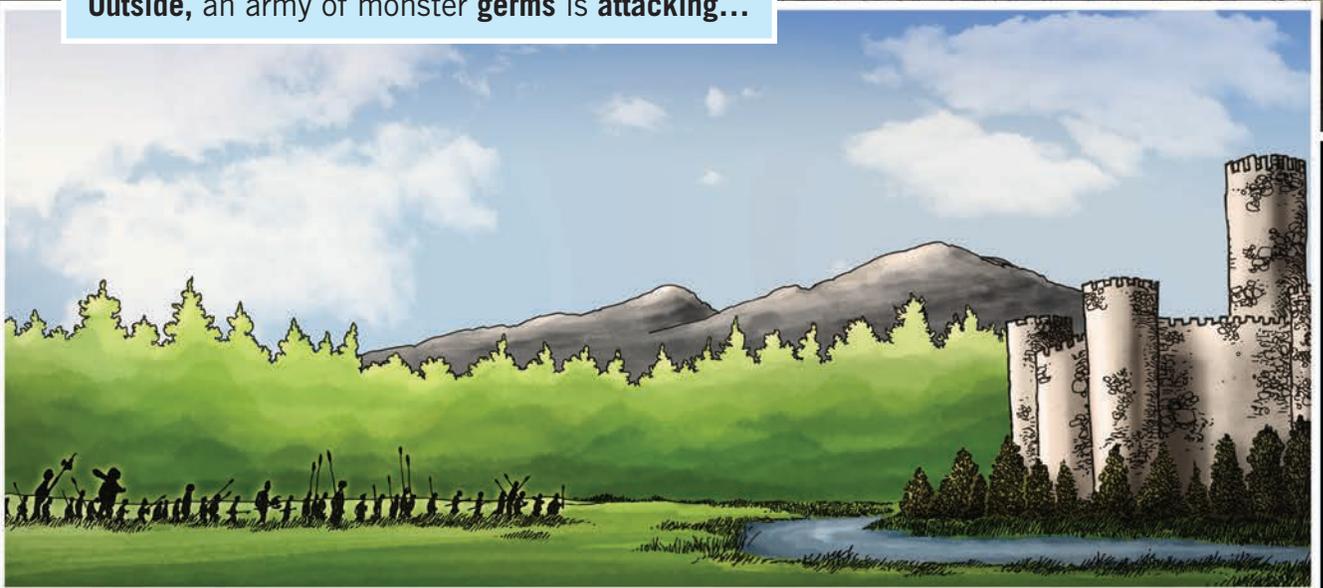
HANG ON,
GUYS...
I PROMISE
THIS IS
PUBLIC HEALTH
RELATED.

HA! HA!
OH, BY THE WAY,
IT'S ME KRIS.
I JUST GOT
TO THE
MEETING...
AND WHAT
TIMING!

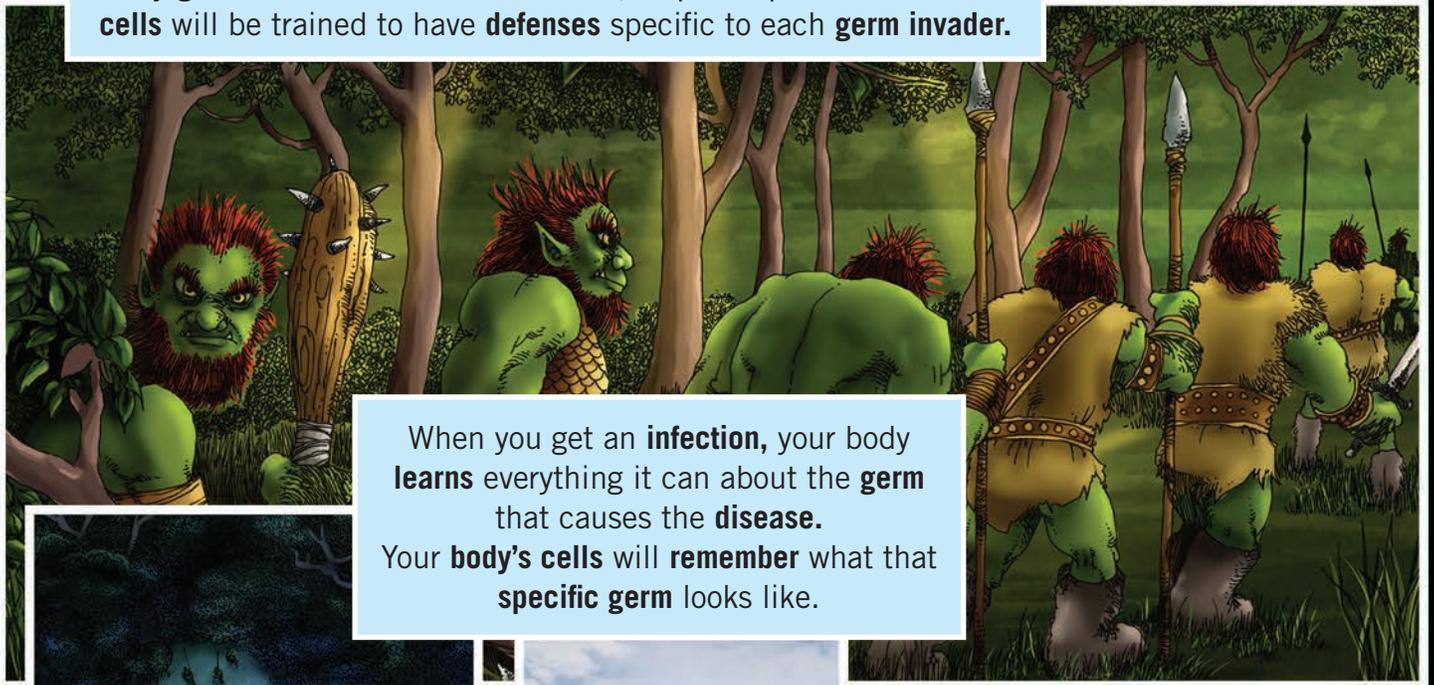


YOU SEE,
WE REPRESENT
THE **BODY'S IMMUNE
SYSTEM**, AND THIS
CASTLE HERE IS THE
HUMAN BODY.

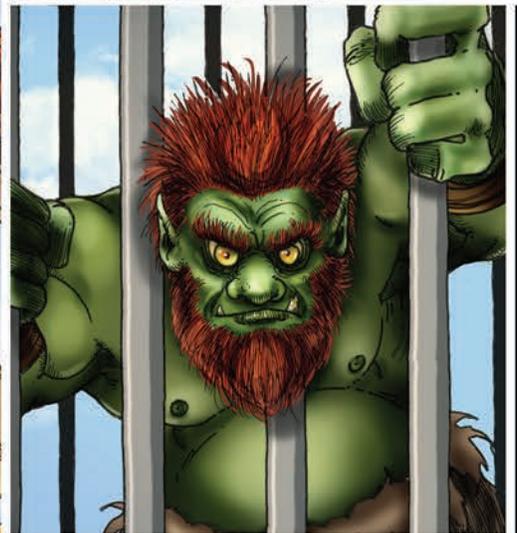
Outside, an army of monster germs is **attacking...**



Every germ is different. To **combat** this, a special platoon of **immune cells** will be trained to have **defenses** specific to each **germ invader**.



When you get an **infection**, your body **learns** everything it can about the **germ** that causes the **disease**. Your **body's cells** will **remember** what that **specific germ** looks like.



Your **immune cells** are constantly on the lookout for **invading germs**.

When **germs** are spotted and **recognized** by the **immune system**, we must leap into action to **fight the infection!**





I THINK YOU ACTUALLY MANAGED TO PULL OFF THE PUBLIC HEALTH ANGLE!

SEE, I TOLD YOU GUYS IT WOULD MAKE SENSE BY THE END!

NICE, R.J.!



SORRY I'M LATE TO THE MEETING, I HAD A BAKING ACCIDENT.

NICE ENTRANCE. WHAT'S THAT ON YOUR FACE?

I WAS PRACTICING BAKING A CAKE TO ENTER INTO THE CAKE COMPETITION AT THE FAIR, BUT I GOT FLOUR ALL OVER ME!

Kris Vice President



HEY, AT LEAST YOU MADE IT INTO MY PUBLIC HEALTH VISION.



SO, I GATHER THIS IS A PUBLIC HEALTH IMAGINATION EXERCISE? CAN I GO NEXT?

OK, GUYS. I'M ON A SPACE STATION...



WOW! AND WE THOUGHT R.J.'S WAS OUT THERE...

“The space station is full of people **infected** with an **alien virus**, but I am completely unaware.”



“I am just going about my **business**. Little do I know that the space station is **contaminated** with the **virus**. Just by being in the environment, I'm being **exposed** to the **virus!**”

“If you are in a **contaminated environment** and don't take the **proper precautions**, you can get **sick**, too.”

“The **virus** can enter a person's eyes, nose or mouth to cause **infection**.”



“Oh no! The **virus** has gotten to **me**. It's trying to **infect me!**”

“**However**, I know that I'll be **safe** because I have been **vaccinated**. **Vaccines** work by causing your **immune system** to recognize and **fight** against the **attacking virus**.”



OH, WOW! KRIS!
THAT WAS SCARY.
I GUESS BEING
COVERED IN FLOUR
GOT YOU THINKING
ABOUT BEING
COVERED
IN A VIRUS!



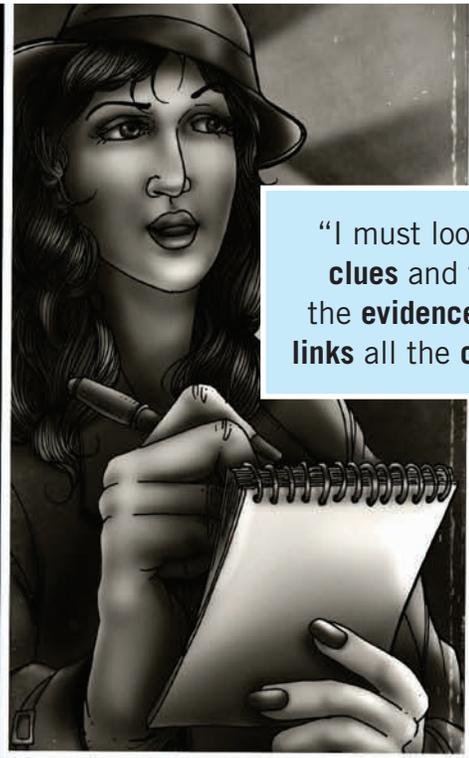
HMM,
MY TURN ALREADY?
LET'S SEE...



OK, I'M PICTURING MYSELF AS A *DETECTIVE*.
I'M GOING TO TRY AND KEEP IT FOCUSED ON
PUBLIC HEALTH FROM THE START... UNLIKE
YOU GUYS!... SO LET'S SAY I'M A *DISEASE*
DETECTIVE.



“There has been an **outbreak** of **foodborne illness**. I have been doing some studying prior to **CDC camp**, so I know that foodborne illness is caused by consuming **contaminated** food or beverages and sometimes it can be spread from person to person.”



“I must look for **clues** and find the **evidence** that **links** all the **cases!**”

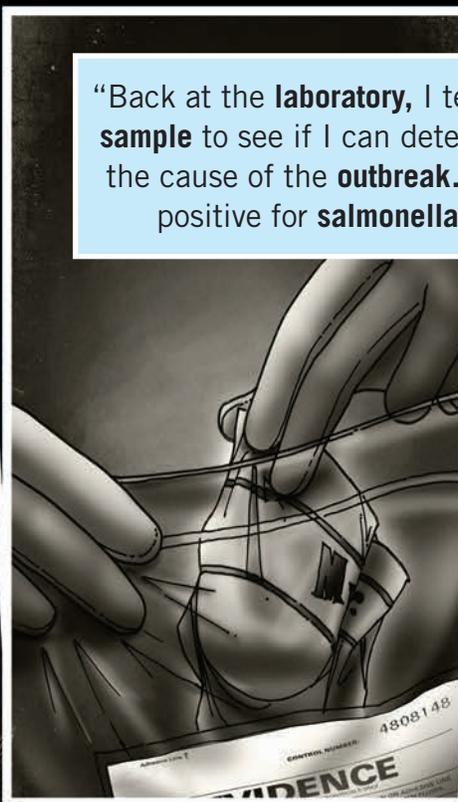


“**Everyone** who has gotten **sick** ate at this **restaurant!**”



HMM.

“I find a **sample** of food to take back to the **lab.**”



“Back at the **laboratory**, I test the **sample** to see if I can determine the cause of the **outbreak**... it's positive for **salmonella!**”



“Now I need to **reach out** and see who else may have **eaten** at this **restaurant**, and I need to **protect** people who could be at **risk.**”

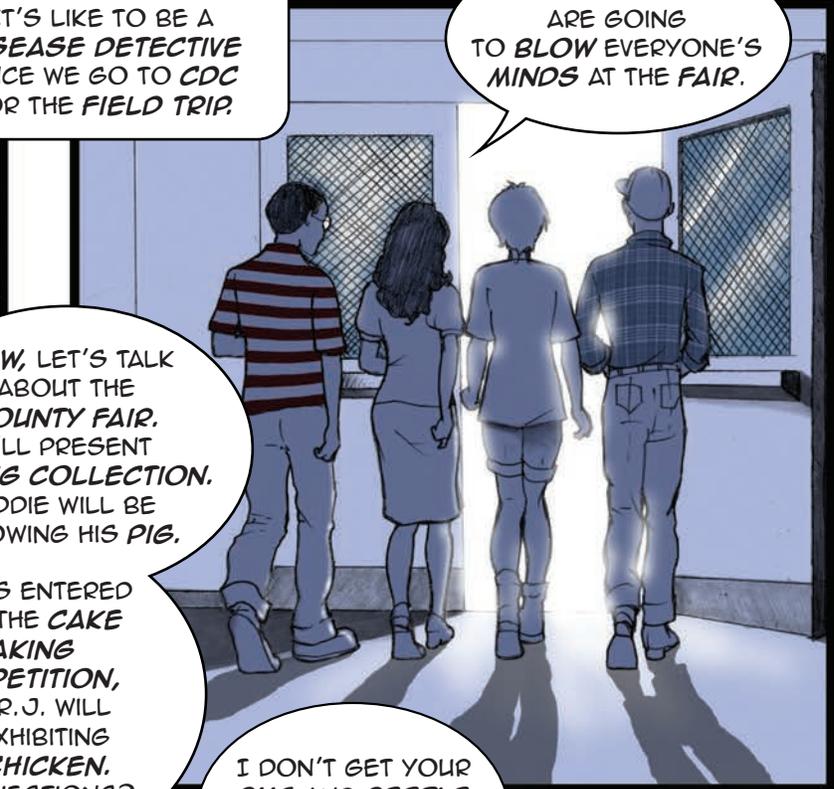


THAT WAS *FUN*, EVERYONE!
I'M SURE WE WILL GET
A MORE REALISTIC
UNDERSTANDING OF WHAT
IT'S LIKE TO BE A
DISEASE DETECTIVE
ONCE WE GO TO *CDC*
FOR THE *FIELD TRIP*.

NOW, LET'S TALK
ABOUT THE
COUNTY FAIR.
I'LL PRESENT
MY *BUG COLLECTION*.
EDDIE WILL BE
SHOWING HIS *PIG*.

KRIS IS ENTERED
INTO THE *CAKE*
BAKING
COMPETITION,
AND R.J. WILL
BE EXHIBITING
HIS *CHICKEN*.
ANY QUESTIONS?

MY *BEETLES*
ARE GOING
TO *BLOW EVERYONE'S*
MINDS AT THE *FAIR*.



I DON'T GET YOUR
BUG AND *BEETLE*
FASCINATION,
EM... IT'S KIND
OF *WEIRD*.

LATER ON...



OK, MR.
MEDIEVAL ARCHER
GERM ANALOGY GUY.

AT THE THOMAS COUNTY FAIR...



C'MON
HAMLET,
THE JUDGING
WILL BE
STARTING
SOON...



CAREFUL ABOUT *SUCKING*
YOUR *THUMB* BEFORE
WASHING YOUR HANDS
WHEN AROUND *ANIMALS*, DEAR.
THEY MAY CARRY *GERMS*.

MOMMY...
LOOK AT THE
CUTE PIG!

OH YEAH!
NOW THAT'S WHAT
I'M TALKING
ABOUT!

AND THE
BEST IN SHOW
GOES TO
ROBERT JACKSON
AND HIS BEST
IN CLASS
CHICKEN!

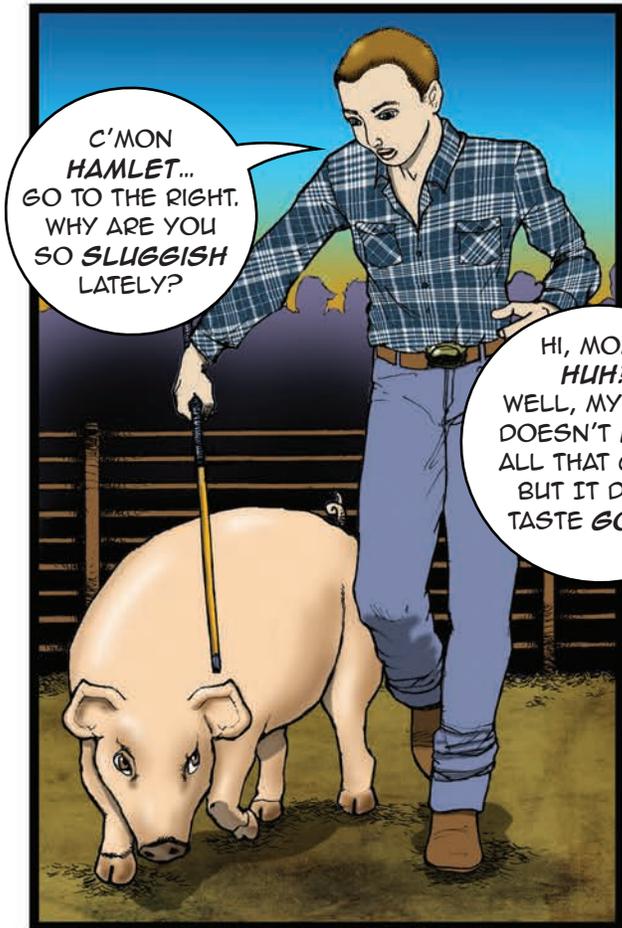


YOU'RE LOOKING
AT THE OWNER
OF THE BEST CHICKEN
IN THOMAS COUNTY!



MY PROJECT
IS DEFINITELY
WINNING THIS
YEAR!





C'MON HAMLET... GO TO THE RIGHT. WHY ARE YOU SO SLUGGISH LATELY?

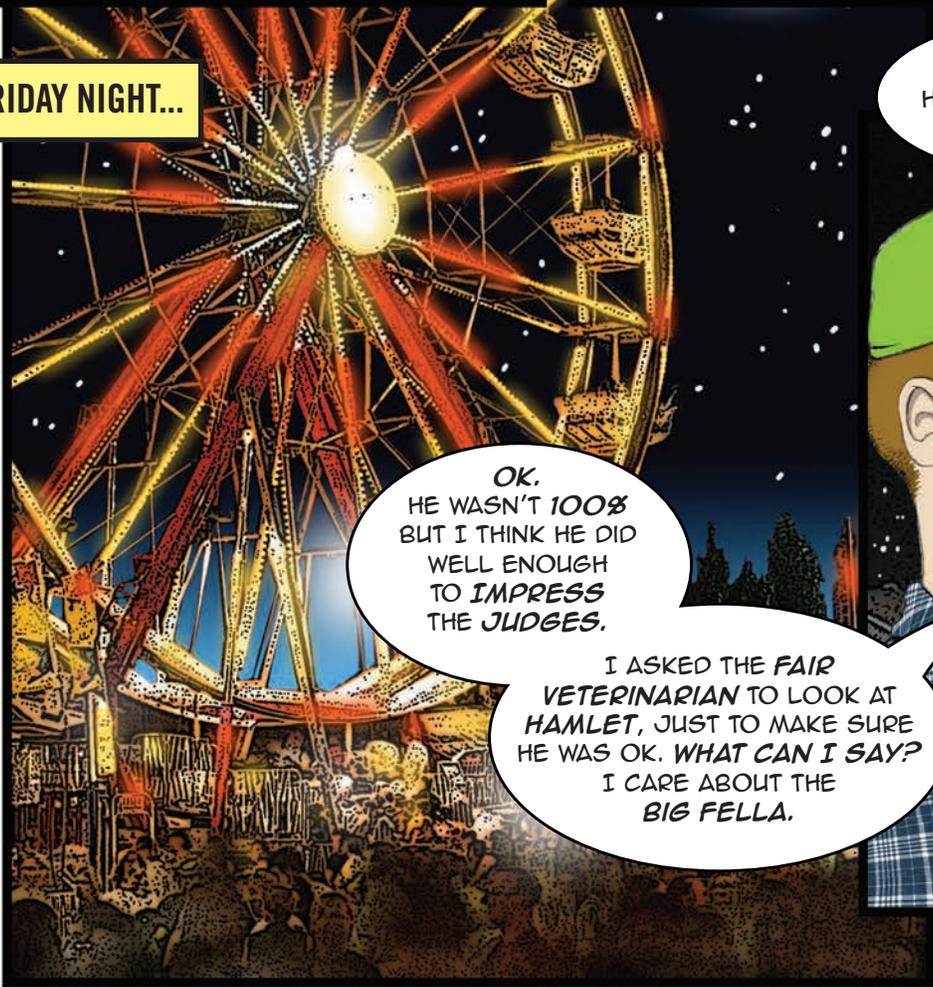
HI, MOM... HUH? WELL, MY CAKE DOESN'T LOOK ALL THAT GREAT. BUT IT DOES TASTE GOOD!



CAKE DECORATING COMPETITION

WELL, EDDIE... HOW DID HAMLET DO TODAY?

FRIDAY NIGHT...



OK. HE WASN'T 100\$ BUT I THINK HE DID WELL ENOUGH TO IMPRESS THE JUDGES.

I ASKED THE FAIR VETERINARIAN TO LOOK AT HAMLET, JUST TO MAKE SURE HE WAS OK. WHAT CAN I SAY? I CARE ABOUT THE BIG FELLA.

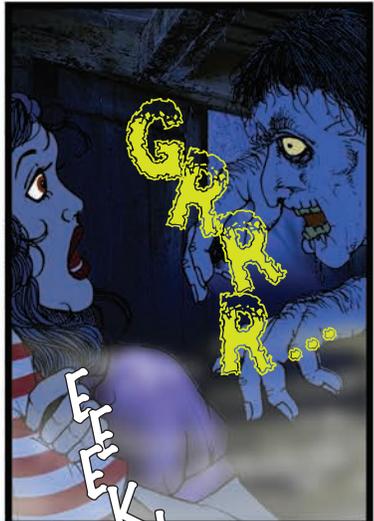




HEY, YOU GUYS
UP FOR THE
HOUSE OF HORRORS?
YOU'RE NOT SCARED,
ARE YOU?



N-NOTHING
TO WORRY
ABOUT...
THOSE ARE
JUST
ACTORS...
I THINK...



I DON'T KNOW
ABOUT THIS,
YOU GUYS...



COUGH!
COUGH!



HA!...
I CAN'T BELIEVE
THOSE TWO
ARE REALLY
SCARED!

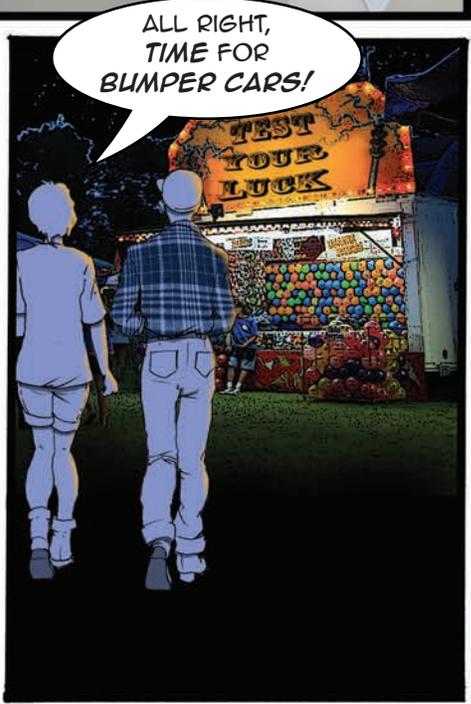
L-LET'S
GO TRY THE
BUMPER CARS...
OKAY?

Y-YES...
LET'S...

MY ASTHMA
IS KICKING IN,
IT MAY BE THE
FOG MACHINES
IN HERE.



PUFF



ALL RIGHT,
TIME FOR
BUMPER CARS!



AWESOME!
I LOVE
BUMPER CARS!



WHOA... DUDE!

BLAM!

HE'LL LIVE.
MORE ROOM FOR
FUNNEL CAKES,
EH MAN?



...WOW, I'M REALLY
NOT FEELING WELL
YOU GUYS...

BURRITOS
AND BUMPER CARS...
PROBABLY NOT A GOOD
COMBINATION.



EDDIE ...
YOU OK?

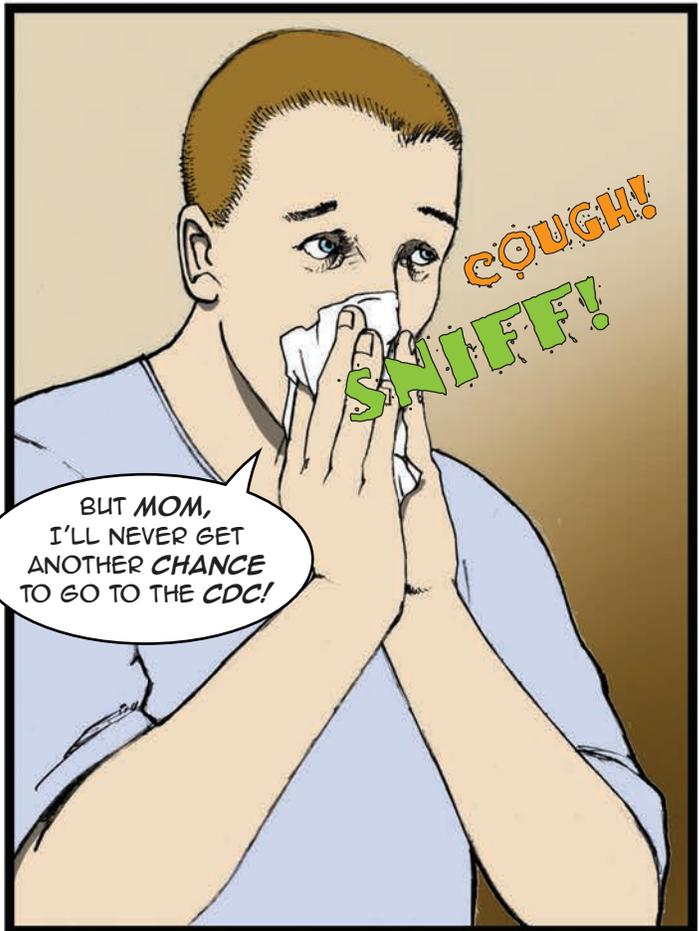
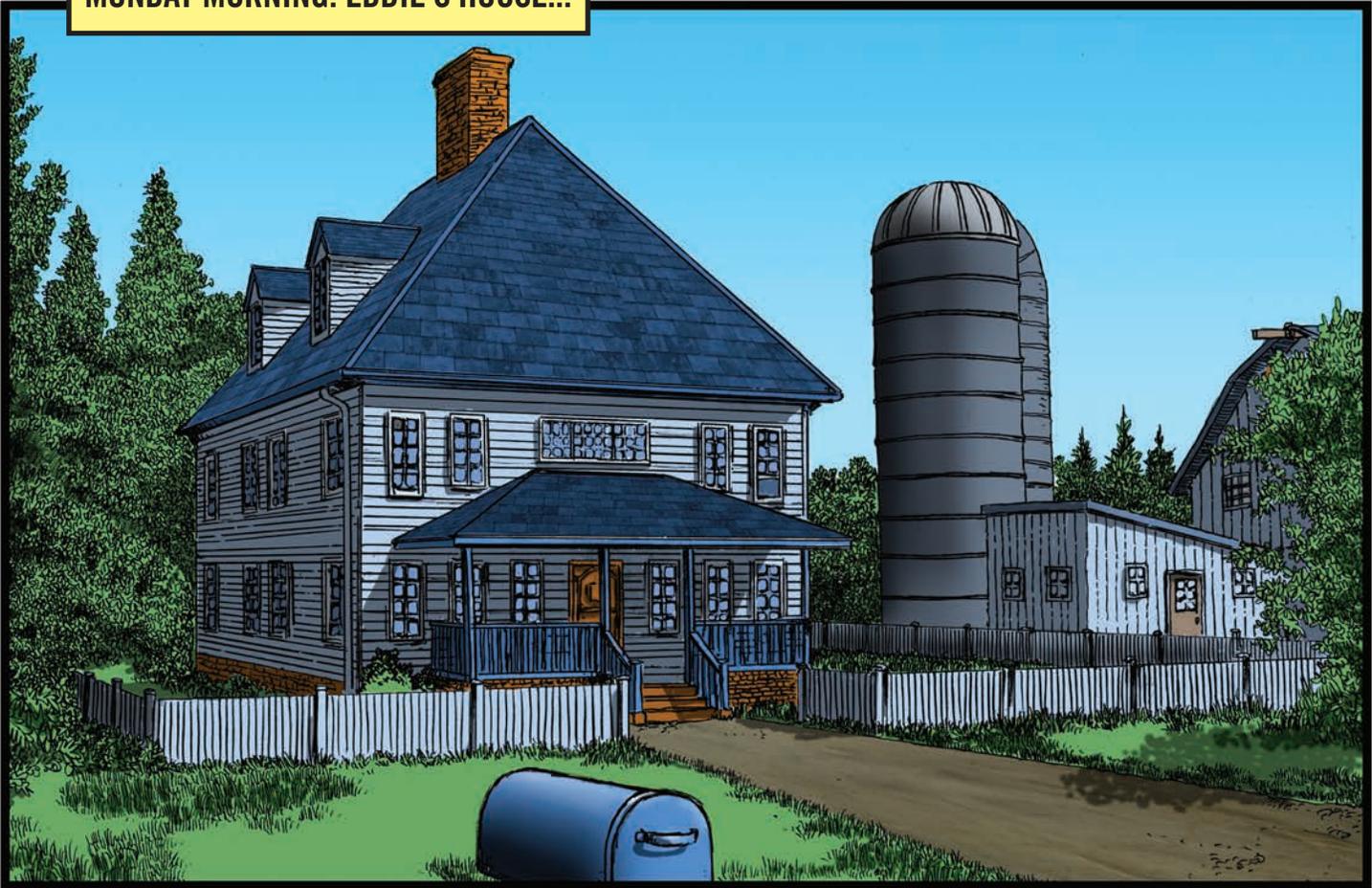


BLUUGG!

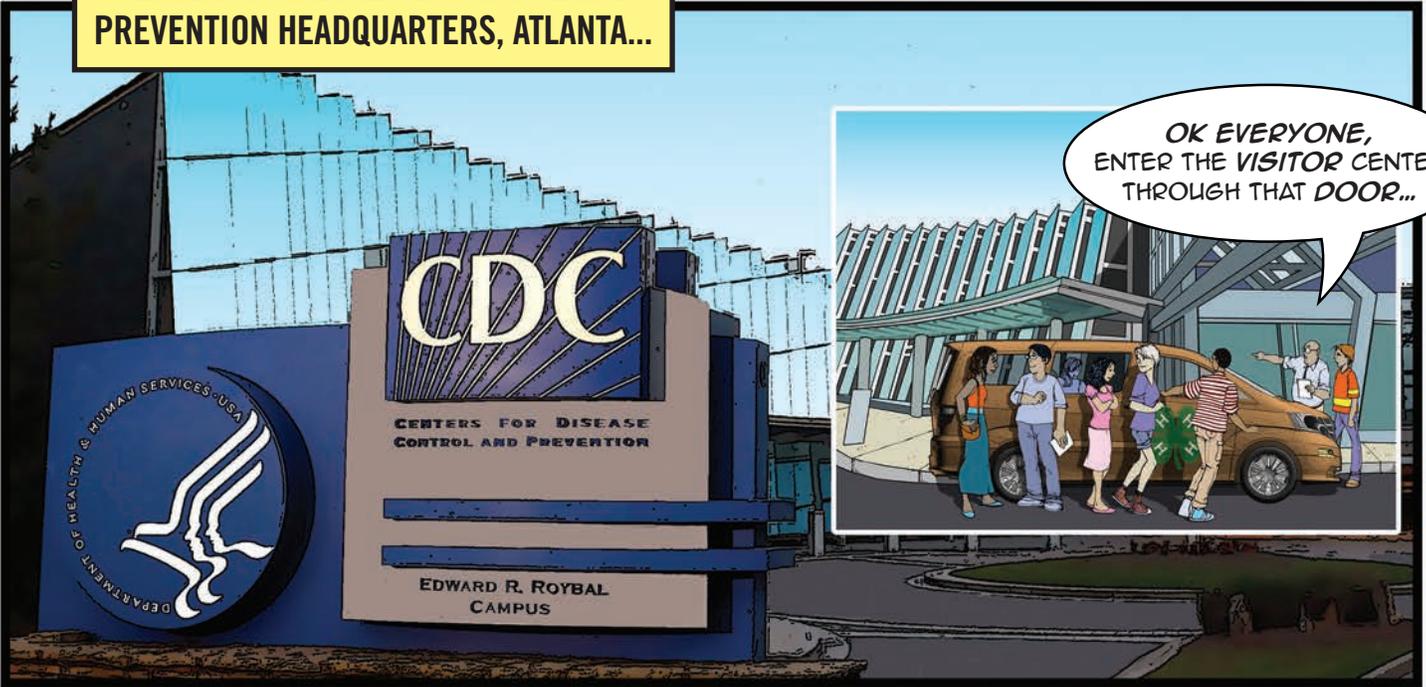


UGH,
EDDIE IS
THROWING UP.
I THINK IT'S TIME
TO CALL IT A
NIGHT!

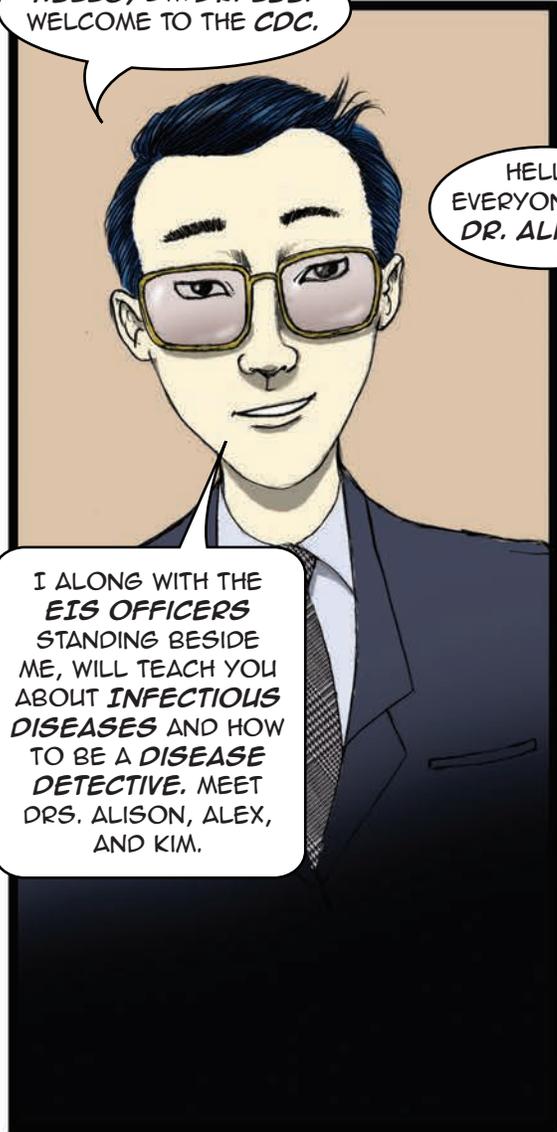
MONDAY MORNING: EDDIE'S HOUSE...



CENTERS FOR DISEASE CONTROL AND PREVENTION HEADQUARTERS, ATLANTA...



HELLO, I'M DR. LEE.
WELCOME TO THE CDC.



I ALONG WITH THE
EIS OFFICERS
STANDING BESIDE
ME, WILL TEACH YOU
ABOUT **INFECTIOUS
DISEASES** AND HOW
TO BE A **DISEASE
DETECTIVE**. MEET
DRS. ALISON, ALEX,
AND KIM.

HELLO
EVERYONE, I'M
DR. ALISON.



I'M
DR. ALEX.



AND I'M DR. KIM.
WE ARE CDC
EIS OFFICERS...



...WHICH STANDS
FOR **EPIDEMIC
INTELLIGENCE SERVICE**.
WHEN DISEASE OUTBREAKS
OR OTHER PUBLIC HEALTH
THREATS EMERGE, WE ARE
ON THE SCENE.



BY THE END OF THIS
COURSE, YOU'LL KNOW
ABOUT DIFFERENT KINDS OF
INFECTIOUS DISEASES
AND HOW **CDC**
PROTECTS THE PUBLIC.



THIS IS GOING
TO BE **GREAT!**
I WISH **EDDIE**
COULD BE HERE
TO **EXPERIENCE**
THIS...



NEXT, I'D LIKE TO TELL YOU HOW WE AT *CDC* FIGHT DISEASE.

CDC FOCUSES ON PUBLIC HEALTH, PROTECTING THE HEALTH AND SAFETY OF *GROUPS* OF PEOPLE.

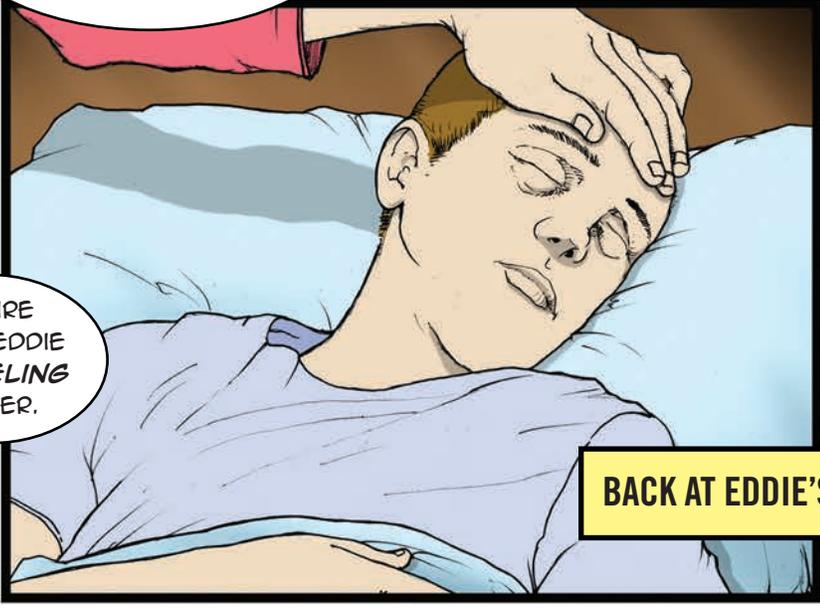
WHAT IS PUBLIC HEALTH?

- PUBLIC HEALTH WORKERS**
- Community Health
 - Focus on Preventing Diseases
 - Investigate Diseases in Groups of People

- CLINICIANS**
- Individual Health
 - Focus on Treating Diseases
 - Diagnose and Treat Disease in One Patient



I SURE HOPE EDDIE IS *FEELING* BETTER.



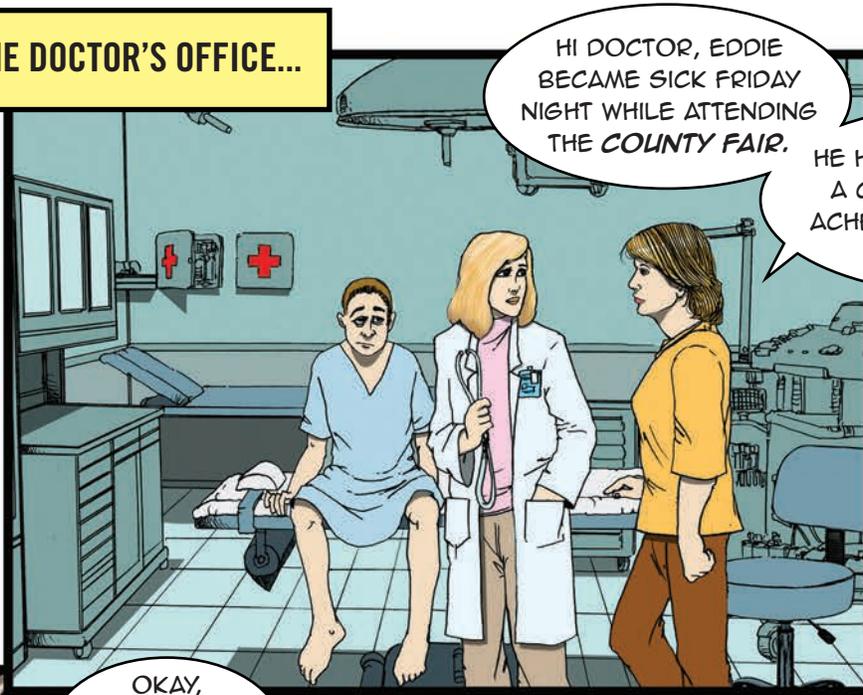
BACK AT EDDIE'S HOUSE...



MOM, I FEEL *WORSE*.

I'M TAKING YOU TO THE *DOCTOR*.

LATER MONDAY AT THE DOCTOR'S OFFICE...



HI DOCTOR, EDDIE BECAME SICK FRIDAY NIGHT WHILE ATTENDING THE *COUNTY FAIR*.

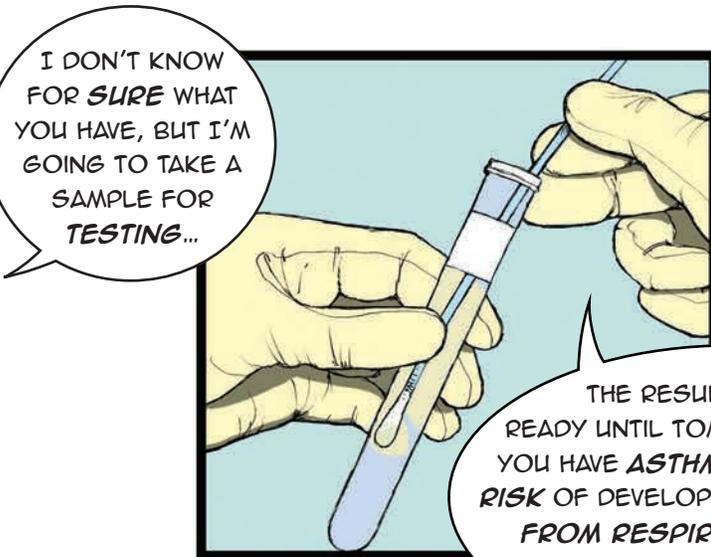
HE HAS HAD A 101° FEVER, A COUGH, AND MUSCLE ACHES. HE ALSO SUFFERS FROM *ASTHMA*.



OKAY, JUST BREATHE NORMALLY FOR ME.



IT APPEARS YOU HAVE AN *UPPER RESPIRATORY INFECTION*, EVEN THOUGH WE ARE NO LONGER IN COLD AND FLU SEASON.



I DON'T KNOW FOR *SURE* WHAT YOU HAVE, BUT I'M GOING TO TAKE A SAMPLE FOR *TESTING*...

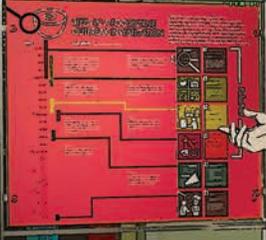
THE RESULTS WON'T BE READY UNTIL TOMORROW, BUT SINCE YOU HAVE *ASTHMA* AND ARE AT *HIGH RISK* OF DEVELOPING *COMPLICATIONS* FROM *RESPIRATORY DISEASE*, I'M GOING TO PRESCRIBE YOU THIS MEDICATION.



PLEASE CALL THE OFFICE IF EDDIE STARTS TO FEEL WORSE.

PEOPLE CAN GET ZOOONOTIC DISEASES THROUGH **CLOSE CONTACT** WITH AN **INFECTED ANIMAL**, ITS **ENVIRONMENT** OR OTHER **INFECTED PEOPLE**.

MANY **FOODBORNE** DISEASES ARE ALSO **ZOOONOTIC** IN ORIGIN.



MAKING FOOD SAFER TO EAT

DO YOU THINK **EDDIE** COULD HAVE GOTTEN SICK FROM A **FOODBORNE** OR **ZOOONOTIC** DISEASE?

HMM... **MAYBE**.

CDC COLLABORATES WITH OUR **STATE PUBLIC HEALTH PARTNERS** WHO ARE OFTEN THE FIRST TO IDENTIFY A POTENTIAL PROBLEM.

2009 H1N1 Flu Pandemic

The 2009 H1N1 influenza (flu) pandemic occurred against a backdrop of pandemic response planning at all levels of government including years of developing, refining and regularly exercising response plans at the international, federal, state, local, and community levels. At the time, experts believed that avian influenza (H5N1) viruses posed the greatest pandemic threat. H5N1 viruses were endemic in poultry in parts of the world and were infecting people sporadically, often with deadly results. Given the reality, pandemic preparedness plans were largely based on a scenario of a severe human illness caused by an avian influenza virus. Despite differences in pandemic scenarios and the actual 2009 pandemic, many of the systems established through pandemic planning were used and useful for the pandemic response.

IF THERE IS AN ASSOCIATED **ANIMAL OUTBREAK**, THE **U.S. DEPARTMENT OF AGRICULTURE** AND **STATE VETERINARIANS** ARE ALSO INVOLVED.

WE ALL WORK TOGETHER TO IDENTIFY THE **SOURCE** OF DISEASE AND FIGURE OUT HOW TO **DEAL** WITH IT.

BACK AT EDDIE'S HOUSE...



EDDIE?
WHAT'S
WRONG?!



MOM, I FEEL
WORSE.

I CAN'T...
BREATHE...!

GASP

WEDNESDAY, EARLY MORNING...





EDDIE?
HOW ARE YOU
FEELING?



EDDIE!!!



NOT
RESPONSIVE
AND BARELY
BREATHING.
WE MAY NEED TO
INTUBATE HIM.

PULSE IS
RAPID AND
THREADY.
LET'S GET HIM INTO
ROOM #2. I'LL START
A LINE.



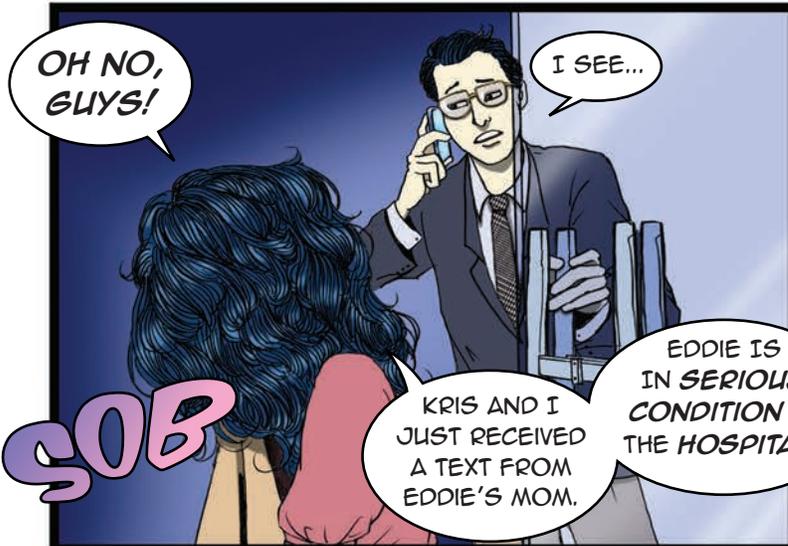
EXCUSE ME, I HAVE TO TAKE THIS...



DR. LEE, THIS IS JIM JEFFERIES WITH THE STATE HEALTH DEPARTMENT.

OUR STATE LABORATORY HAS JUST REPORTED TESTING A VIRUS THAT WE CANNOT IDENTIFY.

THE VIRUS WAS OBTAINED FROM A 17-YEAR-OLD BOY WHO GOT SICK FRIDAY NIGHT. THIS BOY IS CURRENTLY IN **SERIOUS CONDITION** IN THE **ICU**. WE WOULD LIKE YOUR ASSISTANCE WITH TESTING THE VIRUS AND PERFORMING A CASE INVESTIGATION.



OH NO, GUYS!

I SEE...

EDDIE IS IN **SERIOUS CONDITION** AT THE **HOSPITAL!**
KRIS AND I JUST RECEIVED A TEXT FROM EDDIE'S MOM.



HEY, WHERE'S KRIS?

YOU KNOW HOW SHE AND EDDIE ARE **DATING?**

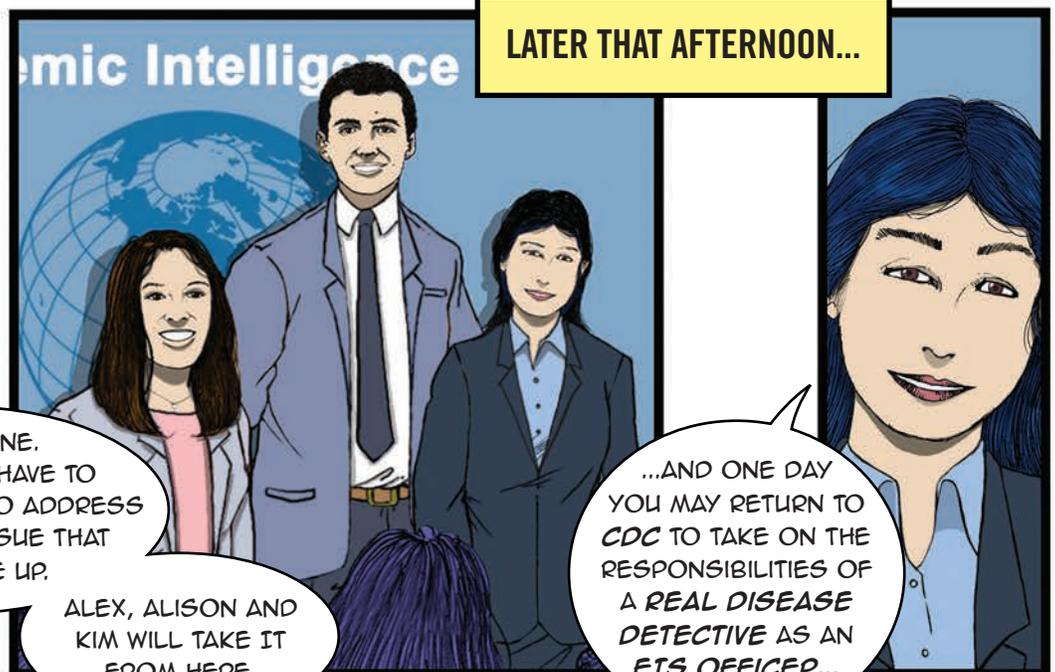
SHE FELT LIKE SHE COULDN'T SIT BY WHILE EDDIE IS **SO SICK**.

I HOPE HE'S GOING TO BE OK.



HI EVERYONE. I'M GOING TO HAVE TO EXCUSE MYSELF TO ADDRESS AN **URGENT** ISSUE THAT JUST CAME UP.

ALEX, ALISON AND KIM WILL TAKE IT FROM HERE.



LATER THAT AFTERNOON...

...AND ONE DAY YOU MAY RETURN TO **CDC** TO TAKE ON THE RESPONSIBILITIES OF A **REAL DISEASE DETECTIVE** AS AN **EIS OFFICER**...

THE KIDS LEAVE CDC DISEASE DETECTIVE CAMP...

WHEN WE GET HOME, LET'S MEET UP WITH KRIS. SHE'S AT THE HOSPITAL WITH EDDIE.

LET'S SEE HOW HE IS DOING AND LEND HIM OUR SUPPORT.

I'M IN 100 PERCENT!

LET'S *DISCUSS* THE CASE DURING THE DRIVE. WE WILL DRIVE STRAIGHT TO THOMAS COUNTY.

FROM THERE, WE'LL MEET UP WITH REPRESENTATIVES FROM THE *STATE PUBLIC HEALTH DEPARTMENT* AND THE *STATE VETERINARIAN'S OFFICE* TO DISCUSS NEXT STEPS.

SHORTLY AFTER...

TIME FOR A ROAD TRIP IN THE CDC VAN...

THE EIS OFFICERS PREPARE TO LEAVE FOR THOMAS COUNTY...

OK, LET'S *SUMMARIZE* WHAT WE KNOW ABOUT THE SITUATION SO FAR.

WELL, WE HAVE AN *UN-IDENTIFIABLE VIRUS* WE HAVEN'T SEEN BEFORE...

YES, AND RIGHT NOW WE ARE DEALING WITH A SINGLE CASE OF *SEVERE RESPIRATORY ILLNESS* IN A 17-YEAR-OLD MALE WHO GOT SICK FRIDAY NIGHT.

DR. LEE SAID THE PATIENT'S VIRUS SAMPLE HAS BEEN SHIPPED TO *CDC*. WE'LL KNOW MORE ONCE THE *CDC LAB* ANALYZES THE VIRUS.

LATER AT THE EMERGENCY ROOM WHERE EDDIE IS BEING TREATED...



WE'RE ALL SO WORRIED ABOUT EDDIE!



THANK YOU, SWEETHEART. EDDIE NEEDS ALL OF OUR LOVE AND SUPPORT RIGHT NOW.



HELLO, MRS. SCHWARTZ. I WOULD LIKE TO SPEAK TO YOU ABOUT EDDIE'S CONDITION, PLEASE COME WITH ME.

LET'S THINK BACK AND SEE IF WE CAN USE WHAT WE LEARNED AT CDC DISEASE DETECTIVE CAMP TO TRY AND SOLVE HOW EDDIE GOT SICK.



YEAH, LET'S DO IT! I THINK WE CAN AT LEAST ATTEMPT TO NARROW DOWN THE SOURCE OF HIS ILLNESS.

AT THE PUBLIC HEALTH DEPARTMENT...



LIKewise, WE'LL GET YOU UNPACKED AT OUR OFFICE.



ONCE INSIDE, LET'S FIND OUT IF THE *HEALTH DEPARTMENT* HAS HAD A CHANCE TO CONTACT LOCAL *HOSPITALS* AND *DOCTORS' OFFICES* TO SEE IF THERE HAVE BEEN ANY OTHER *UNUSUAL RESPIRATORY CASES* IN THE LAST FEW DAYS. IF NOT, WE CAN HELP THEM MAKE THOSE CALLS.

OK, WHILE YOU TWO GET SET UP AT THE HEALTH DEPARTMENT, I'LL HEAD TO THE *HOSPITAL* TO INTERVIEW THE BOY'S FAMILY, CHECK HIS MEDICAL CHART AND SPEAK WITH HIS PHYSICIAN.



KRIS: "Yeah, he was the only one of us to eat a burrito."

R.J.: "Yeah, I was doubling down on corn dogs, but I didn't get sick."

MEANWHILE, AT THE PUBLIC HEALTH DEPARTMENT...

I'M GOING TO SIT DOWN WITH SOME OF THE EPIDEMIOLOGISTS HERE TO SEE IF THERE HAS BEEN AN INCREASE IN RESPIRATORY ILLNESS REPORTED IN THE AREA.

WE NEED TO ENSURE THIS NEW VIRUS IS NOT SPREADING IN THE COMMUNITY.



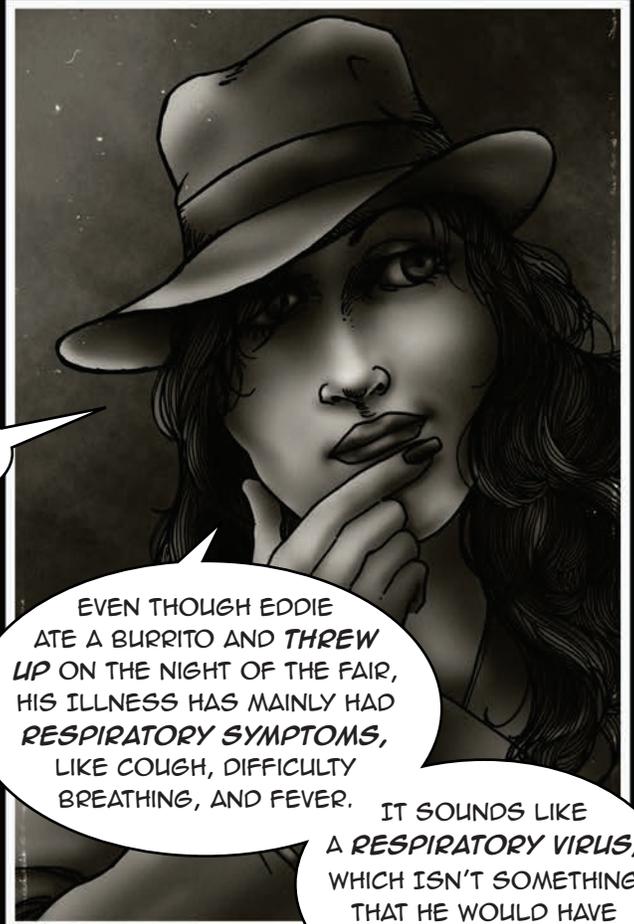
GOOD PLAN. I'M GOING TO FINISH GETTING SET UP HERE, AND THEN I'LL CHECK IN WITH ALISON TO SEE IF SHE HAS ANY LEADS TO FOLLOW UP ON.

BACK AT THE
EMERGENCY ROOM...



OK,
I HAVE TO
THINK LIKE
A *DISEASE
DETECTIVE!*

HMMM...



EVEN THOUGH EDDIE
ATE A BURRITO AND *THREW
UP* ON THE NIGHT OF THE FAIR,
HIS ILLNESS HAS MAINLY HAD
RESPIRATORY SYMPTOMS,
LIKE COUGH, DIFFICULTY
BREATHING, AND FEVER.

IT SOUNDS LIKE
A *RESPIRATORY VIRUS*,
WHICH ISN'T SOMETHING
THAT HE WOULD HAVE
GOTTEN FROM
FOOD.

WHAT WAS EDDIE
EXPOSED TO THAT
WE WEREN'T?

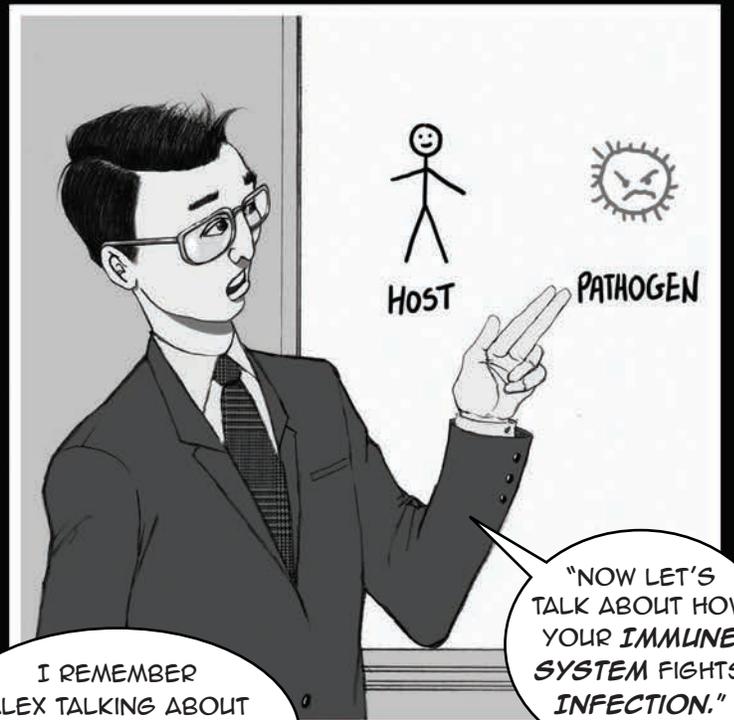
BUT *WHERE* WOULD
HE HAVE GOTTEN A
RESPIRATORY ILLNESS?
WE WERE ALL HANGING
OUT *TOGETHER*.

YOU ARE
RIGHT, EM!



DO YOU
GUYS REMEMBER
DR. LEE TALKING
ABOUT DIFFERENT
PATHOGENS?

I REMEMBER
ALEX TALKING ABOUT
ZOOONOTIC DISEASES
IN THE *CDC MUSEUM*.



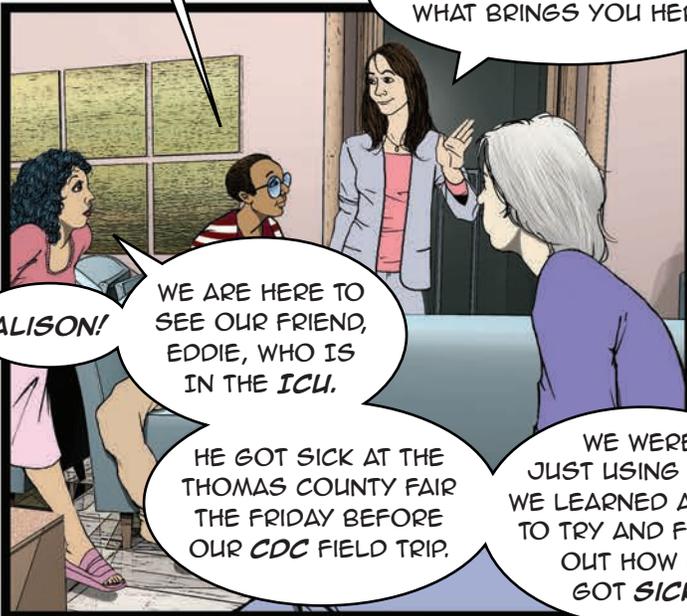
"NOW LET'S
TALK ABOUT HOW
YOUR *IMMUNE
SYSTEM* FIGHTS
INFECTION."

AT THE EMERGENCY ROOM...



HEY,
DR. ALISON!

OH, HI! THIS IS
QUITE A *COINCIDENCE*.
WHAT BRINGS YOU HERE?

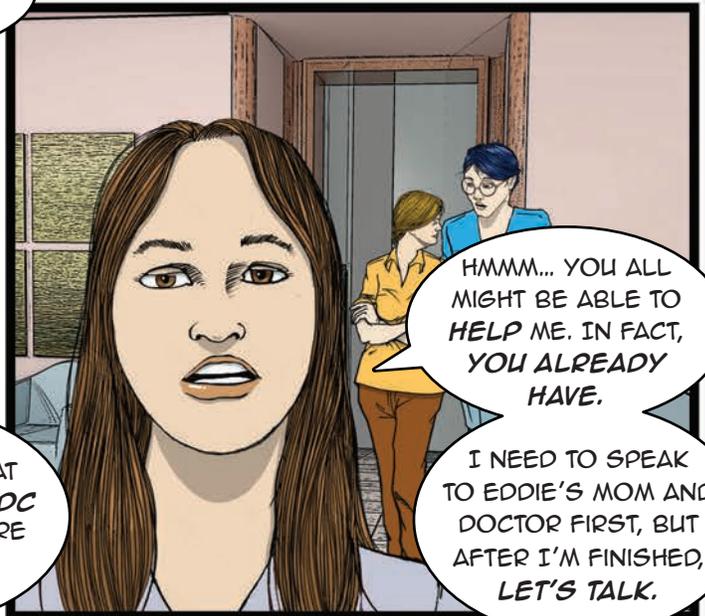


ALISON!

WE ARE HERE TO
SEE OUR FRIEND,
EDDIE, WHO IS
IN THE *ICU*.

HE GOT SICK AT THE
THOMAS COUNTY FAIR
THE FRIDAY BEFORE
OUR *CDC* FIELD TRIP.

WE WERE
JUST USING WHAT
WE LEARNED AT *CDC*
TO TRY AND FIGURE
OUT HOW HE
GOT SICK.



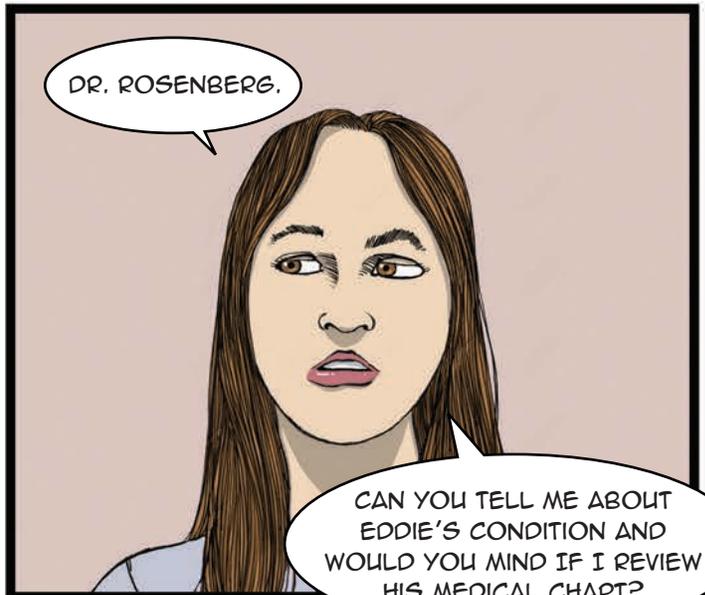
HMMM... YOU ALL
MIGHT BE ABLE TO
HELP ME. IN FACT,
YOU ALREADY
HAVE.

I NEED TO SPEAK
TO EDDIE'S MOM AND
DOCTOR FIRST, BUT
AFTER I'M FINISHED,
LET'S TALK.



HI,
MRS. SCHWARTZ,
DR. ROSENBERG.

I'M DR. ALISON
CROMWELL WITH *CDC*
IN ATLANTA. I'D LIKE
TO ASK YOU A FEW
QUESTIONS ABOUT
EDDIE'S ILLNESS...



DR. ROSENBERG.

CAN YOU TELL ME ABOUT
EDDIE'S CONDITION AND
WOULD YOU MIND IF I REVIEW
HIS MEDICAL CHART?

MINUTES LATER...

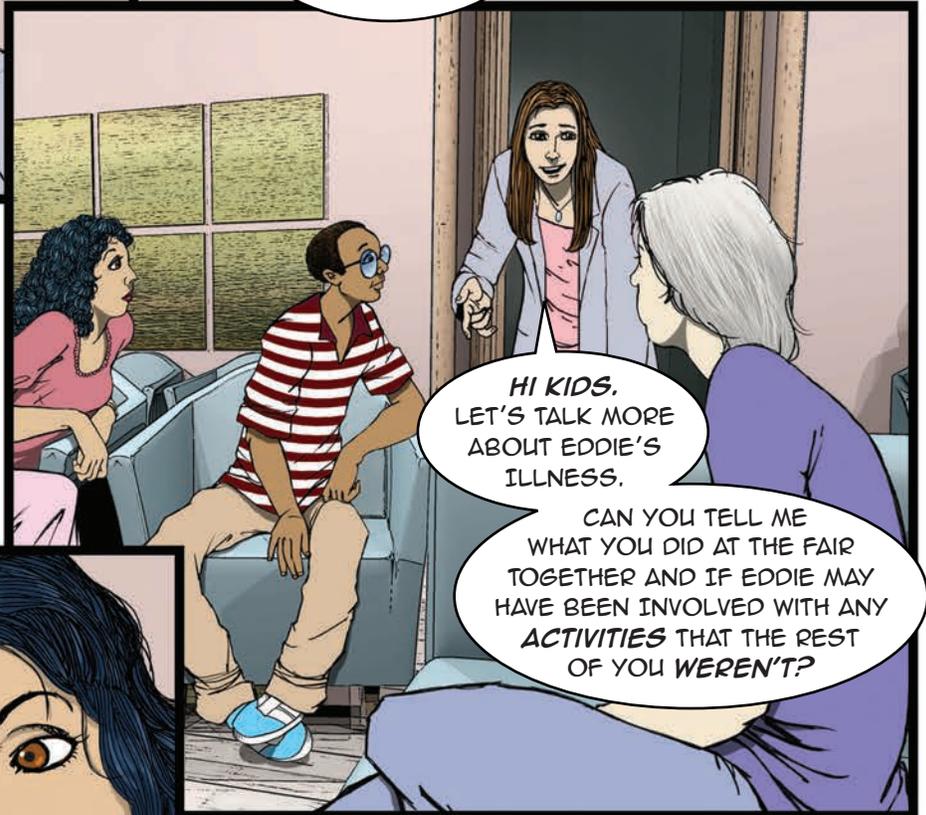
HEY ALEX,
IT'S ALISON.

I'VE SPOKEN
TO EDDIE'S MOTHER,
HIS PHYSICIAN AND HIS
FRIENDS HERE AT THE HOSPITAL,
WHO COINCIDENTALLY WERE
AT THE *CDC DISEASE
DETECTIVE CAMP*.

THEY HAVE ALL
CONFIRMED THAT EDDIE
WAS AT THE THOMAS
COUNTY FAIR THE NIGHT
HE BECAME SICK.

I'M ABOUT TO
SIT DOWN WITH
THE KIDS TO **FIND
OUT** MORE...

ALEX: **WOW!**
OK, I'LL FOLLOW
UP WITH OUR **STATE
PUBLIC HEALTH
COLLEAGUES** TO
GET A HOLD OF THE
FAIR ORGANIZER.



HI KIDS.
LET'S TALK MORE
ABOUT EDDIE'S
ILLNESS.

CAN YOU TELL ME
WHAT YOU DID AT THE FAIR
TOGETHER AND IF EDDIE MAY
HAVE BEEN INVOLVED WITH ANY
ACTIVITIES THAT THE REST
OF YOU **WEREN'T?**

ALISON,
WE WERE
JUST TALKING
ABOUT THIS.

WE ATE AT THE
SAME PLACES
AS EDDIE, EVEN
THOUGH HE HAD A
BURRITO AND **NO
ONE ELSE** DID.

I JUST
POINTED OUT THAT
HIS ILLNESS HAD
SYMPTOMS ASSOCIATED
WITH **RESPIRATORY
DISEASE**, LIKE HIS
COUGH...

VERY ASTUTE,
EMILY. WHAT WAS
EDDIE DOING AT THE
FAIR THAT MAY HAVE
EXPOSED HIM TO
A **RESPIRATORY
VIRUS?**

HMM... WELL EDDIE'S MAIN ACTIVITY AT THE FAIR WAS SHOWING HIS PIG, **HAMLET**. EDDIE MENTIONED THAT **HAMLET** WASN'T **100 PERCENT**. HE EVEN ASKED THE **FAIR VETERINARIAN** TO TAKE A LOOK AT **HAMLET**.

THIS IS
HELPFUL, EMILY.
PIGS CAN **SPREAD
VIRUS** EVEN WHEN
THEY **APPEAR
HEALTHY**.

I'M GOING TO
FOLLOW UP WITH
MY FELLOW **EIS
OFFICER, ALEX**.



ALEX, IT'S ALISON. I JUST TALKED TO EDDIE'S FRIENDS AGAIN. THEY SAID HE SHOWED A PIG AT THE FAIR.



INTERESTING... I JUST GOT OFF THE PHONE WITH THE FAIR ORGANIZER. WE'RE SUPPOSED TO MEET AT THE FAIRGROUNDS TO TALK. I'LL SEE IF HE CAN HAVE THE FAIR VETERINARIAN MEET US AS WELL.

SEVERAL HOURS LATER...



THANKS TO YOU BOTH FOR MEETING WITH ME.

DR. TOLANI, I UNDERSTAND THAT YOU ARE THE VETERINARIAN WHO INSPECTED THE ANIMALS AT THE FAIR.

CAN YOU TELL ME IF THERE WAS ANY ILLNESS AMONG THE ANIMALS?



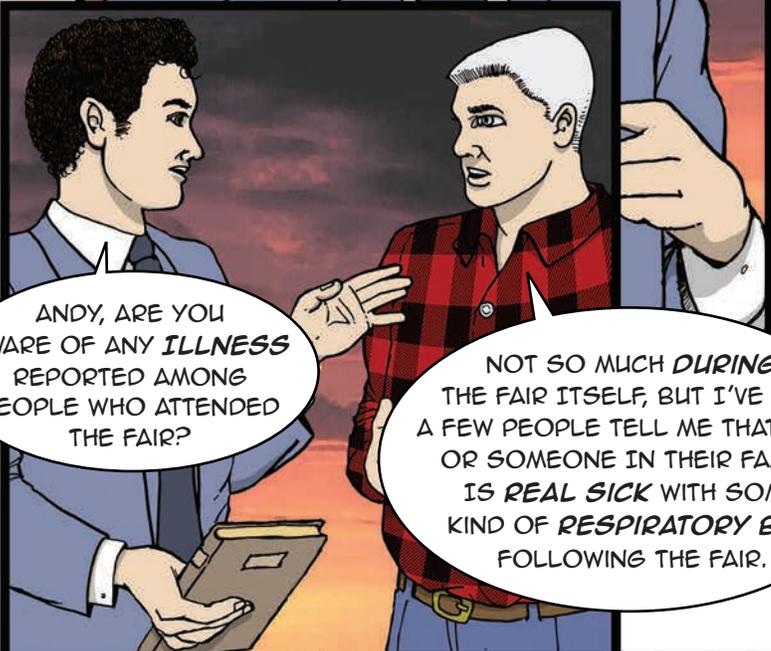
WELL, WE HAD THREE HORSES WITH COLIC AND A FEW CASES OF RINGWORM IN THE COWS.

WHEN I EXAMINED THE PIGS, A FEW HAD A MILD FEVER.

I TOOK SAMPLES FROM THEM, WHICH ARE CURRENTLY BEING TESTED AT THE STATE ANIMAL HEALTH LABORATORY.



GREAT WORK! I'M INTERESTED TO KNOW THE RESULTS OF THOSE TESTS.



ANDY, ARE YOU AWARE OF ANY ILLNESS REPORTED AMONG PEOPLE WHO ATTENDED THE FAIR?

NOT SO MUCH DURING THE FAIR ITSELF, BUT I'VE HAD A FEW PEOPLE TELL ME THAT THEY OR SOMEONE IN THEIR FAMILY IS REAL SICK WITH SOME KIND OF RESPIRATORY BUG FOLLOWING THE FAIR.



HMMM... COULD YOU GIVE ME SOME CONTACT NAMES AND NUMBERS SO I CAN FOLLOW UP?



YOU HAVE THE RESULTS?

HMM... I SEE... THANK YOU.



THAT WAS THE STATE ANIMAL HEALTH LABORATORY CALLING WITH THE SWINE TEST RESULTS...

YOU ARE GOING TO WANT TO HEAR THIS...

SOON AFTER, AT CDC'S LABORATORY...

HOURS LATER...

ALEX, ONE OF OUR *EIS* OFFICERS IN THE FIELD JUST CALLED.

THE BOY FROM THOMAS COUNTY HAD *EXPOSURE TO PIGS* AT THE AGRICULTURAL FAIR.

RESULTS FROM THE PIGS HAVE COME BACK POSITIVE FOR AN *INFLUENZA VIRUS* THAT IS CIRCULATING IN *SWINE*.

OUR PRELIMINARY TEST RESULTS FROM THE BOY INDICATE *INFECTION* WITH A *SIMILAR VIRUS*, INDICATING THE BOY MAY HAVE BEEN INFECTED BY HIS *PIG*.

LET'S TALK TO *USDA'S* LABORATORY TO COMPARE THE *GENOMES* OF BOTH VIRUSES. THE *GENES* WILL TELL US WHAT WE ARE *DEALING* WITH.

WE NOW KNOW THAT THIS IS A *NEW FLU VIRUS* WITH GENES FROM *PIGS, BIRDS* AND *HUMAN FLU VIRUSES*... THE GENERAL PUBLIC WILL *NOT HAVE EXISTING IMMUNITY* AGAINST THIS VIRUS...

CALL ALEX, ALISON AND KIM. WE NEED TO *LET THEM KNOW* WHAT WE ARE *DEALING* WITH HERE. WE WILL NEED TO CALL OUR *STATE HEALTH COLLEAGUES* AS WELL.

090 21 59 07
DAYS HOURS MINUTES SECONDS

IF THIS VIRUS HAS THE ABILITY TO *SPREAD EASILY FROM PERSON TO PERSON*, IT COULD START A *PANDEMIC*...

A *GLOBAL OUTBREAK* OF DISEASE...

BACK AT THE PUBLIC HEALTH DEPARTMENT...

I JUST HEARD BACK FROM **HEADQUARTERS**. **CDC'S** LABORATORY IN ATLANTA AND **USDA'S** LABORATORY HAVE OBTAINED PRELIMINARY TEST RESULTS THAT INDICATE A **POSSIBLE MATCH** BETWEEN EDDIE'S VIRUS AND THE VIRUS OBTAINED FROM HIS **PIG**. THEY ARE SAYING THIS VIRUS HAS **PANDEMIC POTENTIAL...**

FOR A VIRUS TO CAUSE A **PANDEMIC**, THE MAJORITY OF THE WORLD'S POPULATION MUST **NOT HAVE EXISTING IMMUNITY** AGAINST IT, AND THE VIRUS MUST BE CAPABLE OF **SPREADING EASILY AND SUSTAINABLY** FROM PERSON TO PERSON.

YES. LET'S HOPE THAT THIS VIRUS ISN'T SPREADING FROM **PERSON TO PERSON** YET, BUT THAT'S WHAT WE **NEED TO FIND OUT**. LOCAL **HOSPITALS** AND **HEALTH CARE PROVIDERS** ARE STILL REPORTING **NORMAL PATTERNS OF ILLNESS**, ACCORDING TO OUR **STATE PUBLIC HEALTH COLLEAGUES**.

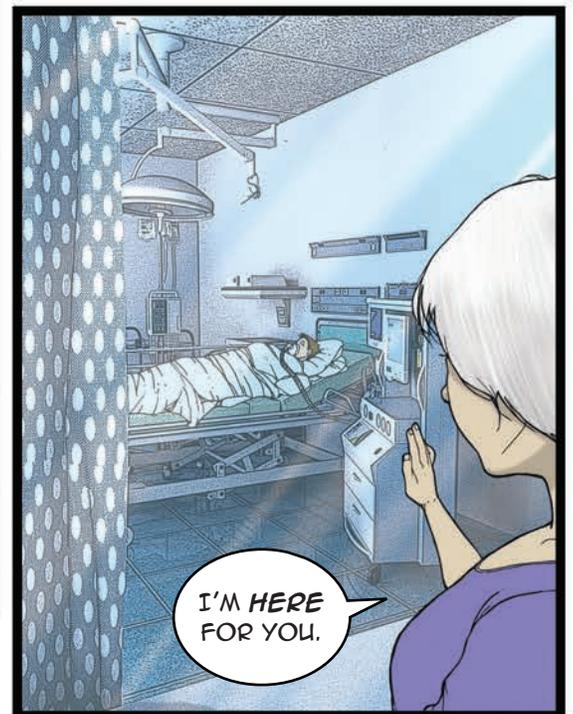
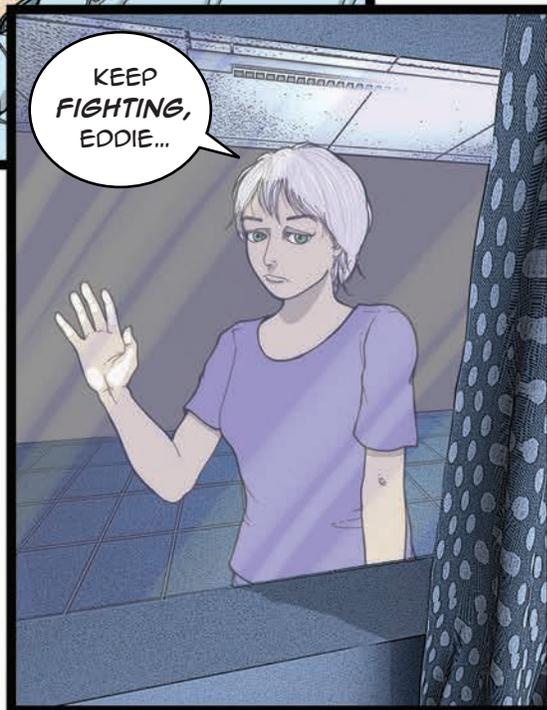
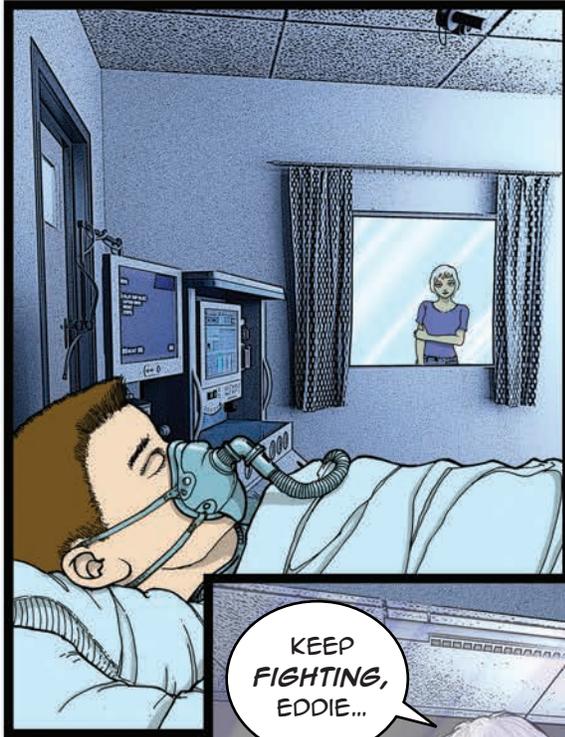
THE **FAIR MANAGER** SAID SOME PEOPLE REPORTED GETTING **SICK** FOLLOWING THE **FAIR**, AND HE ALSO SAID MORE **PIGS** HAVE TESTED **POSITIVE**.

NOPE, WE'RE JUST GETTING STARTED...

OKAY. LOOKS LIKE OUR **JOB ISN'T OVER**.

YES. WE WILL NEED TO FOLLOW UP WITH HIM AND OUR **STATE PUBLIC HEALTH PARTNERS** TO SEE IF WE CAN LEARN MORE ABOUT THEIR ILLNESS AND POSSIBLY GET THOSE PEOPLE **TESTED**. LET'S GO AHEAD AND ALSO **COORDINATE** WITH THE **STATE PUBLIC HEALTH DEPARTMENT** AND **HEALTH CARE PROVIDERS**. WE CAN ASK THEM TO TAKE SAMPLES FOR **TESTING** FROM ANY PATIENTS WITH **FLU-LIKE ILLNESS** THAT HAVE HAD RECENT **CONTACT WITH PIGS**. WE SHOULD ALSO SET UP A PHONE CALL WITH **STATE AND FEDERAL ANIMAL HEALTH OFFICIALS**.

BACK AT THE HOSPITAL...



MEANWHILE, A SUBCONSCIOUS EDDIE RACES TO FIND A WAY TO
ACTIVATE HIS IMMUNE SYSTEM AGAINST THE ATTACKING VIRUSES...

THESE VIRUSES
ARE RIGHT ON
MY TAIL...

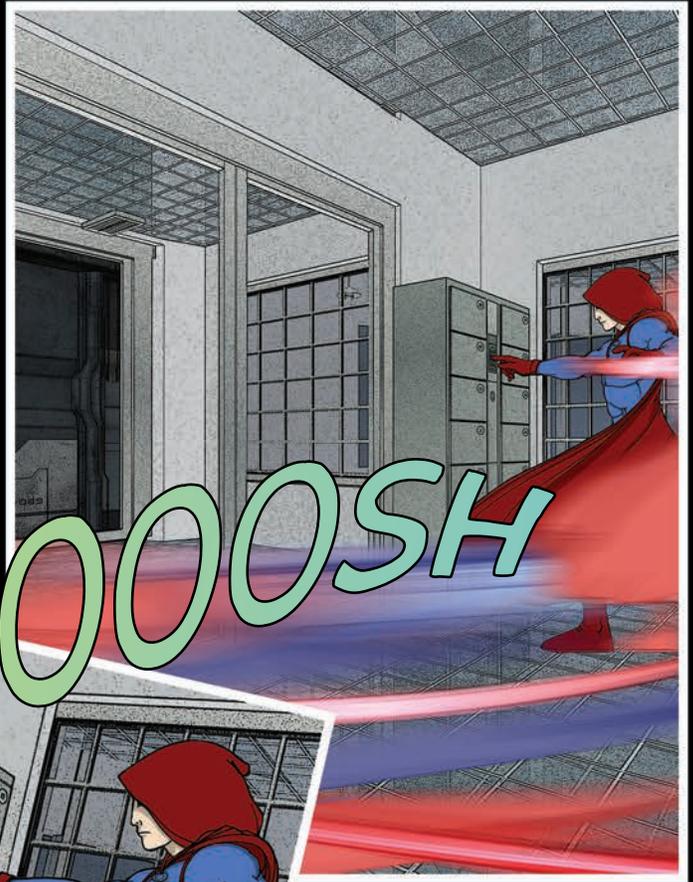
RAAAW

WRRRRRRRR

I MUST FIND THE
CURE BEFORE
IT'S TOO LATE!

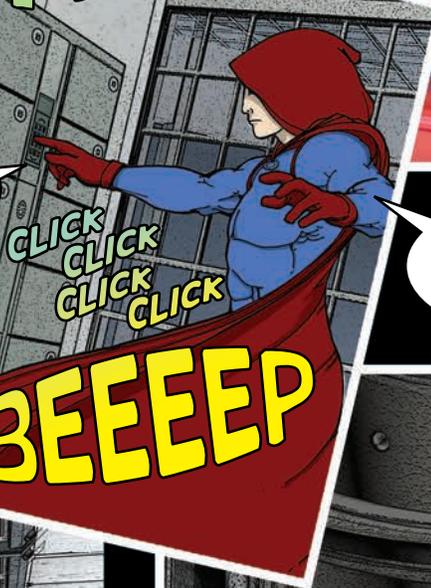


I MUST BE CLOSE...



WHOOOSH

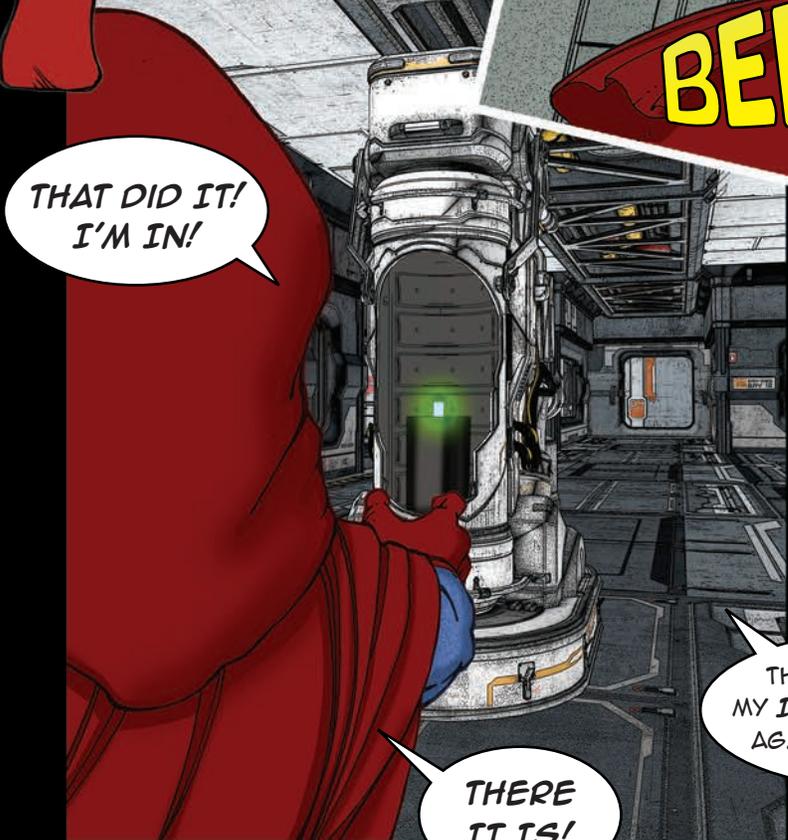
THIS INPUT PANEL MUST OPEN ACCESS TO THE ROOM HOUSING THE CURE!



CLICK
CLICK
CLICK
CLICK

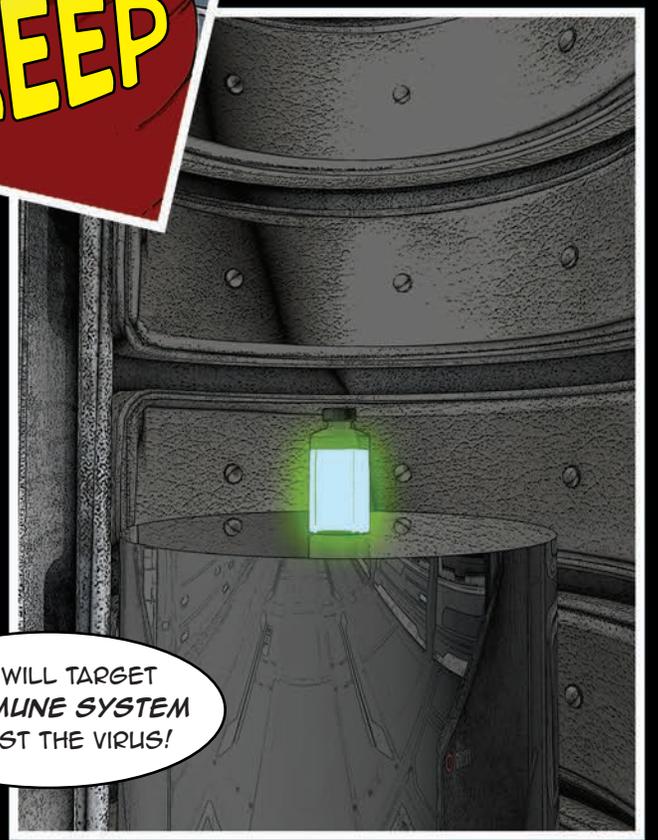
BEEEEP

ACCESS GRANTED!



THAT DID IT!
I'M IN!

THERE IT IS!

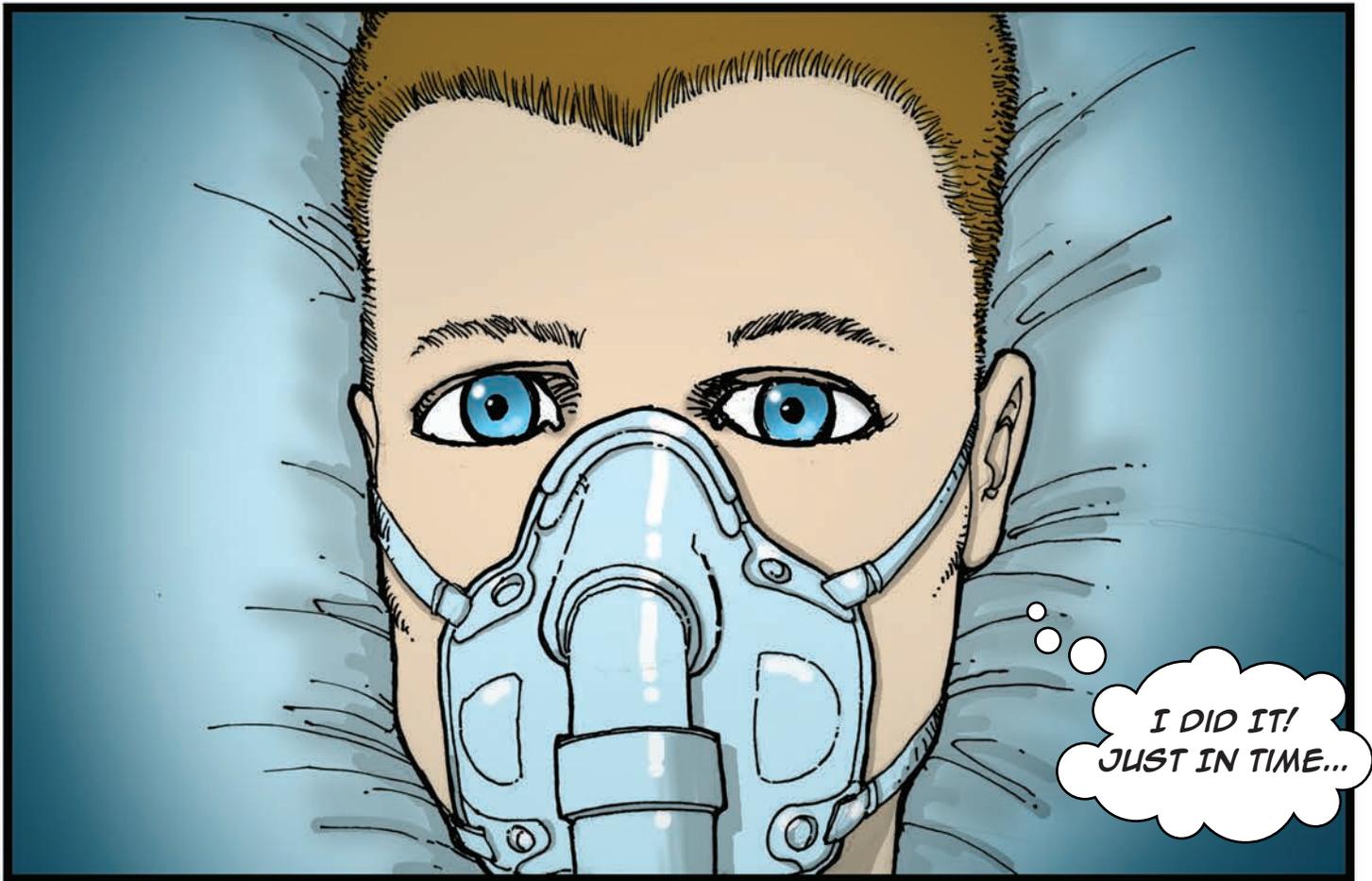
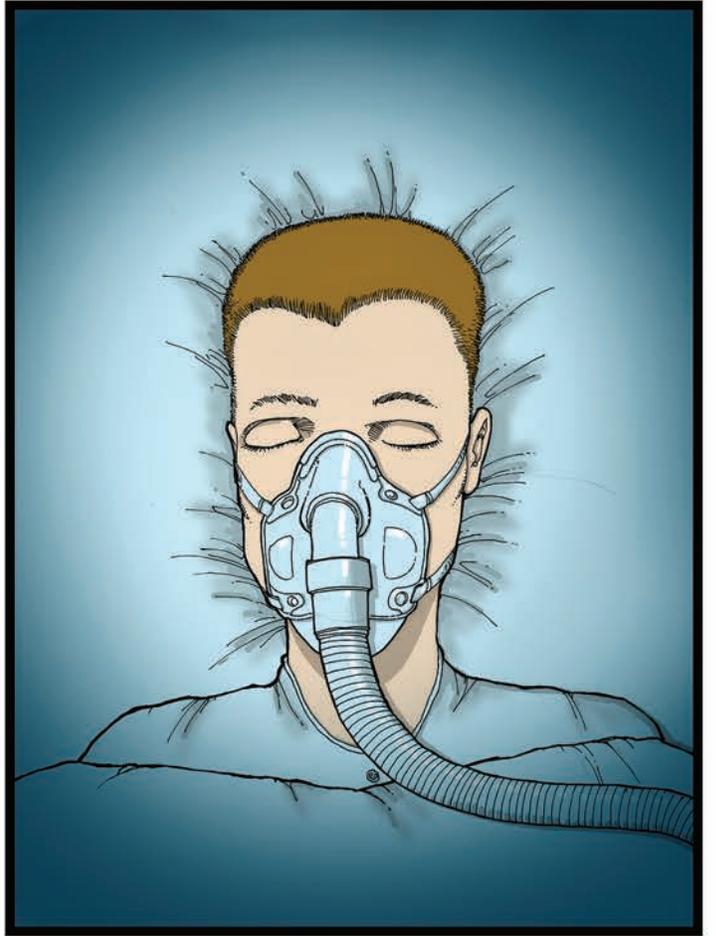
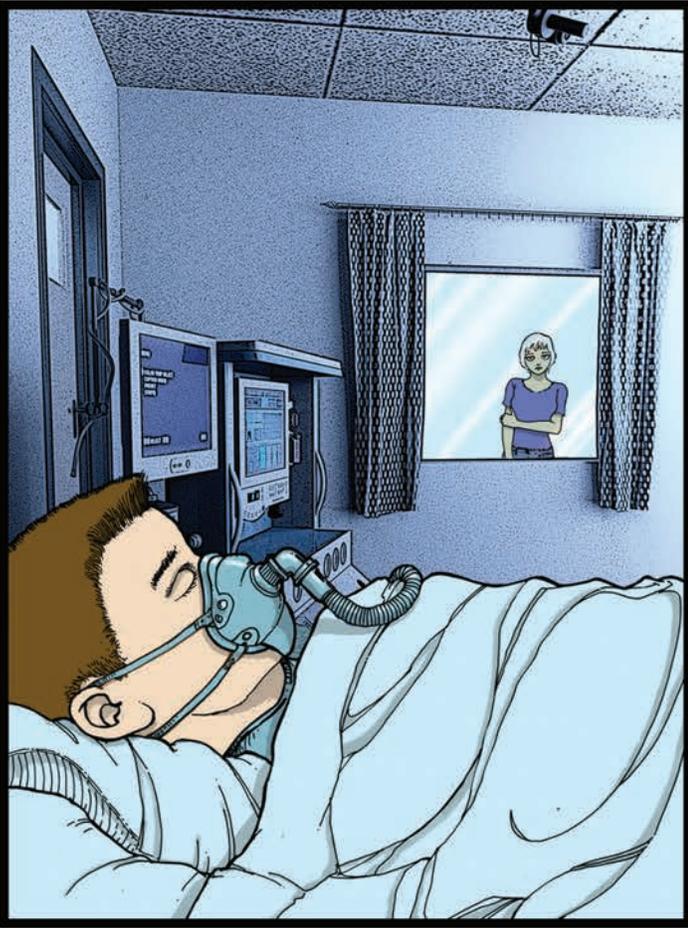


THIS WILL TARGET MY IMMUNE SYSTEM AGAINST THE VIRUS!

NOT A MOMENT
TOO SOON!

RAAAWWWWRRRRRRRR





A WEEK LATER...

HOW ARE YOU FEELING, EDDIE?

OH, I'M DOING BETTER.

AS YOU CAN SEE, HAMLET IS DOING BETTER, TOO.



OINK!

YOU KNOW, EVEN THOUGH I DIDN'T GET TO GO TO CDC'S DISEASE DETECTIVE CAMP, I LEARNED A LOT FROM THIS EXPERIENCE...

FOR ONE, I LEARNED THAT I COULD CATCH A FLU VIRUS FROM HAMLET, AND NOT ONLY THAT, HAMLET CAN GET INFECTED WITH FLU VIRUSES FROM US AND FROM OTHER PIGS AT THE FAIR, TOO.

I ALSO LEARNED THAT DUE TO HAVING ASTHMA, I AM AT HIGH RISK OF SERIOUS FLU ILLNESS. TRUST ME, I'LL REMEMBER THAT TO TRY AND AVOID ANOTHER TRIP TO THE HOSPITAL.

THAT'S TRUE, EDDIE. ALISON TOLD ME THAT CDC RECOMMENDS FOR HIGH RISK PEOPLE AT AGRICULTURAL FAIRS TO AVOID ENTERING THE SWINE BARN AND TO AVOID PIGS WHILE AT THE FAIR.

REALLY? BUT WHAT ABOUT ME RAISING HAMLET AT HOME?

SO... ALISON SAID THAT IT'S OK FOR PEOPLE AT HIGH RISK TO RAISE PIGS AT HOME. SHE SAID THE PRIMARY CONCERN IS WHEN LARGE NUMBERS OF PIGS AND PEOPLE COME TOGETHER AT AGRICULTURAL EVENTS. THAT'S WHEN THESE VIRUSES ARE MOST LIKELY TO SPREAD BETWEEN PIGS AND PEOPLE.



OH, I SEE. THAT MAKES SENSE. BUT HOW DO PEOPLE KNOW IF THEY ARE AT HIGH RISK?

ALISON SAID TO CHECK CDC'S FLU WEBSITE IF WE HAD ANY QUESTIONS.



I REMEMBER HER SAYING THAT IN ADDITION TO PEOPLE WITH **ASTHMA**, PEOPLE AT HIGH RISK INCLUDED KIDS **YOUNGER THAN 5 YEARS OLD**, **PREGNANT WOMEN**, AND PEOPLE WITH OTHER **LONG TERM HEALTH CONDITIONS**, LIKE **DIABETES**, TO NAME A FEW.

THAT'S GOOD TO KNOW. SO IS THERE ANYTHING ELSE THEY **RECOMMEND DOING TO PREVENT GETTING SICK** WITH ONE OF THESE VIRUSES?

WELL, THE EIS OFFICERS SAID THAT **PIGS** DON'T ALWAYS **APPEAR SICK** WHEN THEY HAVE THE **FLU**, SO **WASHING YOUR HANDS** BEFORE AND AFTER HANDLING THEM IS A **GOOD IDEA**.

THEY ALSO SAID YOU SHOULDN'T **EAT** OR PUT ANYTHING IN YOUR **MOUTH** WHEN AROUND PIGS. THIS DOESN'T REALLY APPLY TO ANY OF US, BUT THEY ALSO SAID **NOT TO BRING ANY KIDS' TOYS, PACIFIERS AND STROLLERS** INTO **ANIMAL AREAS** AT FAIRS.



AH! I SEE. DR. TOLANI THE **FAIR VETERINARIAN** TOLD ME THAT THEY TAKE PRECAUTIONS ON THE **ANIMAL HEALTH** SIDE, AS WELL.

SHE SAID IT TAKES EVERYONE WORKING TOGETHER TO **KEEP ANIMALS AND PEOPLE HEALTHY**.

THAT'S WHY THERE ARE **SO MANY RULES** WE FOLLOW WHEN WE RAISE AND SHOW OUR ANIMALS, SUCH AS NOT KEEPING THE PIGS AT THE FAIR LONGER THAN **THREE DAYS**.

SHE SAID THAT HELPS **REDUCE SPREAD OF DISEASE** AMONG PIGS AND PEOPLE.



WHILE EDDIE WAS IN THE **HOSPITAL**, ALISON TOLD ME A FEW MORE THINGS.

SHE SAID WHEN **FLU VIRUSES** FROM **PIGS** INFECT PEOPLE, IT'S CALLED A "**VARIANT FLU VIRUS**" INFECTION.

SHE SAID VARIANT VIRUS INFECTIONS DON'T HAPPEN OFTEN, BUT SOME OCCUR **EVERY YEAR**, PARTICULARLY DURING FAIR SEASON.

ALISON ALSO SAID THAT VARIANT VIRUSES ARE **DIFFERENT** FROM THE FLU VIRUSES THAT NORMALLY MAKE PEOPLE SICK DURING THE FLU SEASON. SINCE PEOPLE AREN'T OFTEN **EXPOSED** TO VIRUSES FROM **PIGS**, MOST **DON'T HAVE ANTIBODIES** THAT PROTECT AGAINST VARIANT VIRUSES.

AS WE LEARNED DURING **DISEASE DETECTIVE CAMP**, OUR BODIES' **IMMUNE SYSTEM** PRODUCES ANTIBODIES TO FIGHT AGAINST INFECTION, AND THE **SAFEST** WAY TO GET ANTIBODIES IS THROUGH **VACCINATION**. ALTHOUGH THE FLU VACCINE ISN'T DESIGNED TO PROTECT AGAINST **VARIANT FLU**, IT IS STILL **IMPORTANT** TO GET, BECAUSE IT CAN HELP **PROTECT** US FROM GETTING THE FLU AND SPREADING IT TO OTHERS, INCLUDING **HAMLET**.

OH WOW! HOW OFTEN DO PEOPLE GET REALLY **SICK** FROM THESE VIRUSES, LIKE I DID?



NOT TOO OFTEN. ALISON SAID THAT **MOST** PEOPLE WITH **VARIANT FLU** JUST HAVE **TYPICAL FLU** ILLNESS, BUT JUST AS WITH ANY TYPE OF FLU, SOME PEOPLE WILL GET **REALLY SICK** FROM VARIANT FLU. THIS IS PARTICULARLY IMPORTANT FOR PEOPLE AT **HIGH RISK**, LIKE YOU.



YEAH, ALISON SAID THAT **ANY FLU VIRUS** INFECTION CAN BE **DANGEROUS**, EVEN DEADLY, EVEN FOR OTHERWISE **HEALTHY** PEOPLE.

SHE SAID **CDC** WAS INVESTIGATING TO SEE IF THE VIRUS YOU HAD IS **SPREADING BETWEEN PEOPLE**...

ON THAT POINT, ALISON SAID THAT THEY **ALWAYS** TRY TO INVESTIGATE VARIANT VIRUS INFECTIONS TO SEE IF THEY ARE SPREADING FROM PERSON-TO-PERSON.

SHE SAID **MOST** VARIANT VIRUSES SPREAD FROM AN **INFECTED PIG** TO A **PERSON**, BUT THESE VIRUSES USUALLY ARE **NOT ABLE** TO SPREAD EASILY FROM PERSON TO PERSON, LIKE **SEASONAL FLU**.



OH, YEAH! WHEN A FLU VIRUS FROM **ANIMALS** GAINS THE ABILITY TO SPREAD EASILY FROM **PERSON TO PERSON**, THAT'S WHEN A **PANDEMIC** CAN OCCUR.



IN FACT, THAT'S HOW THE **2009 FLU PANDEMIC** OCCURRED. ALEX TOLD ME THE 2009 **H1N1 VIRUS** HAD A MIX OF GENES FROM **NORTH AMERICAN PIGS**, **PIGS FROM EUROPE AND ASIA**, **BIRDS**, AND EVEN **HUMANS**.

THAT'S...
KIND OF
CRAZY!



WOW!
YOU GUYS
JUST TAUGHT
ME A LOT!



ADDENDUM

Please visit the following websites for additional information about health topics and recommendations discussed in *The Junior Disease Detectives: Operation Outbreak*.

CDC WEBSITE RESOURCES:

CDC Flu Website: <https://www.cdc.gov/flu/>

CDC Swine/Variant Flu Website: <https://www.cdc.gov/flu/swineflu/index.htm>

What People Who Raise Pigs Need to Know About Influenza (Flu):

<https://www.cdc.gov/flu/swineflu/people-raise-pigs-flu.htm>

Key Facts about Human Infections with Variant Viruses:

<https://www.cdc.gov/flu/swineflu/keyfacts-variant.htm>

Key Facts about Swine Influenza in Pigs:

https://www.cdc.gov/flu/swineflu/keyfacts_pigs.htm

Key Facts for People Exhibiting Pigs at Fairs:

https://www.cdc.gov/flu/pdf/swineflu/fair_exhibitor_factsheet.pdf

Take Action to Prevent the Spread of Flu Between Pigs and People:

<https://www.cdc.gov/flu/pdf/swineflu/prevent-spread-flu-pigs-at-fairs.pdf>

CDC Healthy Pets Healthy People Website: <https://www.cdc.gov/healthypets/index.html>

CDC Zoonotic Diseases Website: <https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html>

CDC Pandemic Flu Website: <https://www.cdc.gov/flu/pandemic-resources/index.htm>

USDA WEBSITE RESOURCES:

Zoonotic Influenza and Measures for Prevention at Fairs:

<http://nasphv.org/documentsCompendiaZoonoticInfluenza.html>

Influenza in Swine: <https://www.usda.gov/topics/animals/one-health/influenza-swine>

USDA Surveillance for Influenza A Virus in Swine Update:

https://www.aphis.usda.gov/aphis/ourfocus/animalhealth/sa_animal_disease_information/sa_swine_health/ct_siv_surveillance/

