we are honored to have dr charles daniel
chuck is pharmacist in chief at the
university of california san diego
associate dean for professional practice
and clinical professor in the skaggs
school of pharmacy at the university of
california san diego
chuck received his bachelors science
degree in pharmacy from the university
of arizona and completed a residency in
hospital pharmacy at the nih
and earned a phd in social and
administrative pharmacy at the
university of minnesota
he has held pharmacy leadership
positions at the university of minnesota
and pharmacist in chief at the nih
clinical center in bethesda
im confident you will enjoy todays
lecture
hello im pleased to be with you here
today and id like to introduce myself
my name is charles daniels im the
associate dean for professional practice
here at university of california san

diego

skagg school of pharmacy and

pharmaceutical sciences im also a

clinical professor of pharmacy and the

pharmacist in chief here at uc san diego

health

im pleased to be able to

share my ideas and thoughts with regard

to

medication use and medication use

quality so i will be

presenting this

with the focus on

sort of trends and changes but with the

basic element around

how

medication use quality is tracked and

measured

i will talk about process and tools for

monitoring and improving medication use

quality and outcomes

and ill just kind of launch into the

topic by chatting a little bit about the

medication use process first of all its

a complex system

well talk about that in a moment

because its complicated theres are

there opportunities for error and error

could mean

mistakes or it could mean

opportunities to improve medication use

by better drug selection and prescribing

in the end it impacts patient care and

the outcomes of the patients that

we are attempting to

reach

process improvement

globally is requires a lot of focus on

systems its data driven

and typically it requires an iterative

cycle process

let me talk for just a moment about the

medication process as its

sketched out and then well

chat some more about the uh the

medication use process

so

when you look at this diagram

essentially

there are multiple

general categories the first of them is

gaining

history

the second is obtaining

and documentation of the medication

history and deciding on what prescribing

should be done

after that theres some

method of transferring that information

and that request

to the

people that will be administering or

moving forward with that order theres a

relatively complex process in pharmacy

that includes some manual and physical

related activities but also

some

pro activities that are related to

understanding the patient figuring out

whether or not the drug dose is correct

and whether or not it needs any

adjustment before its ready to go

following that theres another cycle of

both administrative and

clinical activity that includes patient

education all of that happens before the

patient gets their dose and thats only

on the inpatient setting if you look in

the ambulatory or clinic settings it can

look even more complex the point of

going through this is i want to

demonstrate that because there are many

steps it gives multiple opportunities

for

uh for analysis and multiple

opportunities for improvement of the

process now the shoe heart cycle uh in

the quality improvement activity which

is the slide that im looking at now uh

has really four steps and this is

classic its not related to health care

but

dr shoehart created a concept that is

significantly has

has

worked well in multiple industries but

the improvement process looks something

like this the first step is a planning

stage to find the data which is

important and available

define what new data might need to be

collected in order to do this correctly

plan the change or essentially what the

test is the

interaction or the intervention that is

going to presumably change the results

step two is implementation or pilot

stage

um and during that time period its the

uh when the change that is proposed to

improve

uh the activity uh is goes in place

step three is observation in other words

data collection and at that point in

time uh the ability to look at whether

or not the intervention that you created

uh is has done its job in step four

essentially evaluate the data whats

important about the shoe heart cycle is

not exactly the steps but its the fact

that it is billed and

implemented as a cycle so if at the end

of the first cycle you get the results

that you were looking for then good most

times it requires a second cycle through

with either

major or minor adjustments to the

original uh

intervention plan

so

in looking at

this slide what i really wanted to share

with you is that uh data is the the

driver whether or not its medication

errors which this uh set of slides or

these two uh graphics uh include or

whether or not its uh

optimal outcome uh data is the is the

critical piece and different ways to

look at the data some of which are

relatively uh standard and if you look

at this simple diagram here

uh youll see that its really just

looking at whats going on

not

with no

adjustment for

uh either

number of patients involved it just

looks at how many incidents happened or

how many activities events happened and

that

typically is a launch point but this

slide which really is the shuhart

run chart

is designed to actually start bringing

applied statistics into your quality

metrics and in this particular case

using an upper and lower control limit

helps define when particular

counts

are statistically

significant or

whether or not it happens to be just the

normal variation that you would see in

data so with that in mind uh this

becomes the beginning of how to

implement a statistically driven quality

process now im going to take one quick

look at a couple of document slides that

are related to computerization of the

medication

order and administration process so

one of the things that came out of some

of the early

studies into medication safety and

quality were designed to look at ways to

reduce variation by

forcing uh the process to have fewer

choices one of the presumed saviors of

that was uh

computerizing the order entry process uh

designed and well talk more about this

later but designed to improve the um

process reduce the improve the

standardization and reduce the

variations that could be avoided so

there were multiple studies im not

going to go through all of these but

there were multiple studies that looked

significantly at medication errors

specifically related to computer order

entry

and

in fact a particular study that goes

back to 00 really identified that

while there may be some improvement

associated with the use of computerized

order entry as a

medication quality improvement activity

that it also generated new types of

errors and this study

was a reminder to all of us that

sometimes there are unintended

consequences and the more times that you

look at that cycle and ways to improve

it the more likely you are to be better

now there was an interesting corollary

to this one and thats the

this study that was about the simulation

of technology impact now that was again

a prospective modeling type of an

approach but based on the data that they

had available at the time they

identified that computer

computer uh implementation as part of

the medication order entry process was

likely to save uh approximately 00

days of excess hospitalization for this

particular study site and they

identified as million in associated

costs and again this is for one

particular site so

the important point is

uh that there are opportunities to make

things better

the computer process does help in some

of the variation but its also creates

some

opportunities for failure

so id like to speak for a short while

about medication use evaluation the

reason i use this as a central part

central part of quality of medication

use is because it stands as the

performance improvement method of choice

to focus on evaluating improving

medication use processes and improving

patient outcomes

so theres a

long list of categories of things that

might trigger a medication use

evaluation

uh this slide gives a list of those ill

just point out that some of the examples

might be

new drugs things a bit that have been

added that may uh be associated with uh

disease states that are prone to uh

problems

uh if it impacts a large number of

patients uh those are all categories and

last but certainly not least is

the cost or the expense of the

medication to either the patient or to

the

uh the system

so

with that in mind ill just mention that

there are clearly some opportunities

by looking at pretty basic information

that tells you that there might be a

change in whats going on or how the

drugs being used change may be good or

it may be legitimate or it may

represent a breakdown somewhere but in

these particular cases on this slide if

you look at either antifungal

antibiotics and the change

between those two years the last two

years on the chart and antivirals and

the change there those are the areas

where you might be inclined to say with

a change like that somethings different

so remember what were really looking

for

are

items that will that would highlight us

to particular areas of interest

the ready access to evidencebased

guidelines is an important element that

has changed a little bit of the

landscape of being able to do medication

use evaluation

the reason is that evidencebased

evidencebased guidelines provide the

foundation for whether or not medication

is being used effectively in whatever

the organization is large small or very

small the question is are you using it

the way

uh the clinical evidence supports so

this um

uh national guideline clearinghouse

within ahrq is an important source and

they capture not just uh

governmentbased

guidelines but uh things done by uh many

of the major uh clinical academic

units uh

chest surgeons and uh

internal medicine from around the

country and around the world

so this is an example of one of the

existing uh

evidencebased guidelines that is

available online right now and the

reason i bring that up is not because

im going to speak more about vte and

nonsurgical patients but just because

its a typical kind of an item that

frequently

uh begins to create the foundation for

what is perceived what is expected to be

the best evidencebased use of a

medication

those become the criteria that can be

used by

any organization that wishes to do a

medication use evaluation

and uh it provides a

a source that can be used to create the

criteria

so i will go now into a couple of

specific examples of mue

activities from different organizations

and i started with this slide because

this is a snapshot from

the

results or the presentation of the

results in this one and

what is important is that

this

guideline starts out by identifier this

mue starts out by identifying that the

guideline recommendations from cdc from

the world health organization and from

the infectious disease society of

america

have provided the foundation for what

represents quality or appropriate use of

of this medication in this patient group

the second point ill ill make right

now is that

it includes two elements one is

uh who it should be used in and the

other is what should be the correct

dosing that goes with that and as we get

uh a couple of slides up well see the

implications of knowing that there are

multiple criteria that go with this

particular set of guidelines

so

without going through all of these

documents i will make the case that

the objectives

for an mue are probably similarly

designed set up and the study design

appropriately created to test the

questions

in the particular population so

frequently

maybe almost all the time

these mues are not large large databases

theyre frequently

what would be seen as a smaller

welldefined database it could be

defined by the number of patients in a

given health system

it could be the number of patients that

were hospitalized it could be the number

of patients that were seen in a clinic

over a particular period of time but it

typically is not uh very large numbers

theyre typically smaller

so in terms of setting the objectives

and designing

the study itself it requires uh

appropriate

rigor and it should be done in a way

that allows the organization to be

comfortable with the results but they

may or may not be uh as fully

scientifically grounded as one might

like to see for a uh for a uh

double blind study

so im gonna just go through a couple of

the pre the

findings from this particular study

because

because i want to talk about i want you

to understand

the reason that these studies imply ways

to

improve the quality of the prescribing

so in this particular um slide youll

see a pie diagram that basically says

that

seven percent of the 9 patients that

they

um

that they looked at seven percent uh had

empiric therapy there was not a test a

diagnostic

and seven percent had targeted therapy

because they were diagnosed with uh they

had diagnostic data that said that this

patient did truly of influenza

the um

remaining uh large percentage percent

of this study were patients that would

have qualified for

uh for

osceltamivir therapy

but did not receive it during their

hospitalization so that i think will uh

help set up the conversation about

whats next this second uh

slide here from the same

data set i really looked at the question

of if they used oscil tamivir

did they use it correctly

and i think again it looks like from the

data that youll see here on

this part of the chart that largely the

answer was when they used it they used

it pretty well on the other hand there

was still a fairly large population

from as pointed out in the last slide

that may have qualified that did not get

it so

this becomes for an organization that

wants to improve the quality of their

medication use this becomes sort of a

goto point of the slide youve studied

the data youve looked at the results

youve

youre now at a spot of saying so what

and thats what this

type of slide is designed to do and if

youll look here in this corner youll

see strategies to improve and that

becomes the uh the next steps for the

organization in order to be able to be

successful in their in their process or

their activity to improve the use

so im going to go through one more

example mue related example

again to give you a sense of how this

can be used to set up improved

medication use activity

so this was a study looking at

liposomal

bupivacaine

xperel

and this has been a somewhat

controversial product uh across the

country and i think the question is so

if its controversial then why dont you

study it and look at what youve done

with it so

the study objectives that were presented

here

really focused on whether or not if you

used

this particular product the x perel

versus the

alternative therapies that have been in

standard use for a while whether or not

you improved uh post

operative opioid requirements improved

pain scores or impacted the length of

stay after surgery all of which are

important in terms of whether or not you

wish to use this drug which adds more to

the uh cost of the of the

hospitalization

so i wont go through this sliding up uh

in a lot of detail ill just point out

that the key point on this slide is this

duration both of the other um more

traditional uh local anesthetics

bupivacaine or pivocaine have a

substantially shorter duration

and the rationale for use of this more

expensive agent

is that um

you the

duration of the of the anesthesia

provided after the surgery

is

uh provides longer duration less pain

the ability for patients to get up and

move faster

less need to use opioids to treat pain

during that therapy so that yellow or

that red highlighted box

up to hours versus

two to eight for the other alternatives

becomes sort of the critical question

so again this study design while

with limitations based on

the number of patients

was designed to try and answer the

questions with the level of

statistical confidence that could be

generated out of the data

ill go through briefly uh just a couple

of the results slides because i think

they really speak to the question so we

looked on this slide

if if we look at the four categories num

the amount of hour opioid use

um the

stretch between and and the median

hour opioid use i think that

if the question is does

addition of

liposomal bupivacaine to the

postsurgical procedure

reduce the amount of opioids that need

to be used it does not appear to be a

statistically significant difference and

in fact

as you can see there they are

essentially the same from our data but

certainly no statistical significance so

thats one question that we felt

comfortable uh being able to resolve the

second category uh slide set that i

wanted to share is related to pain

scores and if you look here across there

with the darker

blue and the more

aqua color

bars being the liposomal buffane

and the alternative standards that

we talked about earlier you can see that

theres no data to support the fact that

this particular liposomal product

provides a

better pain score if postoperative pain

scores are what are used and theres no

statistical significance to this

difference on any of these

now this is the one that actually caught

a lot of attention

as it was presented and that is

associated with the hospital length of

stay and so if you go

down to this

uh final row here and look at

median post postsurgical length of stay

there is a difference between the

liposomal bupivacaine group and the

standard of care now its not

statistically significant so in this

particular case the mue design

uh what would not be allow us to answer

that question but it does provide an

opportunity

uh for the organization to look at it

and say

maybe we need to look a little deeper

into that particular question

so in looking at the results from the

liposomal bupivacaine mue um one of the

important things

that we want to draw out of it is that

if you define the objectives well up

front and you

follow the allow the data to be able to

drive your

uh your

conclusions that you can make

the opportunity uh a useful way to

improve the use of and decisions about

whether or not particular drugs are

elements that are important for patient

care or whether or not they have a

different uh

role in therapy

so uh it would be its important to

make sure that i share the concept of

the formulary its highly

misunderstood process and essentially

the definition that you see here also

has not changed for some long period of

time and its continuously updated list

of medications and related information

representing the clinical judgment of

physicians pharmacists and other experts

the reason thats important to keep in

mind is because formulary is an

important way to be able to

apply quality

decisions whether its about

evidence that supports the use of a

particular product or whether or not

its about the results of particular

mues that have been concluded and so

effective use of the formulary is an

important tool

to implement uh quality uh medication

use

within whatever size organization youre

talking about

so i wont go through the list but i

wanted to share with you a longstanding

list of thats called the safeguards

against errors on highrisk meds and

while not all of these items apply to

every situation one of the things that

is important is that as you learn from

your medication use activity as you

learn

where the risks might be

wrong decisions unknown or holes in the

data it allows you to be able to start

filling in how medications are used in

those settings and you might be able to

for instance change the order entry

process for a prescriber or you may be

able to change the required

information that has to be submitted

to an information system before you can

give a patient their medications at

whether its hospitalized or in the

community pharmacy so this list is

an opportunity to look at

risks and it works well along with both

the mue as well as the information

system the ordering process used by

prescribers

to get the best optimal use out of it

so i want to talk now for the rest of

the slides that were going to go

through today about uh the changes that

have occurred so if the last

several examples of

use of

of localized data to try to improve

quality

the

expanded

use and availability

of

emr electronic medical recordrelated

data is opening some new horizons for

improvements in medication use so the

examples that ill use here ill talk

about each of them specifically but they

represent essentially

benchmarking not only

across

a given organization but

to look more carefully at how

organizations are using medications

compared to other similar types of

organizations so in this particular

example that we have here

this is really a

[Music]

a measure a very high level measure of

observed mortality versus expected

mortality and

its pretty high level but as it relates

to medication use or anything else

in the end the question is what are the

important outcomes ive underlined here

this particular category general surgery

and if you run across this uh this list

what youll see

is that

for this particular observed mortality

in this particular organization

percent compares to a

uh compares to a

observed or expected of 0 and that

puts the um

and that compares to the uhc which is a

comparator group in this case median of

0 so for this particular organization

looking at

the

results of this particular multiuh

hospital comparator shows them to be in

the th rank out of that reported

so

in that this particular

measure is

not medication specific id like to go

more into some of the examples that are

out there that are more

focused on medication related issues now

this is data from a

a stroke

category within this particular database

and

in this particular case ive underlined

discharge on statin medications so this

is a measure of whether or not at

hospital discharge patients had

been

asked or had been prescribed a statin

medication following their mi and this

is a came again from standardized

evidencebased

criteria that say that patients are

better served and so if the intent is to

make sure that all of your patients at

discharge after mi

started with a statin then having this

benchmark to be able to compare uh this

particular organizations

effectiveness doing that compared to a

larger group that is uh has a similar

type of character is an important way to

find out whether or not um this

organization is meeting its uh uh its

target in this particular case its

obviously its uh better than the

average and i think

the idea is look and see if youre not

where you want to be then you need to

figure out what the best practice is and

start implementing change this is um

theres two versions of this one and

ill just the this is what the slide

looks like

uh as it is and this is benchmarking

medication use associated with kidney

transplant uh drg and in this particular

hospital

it allows one to look at

the high level numbers but also how

theyve implementation or implemented

use of specific drugs

along with the important piece

that is available now that historically

was not and that is uh medication use in

comparison to patient outcomes and so

this is the same slide but if you look

here at the top ive got ive just taken

that piece that was at the top of the

previous slide and ive blown it up a

little bit so in this particular case

the target hospital is compared to

vision benchmark group which are

identified as hospitals that have the

same profile in terms of patient care

etc

and then also all vision participants in

this particular

database so if you look across it

the observed mean length of stay of

days the expected which is to say some

variety of the risk adjusted

number for

for all the reporting hospitals was

and

when you look at this you get a

mortality index that is reported here

but

critically what youre looking at is um

that the

defined daily dose cost per case which

is a standardizing tool to find a daily

dose looks like youre getting about the

same length of stay

not as strong of performance on

mortality and the price of this therapy

for these patients is

substantially higher than the benchmark

group so this becomes an opportunity to

look at it and say

here is something that we need to have a

look at and if you drill down into the

bottom half of this

of this

chart you see some opportunities that

are out there but this is the intent of

doing this type of benchmarking is

to look at

actual data on not only how much

medications were used but

impact on outcomes like the stay

mortality

there are multiple others

so heres another type of an example

that is now available out there

so

if you are have if youve identified the

hospital that youre interested in uh

within this database you can even get a

list of patients that are identified in

your

medication use activity that had um in

this case

potentially inappropriate for patients

over years of age and so

the column on the

lefthand side is related to the beers

criteria and i have underlined

benzodiazepines and in this particular

institution

you can see that

theres uh would appear to be an

opportunity to use less benzodiazepines

compared to the uh the vision which is

the reference group target in this one

again the intent is to look at this

these types of data and say is there an

opportunity for us to improve so in this

particular case

uh if this data is presumed to be

relevant and appropriate

then one might want to go back and have

a look at uh criteria for use of

benzodiazepines in

in geriatric patients and decide whether

or not the additional risk is well

suited or whether or not

there ought to be an intervention to try

to reduce that

a couple more examples

from

different

globally available or some cases

proprietary databases

look at

opportunities in this particular case

its liver transplant and ive

underlined uh rabbit atg

and if you look across there you can

have a look at

the hco is the individual hospital the

uhc benchmark

group

and then which would be those that are

have best practices and then the all uhc

and if you look across there again

youll see that there are some

differences in the frequency of the use

of that particular drug and if you run

down through the rest of the table

youll see more cases where theres

variability and while variability isnt

always bad its always something to have

you look at it especially if you have a

a

target group in this case the benchmark

groups that really is

expected to

uh have performed high at a higher level

than uh than the average

so a couple of real quick points

that i wanted to make so if the question

is

knowing that you have the kind of data

that weve looked at in the last few

slides

is this something you can act on this is

a a summary from a study that was done a

few years back uh by some of our

colleagues at the university of kansas

um medical center and the the point of

this slide is that um the intervention

that they used if you will is they

started providing feedback of the types

of uh

similar types of presentations of the

last few slides that i presented to you

they shared them with the service

leaders and as a result of that they

were able to change the pattern with the

uhc line the red line being sort of the

global benchmark that uh

that for all people reporting

and the blue

line representing this particular

medication use

in that target hospital university of

kansas

so i want to make the case that once you
know where the opportunities are which
is where some of the big data
can help as well as the mue data that we
talked about earlier can help this is
theres data out there that says that
you can use that information to change
behaviors
just a couple of last examples um that i
wanted to share with you um
the the value of some of the databases
that are out there allow you to be able
to
look exactly at a small group of
hospitals a cluster that are of
particular interest to
the group and so over on the far
left hand column that you cant see
has been removed for to protect the uh
the privacy of the individual hospitals
but
uh each of these rows then across here
represents
um a different hospital that has
uh similar characteristics and if you
look into the red box area i think what

you can see is again using that defined

daily dose uh standardizing tool

what you can see is that not only are is

the cost of the drugs used this these

high impact drugs which is a defined by

this particular

group vision

and if you look at that you can see that

there are differences in the amount of

drugs used

for this particular uh

diagnosis

group so these are all for the same

patient group and i dont recall right

now

what the thera what the

disease state was but you can see that

there was a substantial amount of

variability in terms of

the cost of the drugs that were used and

some variability in terms of length of

stay now somebody pointed out to me

a few days ago

that length of stay is influenced by

many things and its true but it may

also be influenced in part by medication

use so im not um

im not uh

insensitive to the fact that length of

stay is a pretty crude measure but i

will say its one of the measures that

are being widely used and we need to

look at that as well as some others now

there are this is

a different

metric that

for a study that was done really some

years ago but the reason i pointed out

is because when you look on here what

youll see is the the purpose of this

study in this particular diagram that

youve got in front of you the chart is

um

to look at um the number of patients

that are

that were using novo a high cost high

risk drug

for

prevention of bleeding for which it is

not um

indicated theres minimal data on that

versus

those where its used for

treatment of active bleed for which

there is um

good data on and so this allows each of

the hospitals in this compare group to

be able to decide

if

uh where they sit so these are all

um you know

specifically

numbered so that no names of the

institutions are there but this kind of

data would tell you if you happen to be

the hospital that is

right here number one

um on the

on the use of prevention of bleed that

you may have an opportunity to improve

your use of that drug which impacts not

only outcomes and patient

results but also impacts the cost

lest you think that

cost might not be a fair item to include

in medication use quality all i will say

is that it is widely

incorporated into payer metrics now and

failure to

be able to provide costeffective care

including

results

patient outcomes length of stay food and

be able to be competitive in that one

does impact reimbursement rates so

organizations typically whether or not

theyre

accountable care organizations or hmos

or hospital systems are looking

carefully at that data

so

and again there is this is a another

example of pay for performance related

material

so um

just a couple of last items i think were

down to the last few slides now that i

wanted to share and that is when you get

into this question of how much can you

draw out of

some of the larger data sets that are

now available large that frequently and

widely available to through proprietary

or

or group settings

the ability to look at

data and the flexibility to dig into

this

becomes uh

substantially broader than weve ever

had before so let me summarize real

briefly right now what i wanted to share

with you and hopefully ive given you

some pointers toward

medication use and the quality

associated with medication use is fairly

complicated process it is errorprone

its been shown over the years to not be

easy in spite of the fact that it seems

that it should be

medication use evaluation uh helps

direct

uh toward

opportunities to improve the use of that

medication and drug use can be improved

and weve demonstrated that through some

of the slides and studies that have been

presented to you today

there are substantially more pieces of

data that are out there

that are transparent visible to the

public i

dont i think in the in the

interest of time

well

not talk about those today what i will

say is this um

its been my pleasure to

share these uh several minutes with you

i hope youve enjoyed and learned from

the lecture

if you have questions about this or any

of the content

please go to the course coordinator and

be very

confident that

feedback will get to me if there are

some things that

you saw are opportunities that you would

suggest for improvement thank you