Thank you so much for the opportunity. I will be speaking on predictors of post-operative pulmonary complications, specifically in oncology cases. So let us start with one of those case scenarios where this is we will use sleep over these cases in the ICU where there is a 69 year old male hypertensive diabetic with lower 1 third CA isofigous received in ICU, ex-tubated. He was operated for invasive isofigctomy received in ICU with bilateral ICD-RT engine C2. He had an animal full stay in ICU and was shifted to what on post-op day two. On post-op day four, since morning he was complaining of tachycardia, breathlessness, uneasiness where he was found to have bronchospasm, tachycardia, was received in ICU with shock, required vasopressors, intubation, etc. He was sentenced to a bilateral pneumothorax. ICU was manipulated anti-burdiscua, upgraded and had a rocky ten day stay in the ICU and eventually was shifted to the wards and was decanulated there and eventually discharged. All this after ten days, the questions to be asked to ourselves was this anticipated? Could this really be prevented? Was the family really aware of these complications? So you heard the prediction models come in picture. And lungs are the most vulnerable of them all. Where post-op day two pulmonary complications are common costly and have increased mortality, the changes in the respiratory system starts immediately after induction of GA. Where there is the lung volumes are particularly reduced and respiratory system may take up to six weeks to return to its normal state. Where incidence of PCC is from 1% to 23% around and it has shown that pulmonary complications are more common than cardiac complications. One in five patients with these complications will die within 30 days, sorry to say that after major surgeries. So in 2015, European joint task force published guidelines for perioperative clinic outcomes. Where they came up with definitions for particularly for these complications, where they define respiratory infections, respiratory failure, plural effigence, at-elect cases, pneumothorax, they define bronchospatial, namonitis, also pneumonia and also tricobromcitis, where it was defined. And what is the pathophysiology leading to the pulmonary complications? Where post-induction, there is airway obstruction, there is increased curvature of the spine, then sifiloid diaphragm displacement which causes reduction in the cross-sectional area of the chest wall. All this causes reduction in the FRC and this reduces FRC leads to altered VQ relationships. Sputam retention is a big problem in these patients, particularly after post-intubation. At-electasis is commonly seen where direct compression of lung tissue were

displaced diaphragm, airway closure with FRC reduces below closing volume and rapid absorption
of gases from the alveoli in lung region where the airways are narrow and or closed.
So ultimately all this is exacerbated when the FIO2 of 100% is given and it is advisable
that during surgeries to prevent this complication during surgery we avoid giving 100% of oxygen
and maintaining moderate levels of positive airway pressure to maintain the patency. Also
this that, that positional dependence whether the patient is supine or prone, this at-electasis
is a seam. So what are the risk factors? The risk factors for pulmonary complications are
modifiable and non-modifiable. Out of the non-modifiable there is age more than 65 male
sex period dominance, ASO of grade of more than 2. There is functional dependency, acute
respiratory infection within one month, malignancy, whether weight loss of more than
10% also non-modifiable risk factors are type of surgery whether there is upper abdominal
surgery also where, where heuristic aneurysms and also when there are thoracic surgeries.
Also when urea, there is increased urea, increased creatinine but out of the modifiable factors
there is smoking where it is advisable for smoking physician within 4 weeks of surgery
where there is, where a patient is having COPD, even early COPD cases are shown to have post
operative complications whether the patient is having CHF which has to be optimized with
a cardiologist. Also ASABMI has a big role to play and also modifiable factors are having
a lung protective mechanical ventilator strategies.
So what are the scoring systems and prediction models? To develop us, prediction model outcome
has to be defined precisely whether we are dealing with the mortality, morbidity or looking
at the length of stay of the ICUs. So it is said that inclusion of more than 10 variables
can reduce the efficiency, feasibility and convenience of the prediction model. So there
are multiple scoring systems used in the ICU. The most common we have is the SOFA score
but particularly for post operative cases predicting the mortality we have SAPSTU and
Apache II score where SAPSTU is simplified acute physiological score where they included
age, heart rate, systolic BP, blood pressure, PO2 on mechanical ventilated patient, urine
output, blood urea, nitrogen, WBC, potassium, sodium and out of that depending on the scoring
system the mortality was decided. SAPSTU score was shown to have a good predictive
mortality for surgical resection of rectal care patients. It had good discrimination between
survivors and non-survivors and salonsky found the ability of SAPSTU to discriminate
between survivors and non-survivors was better than Apache II score. Apache II

score is also
commonly used where score of more than 10 and bilateral neck dissection was suggested
for risk factors for post operative complications in oral cancer and increased length of stay.
So even the EPCO definitions had more scoring systems where they defined aristoch, aristoch
and periscope but because of its complexity where they increased, where they introduced
independent predictors for risk as age preoperative SPO2 respiting infections also the duration
of surgery and whether the procedure was emergency. So because the lack of agreement between the
studies the complexity of scoring systems currently make them impractical for clinical use.
Any oncospatific predictor scoreings, so definitely they came up with a code not score where it
was a preoperative controlling nutritional status score specifically in NSCLC cancer cases where
they included three parameters where there was albumin, WBC count and total cholesterol levels.
And also there was prognostic nutritional index and also the gloss moprognostic score
which included CRP and all this ultimately was found that cornered score was found that low
cholesterol level may contribute to a poor prognosis by affecting the intracellular signaling and
impairing the immune system to fight against the infection, wound healing and tumor spread.
In there were some scoring systems done in early COPD patients where their four independent
perioperative risk factors were seen where the patient had old TB lesions on chest x-ray,
low DLC, low BMI and also the longer operative names and so low BMI was associated with poor
prognosis in patients with COPD. It was seen in elderly also there was some studies which said
that lower preoperative prognostic nutrition index and prolonged operative care was an independent
risk factor. So for these patients, nutritional management and minimal illness of strategy was
suggested. There were some studies where in esophageal cancer resections that were FEV1,
CRP and smoking history was considered as predictors for risk surgeries and respiratory complications.
One of the studies was measuring the low skeletal muscle mass in older patients where it was seen
that the muscle mass was directly proportional to the pulmonary function of the patient and so
erector spina muscle at the level of 12 thoracic vertebrae was checked and it was compared in
older patients. It was comparable to swash muscle but they couldn't because it is very easy to have
upper cuts of the CT scan and it was directly said that this loss of this muscle was having a
use of proxy for preoperative pulmonary function. So what are the preventive strategies for
the patient to get away from this respiratory risk? Is the enhanced recovery after surgery?

What are the rational? This is a complete protocol which starts from giving fitness,
intraoperative and also post-anesthetic care. It is a talk in itself but the rational is that
surgical injury and stress leads to metabolic response with profound changes in endocrine,
neural and pulmonary function. Untreated, if it is untreated, there is increased mortality and
morbidity. Minimizing this metabolic response is crusk around the concept of enhanced recovery and it is a multidisciplinary model and with surgeons, anesthetist, pulmonologist,
cardiologist involved in this care. Also there is some exercise therapy where this study defined
what is physical activity, what is the physical capacity, where the physical capacity was defined
as ability to carry out daily tasks with vigor and alertness without undue fatigue and ample
energy to enjoy daily activities. So what it said that exercise capacity measured in maximum oxygen
consumption is an important consideration in decision-making whether the patient is suitable
for surgical resection or no. We owe to max of less than 15 ml per kg. Patients were suggested
to undergo exercise intervention and were given specific exercise therapy before surgery.
Also European Respiratory Society and European Society for Thoracic Surgery came up with guidelines
on fitness for radical therapy in lung cancer patients where this is up for discussion that
detailed evaluation of coronary heart disease generally is not recommended in patients with an
acceptable exercise tolerance such as ability to walk up to two flights of stairs without stopping.
Exercise test can be indicated in all patients undergoing surgery for lung cancer with FEV1
or DLCO and also pre-optative exercise capacity is inversely related to the morbidity and mortality
of these after lung resection. And what is required is to have a post-op toolkit in our ICU where you
give a daily twice a day, fast as BID where you check on feeding, analytization, sedation,
thromboprophylaxis, heads up, ulcerophylaxis, glycemic controls, spontaneous breathing trial,
bladder-able movements, what are the endowling catheters in C2 and also how do you have
plan for DAS clinician or antibiotics. And also there has to be a pre-operative evaluation in the
theta once you particularly having a toolkit where you are there is a proper handover
checking at the drains going through the NSSH-A chart whether the NSSH-A was difficult,
how was the intubation everything and this has shown to help us in better recovery of these
patients. So the take home message was no idle scoring system look at the nutritional status
of the patient like serum albumin levels and total cholesterol levels have a protocolized
post-op toolkit, ERAS protocols which is and also having early physiotherapy which has to be done

and also recommended exercise therapy. I was very quick trying to cover it up, this was a big topic in the chat.
Hello, this was comprehensive talk covering all the aspect regarding the ERAS enhanced recovery after surgery. One thing is there any role of adding a micronutrient in a pre-operative stage just before because albumin you said albumin cholesterol, yes carburetorate proteins we lipid we added but to keep crep cycle TCA cycle and G6 PD you required trace element from NADPH to NADP, ATP to ADP. So I always add micronutrients before surgery so that crep cycle and TCA cycle are at optimal level before surgery, during surgery and after surgery. Any comments?
There is a role definitely there is a role.
That I always add but you have covered all the aspects, any questions from the audience?
We don't know what's stopping it in self-trying.
Yes.
Cover and do.
We have something.
We have this on our portion.
Come in.
Hi, Mio that was a fantastic talk. So actually it will not come in your full-tay but I think I would like to ask Vivek or someone what do you do for pre-hab for these patients like this what he has spoken is absolutely right about predictive factors for post-op complications.
I can answer for Vivek that he comes at 6 o'clock in the morning and wakes the patient up and that's fantastic for post-op. That's why I want to know about pre-hab. So for oncothoracic it's a very difficult thing to do pre-hab because many of the patients are like in private practice they've come today and they're going to get operated so what are your thoughts on it?
So pre-hab of course it's like preparing for war so there is no question that we have to do pre-habilitation but not for all patients. A few patients are innately fit so you know you see the patient you know I use fit of course you do all the testing like cardiac testing if required then PFT deals you ask for their performance status and if at all it's okay it's okay.
But if there is a borderline patient then of course he has to undergo pre-habilitation and what we consider is physiotherapy it's in our checklist that the patient even if his fit goes for physiotherapy consult before operating because after surgery they are not able to perform this pyrometry as effectively as they can so they have to know how to do it before surgery.
So physiotherapy consult before surgery is very important then pulmonology consult in case of especially in case of borderline patients who are requiring bronchodilators who are having co-modibility like IID or COPD or especially undergo resections. Any other optimization of any aberrant or abnormal status like cardiac function like or diabetes controlled all these things but two important things are nutrition

three important
things are nutrition the physiotherapy and the pulmonology. Have you ever tried high intensity
because I have never tried high intensity pre-hab but people have I mean that serve would you have
any of this or I don't know some people have tried that high intensity pre-hab for people
who are very short interval from diagnosis to surgery not the ones with carcinoids or they are
post obstructive but. So so so for for individuals who are where you have an opportunity you know
you know people are already borderline it's an elective surgery so I think in elective surgeries
thoracic elective surgeries you know I think there's an opportunity to do physiotherapy and
and you know build up I think we hardly have any situations of a you know a rapid physio course
or something but yes I think the physio I think the point which I find important is whether it is
very intensive or not is just the visiting the physio therapist gives a positive mindset to the
individual that yes they need to move themselves and do something to get a better outcome in surgery
so I think the visit to the physio therapy typically helps. The second thing what helps in the
pulmonary when they come to us as a pulmonology see them in the opds if the lung function is low
that's a good chance to give them a pump yes you need to do something you know for example
is restriction because of obesity for example you know then there's a good chance to encourage
them on that part another thing is people are not taking medications regularly because you need
50% FERF EC they're moving in the community so the lung function actually allows us to talk to
the individuals and actually help them to take the medications properly and that also has a good
outcome on surgery so yes I think not only intensive prehab, regi-phigital therapy but I think
I think preoperatively I think we can if we look for we can identify many loose points
which can be tightened up. FERF EC one more thing Nicky will just one second also wanted to know
may you wrote to may do you follow any post-operative things like there are some studies on you've
mentioned college stall and everything which you have seen so do you follow any of these in your
center to see which thoracic patients are may have a post-op difficult course like like I have a
study on how the albumin level changes after surgery pre-op to post-op do you have anything in your
institute? I'll be very honest here actually we get involved only you know post-op relatively
and sometimes you know if there is a complex case then Vivek or Jot sir you know before
particularly and also you know we have a big vibrant oncousurgical team here and so proper
teamwork so we really and they are better optimised there are I don't want to boost it but we really

get the not arrogance here but we have least complications I've seen because they are better
better optimised because last check was I mean even less than 0.05% of mortality which was seen.