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Continuous Glucose Monitoring in Hospitalised and Quarantined Patients with COVID-19

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Overview

This presentation highlights the potential applications and benefits of Continuous Glucose Monitoring (CGM) in monitoring disease progression and improving outcomes in patients infected with COVID-19.

The following areas have been looked at:

- Recent reports of the effect of monitoring Glucose levels in COVID-19 patients
- Recent report of the usefulness of monitoring Lactate levels in COVID-19 patients
- Monitoring Glucose Levels in hospitalised and quarantined patients

Multi-centred study of 7,337 cases of COVID-19 in Hubei Province, China, among which 952 had pre-existing T2D[1]

Table 1. Characteristics of Patients in the Well-Controlled and Poorly Controlled BG Groups Before and After Propensity Score Matching

	Unmatched			Matched (1:1)		
Parameters	Well Controlled (n = 282)	Poorly Controlled (n = 528)	SD	Well Controlled (n = 250)	Poorly Controlled (n = 250)	SD
Clinical Characteristics on Admission						
Age, median (IQR)	62 (55–67)	63 (56–68)	−0.094	62 (55–67)	63 (54–68)	0.008
Male gender, n (%)	136 (48.2%)	298 (56.4%)	−0.165	126 (50.4%)	126 (50.4%)	0.000
Female gender, n (%)	146 (51.8%)	230 (43.6%)	0.165	124 (49.6%)	124 (49.6%)	0.000
Heart rate, median (IQR), bpm	84.0 (77.0–95.0)	85.0 (76.3–97.0)	−0.103	84.0 (76.5–93.5)	83.0 (76.0–96.0)	−0.048
Respiratory rate, median (IQR), bpm	20.0 (18.0–20.0)	20.0 (19.0–21.0)	−0.180	20.0 (18.0–20.0)	20.0 (19.0–21.0)	0.008
SBP, median (IQR), mmHg	130.0 (120.0–142.0)	130.0 (120.0–142.0)	0.073	130.0 (120.0–142.0)	130.0 (120.0–142.0)	0.085
DBP, median (IQR), mmHg	80.0 (73.0–89.0)	80.0 (72.0–86.0)	0.074	80.0 (73.0–86.5)	80.0 (72.0–86.0)	0.025
Symptom onset to admission, median (IQR), day	13.0 (7.0–23.0)	10.0 (6.0–17.0)	0.261	12.0 (7.0–20.0)	10.0 (6.0–18.8)	0.177
Fever, n (%)	182 (64.5%)	381 (72.2%)	−0.164	166 (66.4%)	171 (68.4%)	−0.043
Cough, n (%)	169 (59.9%)	350 (66.3%)	−0.132	155 (62.0%)	153 (61.2%)	0.016
Fatigue, n (%)	90 (31.9%)	218 (41.3%)	−0.196	87 (34.8%)	90 (36.0%)	−0.025
Dyspnea, n (%)	48 (17.0%)	117 (22.2%)	−0.130	44 (17.6%)	39 (15.6%)	0.054

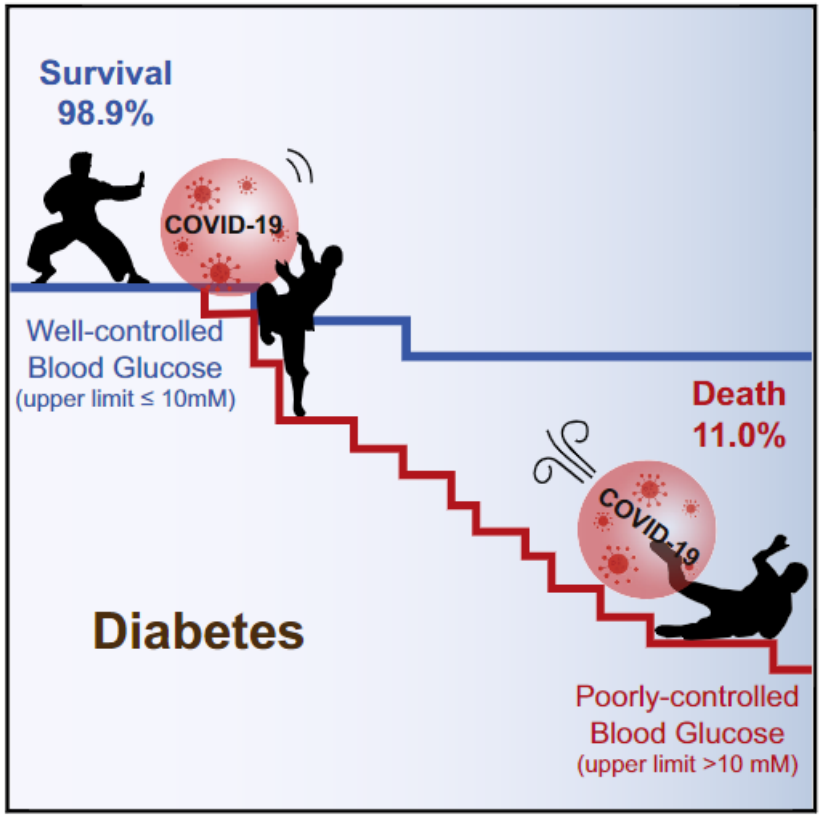
Multi-centred study of 7,337 cases of COVID-19 in Hubei Province, China, among which 952 had pre-existing T2D

Summary:

- Patients with T2D required more medical interventions and had a significantly higher mortality (7.8% versus 2.7%) and multiple organ injury than the non-diabetic individuals
- Well-controlled BG (glycaemic variability within 3.9 to 10.0 mmol/L) was associated with markedly lower mortality compared to individuals with poorly controlled BG (upper limit of glycaemic variability exceeding 10.0 mmol/L) during hospitalization.

Conclusion:

Findings provide clinical evidence correlating improved glycaemic control with better outcomes in patients with COVID-19 and pre-existing T2D.



The Chinese Centre for Disease Control and Prevention: largest case series to date of COVID-19[2]

Summary

- The Chinese Centre for Disease Control and Prevention published the largest case series to date of coronavirus disease 2019 (COVID-19) in mainland China (72,314 cases).
- The case fatality rate (CFR) was 49.0% among critical cases.
- The CFR was elevated among those with pre-existing comorbid conditions; an increase of 7.3% for patients with diabetes.

Conclusion:

- Persons with diabetes are more at risk of fatality if contracting COVID-19 than general population. As such routine monitoring of blood glucose and better control of diabetes could improve chances of survival.

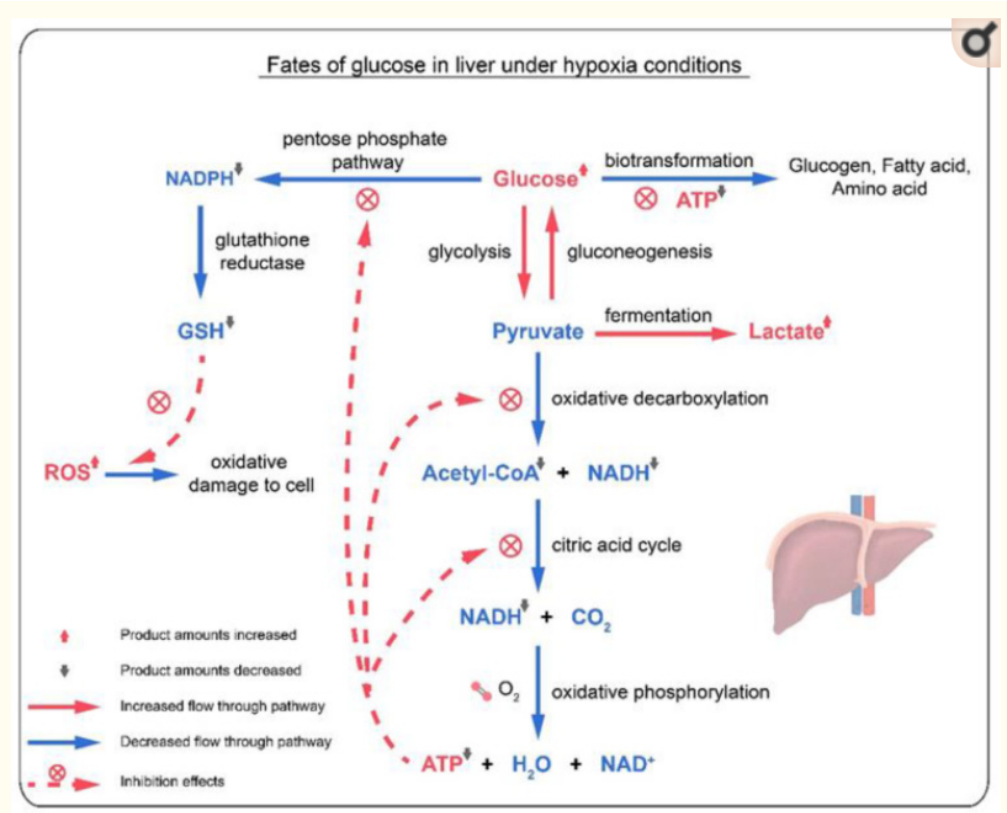
Blood glucose monitoring are crucial for quarantined COVID-19 patients[3]

Summary:

- Patients critically ill with COVID-19 often have compromised lung function which can result in reduced oxygen levels and hypoxia.
- COVID-19 patients are likely to develop hyperglycaemia under such a persistent state of hypoxia
- Acceleration in the anaerobic glycolysis process of glucose forms large amount of lactate in these cases.

Conclusion:

- Large proportion of COVID-19 patients present with hyperglycaemia and increased blood lactate concentrations along with disease aggravation.
- This study strongly suggests that adequate oxygen intake and blood glucose monitoring should be introduced for patients under home quarantine to manage / monitor their condition and prevent further deterioration.



Sheba Medical Centre - Government Hospital in Israel[4]

Summary:

- The care of diabetic patients with COVID-19 in isolation presents a challenge in terms of staff exposure to potential infection.
- To prevent patient-staff transmission, monitoring of glucose levels remotely from outside the designated isolated rooms is required.

Conclusion:

- CGM system offers a novel tool for inpatient diabetes control in COVID-19 isolation facilities and minimises the risk of staff exposure and burden.

Emerging Considerations for Remote Glucose Monitoring during the COVID-19 Pandemic[5]

Summary:

- Changes in hospital patient care have been made to address critical supply shortages, most notably the lack of personal protective equipment (PPE) available to healthcare workers (HCW).
- The traditional approach to care for patients with diabetes in the hospital is complex and requires portable glucose monitors for frequent point-of-care (POC) testing with finger sticks and associated technical and comfort limitations.
- The emerging need to transition to CGM to care for patients with diabetes and COVID-19 under extreme conditions has revealed the impracticality of the previously used (or 'current') glucose monitoring strategies in hospitals.
- The appropriate implementation of CGM technology may significantly decrease the burden of glucose monitoring for patients and providers during and post the pandemic.

Conclusion:

- CGM is likely to become a widely accepted form of continuous monitoring in the hospital setting. During the pandemic, this technology can be used to immediately address the emerging needs for remote / self-monitoring when there is a high demand for both nursing staff and PPE.

Overall Conclusions

- CGM can be used as part of a system to monitor disease progression in patients with COVID-19.

- People with diabetes are more prone to developing critical condition / dying after infection with COVID-19 than general population so monitoring blood glucose levels to control their diabetes becomes more important than ever.

- Up until recently CGM has mainly been used in non-healthcare environments. However due to the need for isolation / to reduce contact between staff and patients during the pandemic it has been used and shown to be effective in a hospital setting too.

References

[1] Association of Blood Glucose Control and Outcomes in Patients with COVID-19 and Pre-existing Type 2 Diabetes (https://www.sciencedirect.com/science/article/pii/S1550413120302382)

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[3] From the insight of glucose metabolism disorder: Oxygen therapy and blood glucose monitoring are crucial for quarantined COVID-19 patients (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7151413/)

[4] Remote Glucose Monitoring of Hospitalized, Quarantined Patients With Diabetes and COVID-19 (https://care.diabetesjournals.org/content/43/7/e75.full)

[5] Implementation of Continuous Glucose Monitoring in the Hospital: Emergent Considerations for Remote Glucose Monitoring During the COVID-19 Pandemic (https://journals.sagepub.com/doi/full/10.1177/ 1932296820932903)