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Review

Permissive strategies in intensive care units: actual trends?

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Permissive strategies in the intensive care unit (PSICU) intentionally allow certain physiological parameters to deviate from traditionally strict control limits to mitigate the risks associated with overly aggressive interventions. These strategies have emerged in response to evidence that rigid adherence to normal physiological ranges may cause harm to critically ill patients, leading to iatrogenic complications or exacerbation of underlying conditions. This review discusses several permissive strategies, including those related to hypotension, hypercapnia, hypoxemia, and lower urinary output thresholds. The key principles of these strategies require careful balancing and close monitoring to ensure that the benefits outweigh the risks for each patient. This approach emphasizes individualized care, thoughtful decision-making, and flexible application of guidelines. The use of a PSICU may help minimize the side effects of treatment while addressing the primary condition of the patient and allowing for a more holistic view of critically ill patients.

Keywords: Anuria; Controlled hypotension; Hypercapnia; Hypertension; Hypoxemia; Intensive Care Unit.

INTRODUCTION

In intensive care units (ICUs), the pursuit of the "best" treatment can sometimes hinder the provision of "better" care, particularly among junior physicians who lack the expertise and experience to handle complex situations effectively. This can lead to overreactions in difficult scenarios, potentially resulting in new complications owing to drug side effects or invasive procedures. The current review discusses permissive strategies in ICU management, including the following: permissive hypotension, which allows lower blood pressure targets to avoid the risks associated with aggressive blood pressure management; permissive hypoxemia, which focuses on tolerating lower oxygen levels to reduce the potential harm of high oxygen concentrations; permissive hypertension, which involves accepting higher blood pressure levels in certain situations to avoid the risk of aggressive blood pressure reduction; permissive hypercapnia, which is based on maintaining higher levels of carbon dioxide in the blood to prevent lung injury from mechanical ventilation; and permissive oliguria, which consists of tolerating reduced urine output to avoid unnecessary fluid administration or interventions. Permissive strategies in ICUs represent an evolving trend to balance the risks and benefits of various interventions to improve patient outcomes while minimizing the potential complications of aggressive treatments.

PERMISSIVE HYPOTENSION

Permissive hypotension is generally defined as a target systolic blood pressure target of approximately 90 mmHg and/or a mean arterial pressure of 50 mmHg, allowing for lower blood pressure targets during fluid resuscitation in patients with trauma to avoid complications from aggressive fluid administration.

ACTUAL EVIDENCE

The history of fluid resuscitation has evolved significantly since Thomas Latta's pioneering attempts at intravenous fluid resuscitation. In the late 19th century, Kronecker and Landerer emphasized the importance of quickly restoring vascular volume in cases of blood loss. The development of fluid therapy continued in the 1920s with Alfred Blalock's contributions [1]. Permissive hypotensive resuscitation is a modern concept aimed at achieving balanced resuscitation in severely injured patients by intentionally lowering the blood pressure during fluid resuscitation. This approach involves restricting the volume of crystalloid fluid administered until surgical control of bleeding is achieved and maintaining a systolic blood pressure of approximately 90 mmHg [2].

The advantages of permissive hypotension include minimizing fluid administration, reducing the risk of interstitial edema in organs, electrolyte disturbances, hyperchloremic acidosis, and decreased vasopressor use. This reduction in vasopressor use consequently lowers the incidence of associated side effects, such as peripheral tissue ischemia, cerebral ischemia, tachyarrhythmias, and coronary spasms [3].

A meta-analysis by Owattanapanich et al. [3] included 30 studies from an initial pool of 2,114. The primary outcome was overall mortality, and the secondary outcomes were organ dysfunction (lung and kidney), volume of fluid administered, and amount of transfusion (packed red blood cells). They reported that hypotensive resuscitation through limited fluid volumes and reduced packed red blood cell administration led to better outcomes than aggressive resuscitation in trauma patients, reporting a reduced incidence of Adult Respiratory Distress Syndrome and multiple organ dysfunction and a non-significant increase in the risk of acute kidney injury [3].

The National Heart, Lung, and Blood Institute clinical trial included 1,563 patients from 60 centers in the USA and compared liberal and conservative fluid strategies [4]. They enrolled 1,563 patients with sepsis-induced hypotension and divided them into liberal and conservative fluid administration groups. The primary outcome was 90-day mortality, and secondary outcomes included organ dysfunction, length of ICU stay, and the use of renal replacement therapy. The conservative group received less fluid and more vasopressors, reflecting a more restrictive fluid resuscitation approach. Despite these differences, no statistically significant differences were reported in 90-day mortality between groups [4].

Perner et al. [5] suggested that aggressive treatment of hypotension should be reserved only if hypoperfusion is verified. Moreover, Lamontagne et al. [6] published a study that enrolled 118 patients. They observed no significant differences in cardiac arrhythmias between lower and higher blood pressure targets. They reported decreased hospital mortality in patients aged > 75 years with lower mean arterial pressure [6].

Maheshwari et al. [7] published a retrospective study analyzing data from 110 US hospitals, enrolling 8,782 patients, and examined the association between hypotension and complications in patients with sepsis-induced hypotension. They demonstrated that maintaining a mean arterial pressure (MAP) of 85 mmHg was associated with an increased risk of cardiac complications and acute kidney injury. In contrast, lower thresholds, particularly below 65 mmHg, were associated with higher mortality rates and acute kidney failure. This suggests that both overtreatment and undertreatment of hypotension can be harmful [7].

The Surviving Sepsis Campaign recommends targeting a mean arterial pressure of at least 65 mmHg during the initial resuscitation of patients with septic shock; however, the effectiveness of this target compared with higher targets remains uncertain [8]. Lavillegrand et al. [9] collected data from 124 patients diagnosed with sepsis and hypotension. The primary goal of resuscitation is to restore hemodynamic stability, which is achieved through administering intravenous fluids, broad-spectrum antibiotics to control infection, and norepinephrine as a vasopressor to elevate MAP. The target MAP was set to 65 mmHg, which is a widely accepted threshold for sepsis management, to ensure adequate organ perfusion. A subset of patients whose MAP remained between 50 and 65 mmHg did not exhibit clinical signs of hypoperfusion, such as altered mental status, oliguria, or elevated lactate levels, despite not reaching the full target of 65 mmHg. This finding suggests that a few patients may tolerate lower MAP levels without compromising tissue oxygenation, challenging strict adherence to the 65 mmHg target in all cases. Lavillegrand et al. [9] suggested that aggressive treatment for sepsis-induced hypotension should be reserved for patients with signs of hypoperfusion.

Data from the Conservative versus Liberal Approach to Fluid Therapy of Septic Shock in Intensive Care study further supported these findings, confirming the non-significant difference in 90-day overall mortality between the conservative and liberal groups [10]. These results suggest that fluid restriction combined with increased vasopressor use may not negatively affect the survival of patients with septic shock [11].

Another systematic review and meta-analysis was recently conducted by Messmer et al. [12]. They evaluated fluid resuscitation in patients with septic shock admitted to the ICU. Thirteen trials met the criteria for the systematic review, and five randomized controlled trials were included in the meta-analysis. Messmer et al. [12] reported no benefit of active fluid resuscitation compared with standard treatment strategies.

RATIONALITY

Fluids are administered to optimize the vascular bed filling, maintain stable hemodynamics, and ensure adequate tissue perfusion. Fluids are drugs with side effects. Systematic reviews have suggested that aggressive fluid administration, which leads to fluid overload, can significantly increase mortality [12]. Furthermore, overfilling can cause tissue and interstitial edema in various organs, including the lungs, kidneys, brain, liver, mesentery, and myocardium [13]. This edema may result in decreased oxygenation, renal failure, and cerebral edema with increased intracranial pressure, mesenteric edema-induced bacterial translocation with increased intraabdominal pressure, hepatic congestion, and decreased cardiac output due to myocardial stiffness.

Overfilling is often associated with ICU complications, such as increased work of breathing, weaning difficulties, prolonged mechanical ventilation, pericardial and pleural effusions, ascites, increased intra-abdominal pressure, and altered hemodynamics [14]. Additionally, sepsis-induced glycocalyx damage promotes fluid accumulation and complications. The "fluid accumulation syndrome" has become increasingly recognized, particularly in ICUs, where it commonly arises during fluid resuscitation, especially in patients with sepsis. This syndrome can negatively affect patient prognosis, affect multiple organ systems, and increase mortality rates in critically ill patients [14].

However, the data remain conflicting, with few studies advocating conservative management and others supporting more liberal and fluid strategies. Overall, permissive hypotension appears to be a promising strategy in particular critical care situations that balances the need for adequate perfusion with the risks associated with excessive fluid administration and high vasopressor use.

PERMISSIVE HYPERTENSION

Permissive hypertension involves the maintenance of high blood pressure in specific situations, such as acute ischemic stroke, to ensure adequate cerebral perfusion.

ACTUAL EVIDENCE

Blood pressure management is guided by the underlying cause (ischemic or hemorrhagic), clinical presentation (acute, subacute, or chronic), and type of emergency treatment (intravenous thrombolysis or endovascular therapy) [15]. Patients who undergo intravascular thrombolysis require a different approach compared to those who do not. Although the ENCHANTED study was not designed for patients treated with endovascular therapy, it demonstrated a lower bleeding risk but no better functional outcomes in the group targeting a blood pressure between 130 and 140 mmHg than those with a blood pressure below 180 mmHg [16].

Ivanov et al. [17] conducted a systematic review analyzing data from 18 trials that included 10,000 patients with ischemic stroke. They observed that the group using antihypertensive drugs had a 13% higher mortality rate compared to that of the standard care and placebo groups, and suggested that aggressive antihypertensive treatments might increase mortality [17].

Wallen et al. [18] recently published data on 653 patients admitted to the emergency department for acute ischemic stroke. The study endpoints included stroke severity (measured using the NIHSS score), home discharge, in-hospital mortality, and length of stay [18]. They concluded that higher systolic blood pressure was associated with decreased stroke severity and improved outcomes, including earlier home discharge and shorter hospital stays [18].

The American Heart Association guidelines recommend distinct blood pressure management strategies for ischemic and hemorrhagic stroke to reduce further damage [19]. For ischemic stroke, the recommendations for permissive hypertension are oriented toward thrombolysis. Specifically, a blood pressure target of less than 220/120 mmHg is advised for ischemic stroke without thrombolysis, whereas a stricter target of less than 185/110 mmHg is recommended if thrombolysis is being performed [19].

For hemorrhagic stroke, the guidelines suggest a blood pressure target of 130–150 mmHg, cautioning that a blood pressure of < 130 mmHg may be harmful. Research indicates that achieving a systolic blood pressure target of 110–139 mmHg does not significantly reduce death or disability rates compared to a standard reduction of 140–179 mmHg [20]. The Antihypertensive Treatment of Acute Cerebral Hemorrhage trial did not support the efficacy of intensive systolic blood pressure reduction below 140 mmHg [21]. This trial emphasized the importance of individualized treatment to identify patients who might benefit from specific blood pressure targets [21].

Although data on optimal blood pressure management during and after thrombectomy remain controversial, with varying levels of recommendations and evidence strengths, a few researchers have emphasized the importance of avoiding hypotension during the procedure. Specifically, they suggested maintaining a systolic blood pressure above 140 mmHg to ensure adequate cerebral perfusion and avoid potential complications. Conversely, after mechanical thrombectomy, blood pressure management becomes equally crucial because preventing severe hypertension can reduce the risk of hemorrhagic transformation or other adverse outcomes. Thus, maintaining systolic blood pressure within the range of 140–160 mmHg post-procedure and less than 140 mmHg after complete recanalization is often recommended to optimize patient outcomes [22].

RATIONALITY

Following an acute ischemic stroke, elevated blood pressure is often observed if autoregulation is intact. However, severe hypertension may lead to complications, such as hemorrhagic transformation, cardiac ischemia, and acute renal failure. In contrast, hypovolemia and hypotension can be harmful, potentially exacerbating ischemic damage, reducing perfusion, and causing kidney injury, which may be worsened by contrast agents used in imaging studies [23].

These clinical implications highlight the importance of individualized blood pressure management tailored to specific condition of each patient and treatment response. Overly aggressive blood pressure reduction can pose significant risks, making it imperative to carefully consider patient-specific factors when determining optimal blood pressure targets. In the context of acute stroke, permissive hypertension, which allows for slightly elevated blood pressure, can be advantageous. This approach helps to maintain adequate cerebral perfusion, potentially reducing the size of the ischemic area and mitigating neurological damage.

For patients experiencing hemorrhagic stroke, it is essential to manage their blood pressure within the recommended range of 130–150 mmHg. Careful management helps prevent further bleeding and minimizes secondary brain damage.

By adhering to these guidelines, clinicians can effectively balance the need to prevent additional injury from both ischemic and hemorrhagic strokes while avoiding the potential harm that can result from excessive lowering of blood pressure. This tailored approach ensures that treatment strategies are optimized for unique clinical scenario of each patient, ultimately improving the outcomes.

PERMISSIVE HYPOXEMIA

Permissive hypoxemia is defined as a PaO_2 target of 55–80 mmHg and/or oxygen saturation of 88–92%, particularly in the management of acute respiratory distress syndrome (ARDS) and chronic hypercapnic conditions such as chronic obstructive pulmonary disease (COPD), sleep apnea, and morbid obesity.

ACTUAL EVIDENCE

Permissive hypoxemia has gained prominence during the coronavirus disease 2019 (COVID-19) pandemic, owing to challenges in achieving the desired oxygenation levels in critically ill patients. This approach tolerates lower oxygen levels in certain cases, such as during a pandemic, to avoid the risks associated with high oxygen concentrations.

This strategy involves accepting lower-than-normal oxygen levels (PaO_2 and O_2 saturation) without compromising patient safety, particularly when higher levels are difficult to achieve. During the pandemic, ICU physicians have often observed lower PaO_2 and O_2 saturation levels in patients. However, in many cases, mildly low values are non-life-threatening.

A recent study published in The New England Journal of Medicine enrolled 2,928 ICU patients admitted within 12 h, each requiring > 10 L of oxygen [24]. Patients were divided into two groups based on oxygenation targets: low oxygen target (PaO_2 60 mmHg) and high oxygen target (PaO_2 90 mmHg). The primary endpoint was 90-day mortality in both groups. They concluded that patients with acute hypoxemic respiratory failure maintained at lower oxygenation levels did not experience increased mortality compared to those with higher oxygenation targets [24].

Furthermore, Giradis et al. [25] published data on 434 ICU patients who were expected to stay for > 72 h. The patients were divided into two groups: a conservative oxygen target group (PaO_2 70–100 mmHg or saturation 94–98%) and a conventional control group (PaO_2 150 mmHg or saturation 97–100%). The study concluded that, compared to a liberal approach (saturation 97–100%), a conservative oxygen target (saturation 94–98%) was associated with a better prognosis and reduced mortality [25].

In a study, two randomized groups with different oxygenation targets were compared: a lower target (oxygen saturation 88–92%) and a higher target (oxygen saturation 96%). They reported no significant difference in organ dysfunction between the groups over 90 days and concluded that a lower oxygenation target was more feasible than a higher target [26].

Another study suggested that data on permissive hypoxemia are controversial and that this strategy should be reserved for patients with severe ARDS receiving specific mechanical ventilation [27]. Moreover, Van der Val et al. [28] reported interesting data in their recent study, finding that a low-oxygen strategy did not decrease the 28-day mortality compared with the standard approach in patients mechanically ventilated for more than 24 h.

Panwar et al. [26] provided intriguing data by comparing the outcomes between patients assigned to a conservative oxygenation target group (oxygen saturation 88–92%) and those assigned to a more liberal oxygenation group (oxygen saturation 96%). The study followed patients for 90 days to assess key outcomes, such as mortality and the incidence of end-stage organ failure. Their findings revealed no significant increase in mortality or rates of organ failure in the conservative group compared with the liberal group. These results suggest that maintaining a conservative oxygenation strategy may be just as safe as a liberal strategy and could offer benefits by avoiding the risks associated with higher oxygen levels, such as oxygen toxicity. This conservative approach may promise to improve patient outcomes without compromising safety, particularly in managing patients requiring long-term oxygen therapy [26].

RATIONALITY

Permissive hypoxemia should be based on individualized patient care. Tailoring oxygen therapy to the specific needs of each patient and preexisting conditions is crucial. Excessively aggressive efforts to elevate PaO_2 may exacerbate underlying health issues and precipitate complications. The benefits of this approach include diminished risk of oxygen toxicity and the adverse effects associated with high oxygen levels, such as lung injury and oxidative stress. Moreover, it promotes more sustainable and manageable treatment protocols, particularly in resource-limited environments or during surges in ICU admissions. Permissive hypoxemia represents a viable strategy for managing patients with acute hypoxemic respiratory failure, especially when optimal oxygenation levels are maintained. This method underscores the significance of personalized care and cautious oxygen therapy, potentially enhancing patient outcomes without heightening mortality risk.

PERMISSIVE HYPERCAPNIA

Permissive hypercapnia generally refers to the tolerance of higher levels of carbon dioxide, typically up to 60–80 mmHg, and a decrease in pH to 7.20. This strategy is used in mechanical ventilation for patients with conditions such as bronchial asthma, COPD, COVID-19, and ARDS, accepting higher levels of CO_2 during lung-protective ventilation strategies to minimize lung injury.

ACTUAL EVIDENCE

This approach, a component of lung-protective ventilation strategies, involves accepting higher levels of carbon dioxide ($PaCO_2$) to avoid lung injury caused by excessive ventilation pressure. The ARDS Clinical Practice Guidelines recommend using low tidal volumes (4–6 ml/kg of ideal body weight) and limiting plateau pressures to minimize lung injury. Maintaining $PaCO_2$ levels up to 80 mmHg and a pH up to 7.20 is generally accepted; however, certain contraindications must be considered [29].

Contraindications include pulmonary hypertension, characterized by high levels of carbon dioxide, which can exacerbate pulmonary hypertension, and increased intracranial pressure; hypercapnia can elevate intracranial pressure, rendering it unsuitable for patients with brain injuries or conditions that elevate intracranial pressure [30]. The physiological effects of hypercapnia encompass tachycardia as a compensatory response, increased pulmonary resistance exacerbating pulmonary hypertension, and elevated intracranial pressure, which poses significant risks for patients with brain injuries through mechanisms such as increased endogenous catecholamines and stress hormone levels, and reduced catecholamine efficacy. Beitler published a compelling paper advocating that the plateau pressure be maintained below 30 cmH_2O and the driving pressure below 15 cmH_2O to mitigate complications associated with mechanical ventilation [31]. In their systematic review and meta-analysis, Gendreau et al. [32] analyzed data from 29 studies involving more than 10,000 patients. They assessed permissive hypercapnia, protective lung ventilation-induced hypercapnia, and hypercapnia associated with noninvasive ventilation, concluding that permissive hypercapnia significantly contributes to improved mortality outcomes in patients with ARDS [32].

RATIONALITY

Several consequences of permissive hypercapnia can be attributed to its pathophysiological effects, which include increased respiratory rate and ventilation, enhanced arterial oxygenation, heightened pulmonary hypertension, increased cardiac output, cerebral vasodilation, and renal compensation in cases of respiratory acidosis. Furthermore, the beneficial effects of hypercapnia extend beyond preventing excessive lung stretching and further lung damage; they enhance oxygenation due to improved ventilation/perfusion matching from hypoxic pulmonary vasoconstriction, a rightward shift in the oxyhemoglobin dissociation curve and potentially increased hematocrit levels [33]. Although permissive hypercapnia is beneficial for reducing lung injury from mechanical ventilation, it must be carefully managed considering its contraindications and physiological impact.

PERMISSIVE OLIGURIA

Oliguria is a common issue in daily ICU practice, and it is defined as a urinary output of less than 0.5 ml/kg/h, whereas anuria is defined as a urinary output of less than 200 ml/24 h. While traditional definitions and initial management strategies focused on a urine output threshold of 0.5 ml/kg/h, recent studies suggest that lower thresholds, such as 0.3 ml/kg/h, may be appropriate in certain contexts.

ACTUAL EVIDENCE

Recent studies have provided nuanced insights into the management of oliguria, suggesting that lower thresholds may be acceptable in certain clinical contexts and that fluid responsiveness should guide treatment decisions. Management of oliguria in ICU patients has evolved to incorporate more individualized and evidence-based strategies. Physicians often respond by administering fluids to fill the vascular bed or increasing blood pressure using fluids or vasopressors. This approach aims to restore adequate perfusion and urine output. Ostermann et al. [34] proposed that oliguria might be better defined as a urine output of 0.3 ml/kg/h for less than 4 h, suggesting this cutoff for considering fluid administration to increase urine output. Myles et al. [35] concluded that a urine output of 0.3 ml/kg/h does not correlate with an increased incidence of acute kidney injury (AKI). Conversely, Mizota et al. [36] reported that a urine output of 0.3 ml/kg/h is linked to a higher risk of AKI, although not within the range of 0.3 to 0.5 ml/kg/h. Other researchers have posited that a urine output as low as 0.2 ml/kg/h may be acceptable without fluid boluses and other AKI risk factors [37]. Van der Zee et al. [38] performed a significant systematic review of 36 studies examining the potential effects of goal-directed therapy on 30-day mortality. Their findings reveal a lack of significant correlation between permissive oliguria and mortality. They advocate for additional studies to determine whether permissive oliguria significantly influences fluid management strategies [38]. The connection between intraoperative urine output and postoperative AKI following urological surgery, specifically partial or radical nephrectomy, is notable. Hur et al. [39] documented the outcomes of 742 patients who underwent these surgeries. They observed that a urinary output threshold of 1 ml/kg/h is associated with AKI post-radical nephrectomy but not post-partial nephrectomy [39]. Urine output is commonly recognized as an indicator of kidney function, yet the evidence remains contentious. Various non-specific mechanisms have been suggested to account for oliguria during surgery, such as surgery-induced microcirculatory stress, hypovolemia, and elevated intra-abdominal pressure [40,41]. Permissive oliguria is defined as oliguria that does not necessarily signify underlying kidney dysfunction where normal creatinine excretion continues. Thus, it is critical to reassess urine output as a criterion before considering fluid administration as the primary intervention [42].

RATIONALITY

Oliguria has long been used as a clinical marker to assess kidney function and fluid balance in ICU patients. Its primary therapeutic approach is fluid administration, with the understanding that the vascular bed may be underfilled. The tendency to administer fluids as a first step often leads to fluid overload and the associated side effects, as previously discussed. To minimize this risk, a fluid challenge (250 ml of normal saline) combined with accurate hemodynamic evaluation and assessment of urinary catheter patency using ultrasonography can help mitigate this issue.

Clinical implications include fluid responsiveness and individualized management. Before administering fluids, physicians should assess whether a patient is fluid-responsive. This can be performed using dynamic assessment tools, such as passive leg raising, stroke volume variation, or other hemodynamic monitoring techniques. Fluids should be considered drugs with potential side effects, including hypervolemia, edema, electrolyte disturbances, and acid-base disorders. Decisions regarding fluid administration should be individualized based on patient-specific factors and the presence of additional risk factors for AKI. Lower urine output thresholds may be acceptable in certain patients without compromising the outcomes, emphasizing the need for a tailored approach.

Assessing fluid responsiveness and considering the overall risk profile of patient are crucial for optimizing treatment and avoiding complications associated with unnecessary fluid administration. Oliguria is not always a pathophysiological finding necessitating fluid or other medical treatments.

CONCLUSION

Critical care thinking is vital for ICU physicians, necessitating a balance among evidence-based guidelines, clinical judgment, and personalized care. Each patient presents unique challenges that require tailored treatment plans based on their underlying conditions and responses to treatment. Premature interventions can result in harmful outcomes, emphasizing the importance of a comprehensive evaluation. Key permissive treatment strategies include individualized care, thoughtful decision-making, and flexible application of guidelines. Examples encompass permissive hypercapnia and hypoxemia to mitigate complications from mechanical ventilation and permissive hypotension and oliguria to avoid fluid overload. Although controversial, permissive strategies like mild hypertension in managing ischemic stroke necessitate further research to standardize their application. These principles will aid ICU physicians in delivering safer and more effective care while reducing the risks associated with aggressive treatments.

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CONFLICTS OF INTEREST

No potential conflict of interest relevant to this article was reported.

DATA AVAILABILITY STATEMENT

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

AUTHOR CONTRIBUTIONS

Writing - original draft: Rudin Domi, Filadelfo Coniglione. Writing - review & editing: Gentian Huti, Krenar Lilaj. Conceptualization: Rudin Domi, Filadelfo Coniglione. Data curation: Gentian Huti. Methodology: Filadelfo Coniglione, Gentian Huti. Project administration: Rudin Domi, Filadelfo Coniglione. Visualization: Krenar Lilaj. Investigation: Krenar Lilaj. Resources: Rudin Domi, Filadelfo Coniglione.

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