Reforming reimbursement of hospital-based emergency care in Estonia

A report by the World Bank to the Estonian Health Insurance Fund

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Contents

Abbreviations

DRG	Diagnosis-related group
ED	Emergency Department
EHIF	Estonian Health Insurance Fund (*Haigekassa*)
HNDP	Hospital Network Development Plan
ICU	Intensive Care Unit
NAO	National Audit Office of Estonia (*Riigikontroll*)
OECD	Organisation for Economic Cooperation and Development
OOH	out-of-office hours

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Executive summary and key recommendations

Although the number of people attending Estonia's Emergency Departments has not been increasing in recent years, the Estonian Health Insurance Fund nevertheless has several problems that it must urgently address. Between 2014 and 2017, the share of total health care expenditure attributable to ED care almost doubled, reaching 13%. EHIF's current reimbursement mechanism is not well designed to contain this spending growth. Most ED costs are reimbursed through an activity-based mechanism. This is inherently inflationary and, although a spending cap is in place, the same budget line is used both for ED care and out-patient care. This means that hospitals have no financial incentive to divert ED attendees to planned care. A vicious circle is thus set up where ED expenditure crowds out resources to provide out-patient care, thus exacerbating the need for ED care. At the same time, many patients use the ED as a substitute for primary care, meaning that EHIF is paying secondary care prices for primary care services.

As *a first step, EHIF should separate funding for emergency care and planned secondary care into distinct streams. Even if no other modifications to the ED reimbursement system are made, this simple reform will bring substantial benefits: ED care and planned secondary care will no longer be financially equivalent, meaning that the tendency for the former to crowd out the latter will be reduced. Furthermore, EHIF and hospitals will be able to monitor and manage the two budget lines separately, allocating resources across the two services more efficiently.*

EHIF should also shift away from activity-based payment and reimburse a greater proportion of ED care through a prospective grant. A grant will act as a minimum income guarantee for smaller EDs and a spending cap for larger EDs. Prospective payment is simpler to administer and will also enable easier planning, cost control and reallocation of resources. It is important that the prospective grant is calculated appropriately, reflecting hospitals' costs accurately. Estonian EDs vary, however, in the services that provide and in activity levels. Collecting detailed data on services and patterns of activity in each ED as a basis to calculate the prospective grant, therefore, will also be necessary.

Two other sets of reforms should be pursued concurrently. First, clinical specialists, hospital managers and EHIF should jointly develop a set of ED performance indicators. After beta-testing and piloting, EDs should be publicly benchmarked against these, to encourage continuous improvement in the quality and efficiency of ED care. In time, some indicators may be linked to ED reimbursement, in a pay-for-performance scheme. Secondly, a suite of reforms beyond the ED should expand the accessibility and effectiveness of substitutes for ED care. Improving the availability and effectiveness of primary care, through Enhanced Care Management, will be particularly critical.

The overall final reimbursement mechanism is likely to resemble:

- ***for busy EDs**: prospective grant acts as a spending cap, approaching 80% - 90% total reimbursement; activity-based payments support quality and innovation;*
- ***for quieter EDs:** prospective grant acts as a minimum income guarantee, approaching 100% of total reimbursement; activity-based payments support quality and innovation, as well as occasional expenses such as one-off diagnostics, procedures or staff costs.*

EHIF already has in place much of the necessary infrastructure to implement a revised ED reimbursement model. Nevertheless, a two to three-year period will be needed to design and implement the changes outlined above. A reasonable timetable would be:

Year 1:

- *in partnership with hospital and specialist associations, determine the scope of an ED prospective grant. This may require some cost-allocation guidelines that specify which investigations and procedures should be performed by the ED for particular patient groups;*
- *gather detailed data on ED staffing levels, consumables and overheads at individual hospitals. This may require negotiatiation with outliers;*
- *determine ED prospective grant for each hospital, or for each HNDP category of hospital;*
- *in partnership with hospital and specialist associations, finalise technical specifications of ED performance indicators, including admission rate.*

Within Year 1, separating ED reimbursement from the budget line for planned secondary care could also be considered. Although doing so brings theoretical advantages (explained on page 26), it also brings risk – principally that the existence of two budget lines makes spending-control more difficult. Separation, therefore, would need to be done carefully to ensure that overall hospital spending remains the same.

Year 2:

- *pilot reimbursement using ED prospective grant in selected hospitals, maintaining activity-based payment for selected activities;*
- *monitor activity in individual EDs and auditing adherence to the clinical and cost-allocation guidelines;*
- *beta – testing of ED performance indicators;*
- *maintain programme of further development and research, including a patient-level information and costing system.*

Year 3:

- *extension of reimbursement using ED prospective grant to all hospitals;*
- *continued auditing of adherence to cost-allocation guidelines, and possible reallocation of ED resources to planned primary/secondary care;*
- *open benchmarking of ED performance indicators; linkage to reimbursement may be considered.*

1. Introduction

The Estonian Health Insurance Fund (EHIF) is facing a tough financial outlook. According to the National Audit Office (NAO), the Fund has been in negative financial balance for several years, with the deficit reaching almost €30 million in 2016 and projected to be €2.1 million in 2017 (although additional state funds eventually allowed 2017 to end with a surplus). These financial pressures mean that planning and providing health care services efficiently and sustainably is critical. Services provided in hospitals' Emergency Departments (ED) are central to these considerations, given that the NAO's recent report into the organization of ED care found that the average ED treatment invoice submitted by hospitals to EHIF increased by 24% annually between 2014-2017, reaching €341 in 2017.

There is substantial evidence that Estonian's are using EDs in place of primary care or secondary care out-patient appointments. The average ED invoice generated is about 4 times higher than the average cost of a family physician's appointment. Hence EHIF is paying for primary care at secondary care prices. Patients are also substituting ED for planned outpatient secondary care. A critical observation is that planned secondary care and ED attendance are funded from the same budget line. This means that there is little financial incentive for hospitals to work against patients substituting the former for the latter. A vicious circle is thus set up – ED attendance crowds out funding to provide planned secondary care, further increasing the demand for ED.

EHIF wishes to revise how it reimburses hospitals for providing emergency care. Like many funders in health systems around the globe, EHIF must balance technical efficiency with reasonable access to ED care. EHIF recently piloted a new reimbursement mechanism in two hospitals based on the use of patient triage categories, to better reflect the marginal costs of higher-need patients, in addition to a 'readiness-fee' based on the costs of 24-hour availability of emergency services. This pilot did not curtail spending as expected, however, meaning that discussion on the best way to pay for ED care is ongoing.

This report makes recommendations on how EHIF should work with hospitals and specialist associations to redesign the reimbursement of ED care, balancing accessibility and quality of care with efficiency and sustainability. The report focuses on payment systems. It must be acknowledged, however, that payment system design is just one of the instruments that might be used to achieve the health care system's objectives and - in the case of ED care – is a relatively limited instrument. The report considers, therefore, the critical interactions with other health care services (particularly primary care) that an efficient and sustainable system of emergency care must get right. The report also acknowledges the varying perspectives of key stakeholders (patients, hospitals and the health insurance fund) when designing and funding the optimal role for ED care.

After an Introduction, Section 2 of the report considers, from a theoretical standpoint, the critical issues in designing a reimbursement mechanism for ED care, as well as the various perspectives (patient, hospital, health insurance fund) that must be addressed. Section 3 places the Estonian experience in context by describing trends and drivers of the demand for ED care in OECD countries. Section 4 describes in detail Estonia's current arrangements for delivering and reimbursing ED care. Section 5 offers a set of recommendations for how reimbursement could be improved. The report closes by identifying areas for further analysis and research.

2. Critical issues in designing the delivery and reimbursement of emergency care

This section considers the role of the Emergency Department within a health care system. Being a 'front-door' to the system brings three important consequences: first, multiple factors determine demand for ED care, many of which are beyond its control. This means that EDs are essentially 'activity takers' and have limited ability to adjust patient flow. Second, the ideal role for an ED will vary from setting to setting, even within a single health care system. Third, deficiencies in a system will often appear as 'problems' with EDs rather than as problems for the system as a whole. These particularities need to be kept in mind when designing a fair and sustainable reimbursement system.

EDs, as a front door to the health system, are activity takers rather than activity shapers

Growth in the use of EDs is seen as a problem in many health care systems. Several recent international studies have illustrated that the challenges that EHIF is facing are shared by several other health care systems (European Commission. Directorate-General for Health and Food Safety 2017; HOPE - European Hospital and Healthcare Federation 2015; Jayaprakash et al. 2009; Sagan and Richardson 2015b). Strategies to address this problem, including funding design and differential pricing, have two sorts of objectives (Van den Heede and Van de Voorde 2016). The first locates the problem as one of unnecessary duplication with the primary care system. This leads to strategies to divert or discourage users of the ED to other sources of care, on the assumption that hospital-based care is more costly for the system than other care sources (Agarwal et al. 2012; Han et al. 2015; Harrison et al. 2014; Sagan and Richardson 2015a; Turner et al. 2015; Viner et al. 2018). The second framing of the problem is focussed on the efficiency of the ED itself: how to manage the increasing volumes of ED services more efficiently. These efforts focus not on diverting patients from the ED, but rather, setting targets for how speedily patients are seen and reducing patient waiting times (Bobrovitz et al. 2017; Di Somma et al. 2015; Sullivan et al. 2016).

Demand for ED services is primarily determined by factors outside the hospital's control. These factors include social and individual determinants of health, mediated by personal care decision making and availability of alternative care choices. This highlights the importance of alternatives to the ED in shaping use choices: EDs are essentially 'activity takers' rather than 'activity shapers'. It is notable that almost all of the ED utilisation strategies identified by authors such as Raven et al. (2016) and Smulowitz et al. (2013) are not within the control of the ED. The principal strategies that EDs can take to reduce demand are often quality-reducing (for example, increasing waiting times) or dependent on patients' preferences (for example, encouraging frequent users to seek alternatives).

The ideal role for an ED will vary from one health care system to another, and from one hospital to another within a single system. This intersection of ED care with other services (such as primary care, admitted-patient care, diagnostic services etc.) means that the ideal role for EDs is highly dependent on the availability and quality of other types of first contact care (Pines et al, 2016). These inevitably vary from one health care system to another and, within a single system, from one locality to another. EDs can serve as a substitute or complement to other services, and deficiencies in a system (that is, unmet needs) will often appear as 'problems' with EDs rather than as problems for the system as a whole.

Furthermore, not all EDs should be expected to offer the same array of services. Highly specialized emergency care (such as vascular, cardiothoracic or neuro- surgery) should only be offered by a few centres of excellence.

Funding policy is just one of the instruments that might be used to influence ED activity. The complex set of determinants of ED activity means that EHIF, hospitals and ED specialist associations will need to address the complex interactions of primary, emergency and in-patient care in achieving both better patient outcomes and more efficient use of resources. In particular, the role of the ED in providing after-hours medical attention and access to diagnostic services must be considered, as well as the ED's interactions with out-of-hospital services, the care-seeking behaviour of ambulatory ED attendees, and the motivations and actions of ED staff.

ED reimbursement should include fixed and variable elements, reflecting the activity- and availability-functions that EDs must perform

Most reimbursement mechanisms combine fixed and variable elements. Public funding should aim to mirror underlying economic theory where efficiency is achieved when marginal costs equals marginal revenue (Laffont and Tirole 1993), and the easiest way to achieve this is to combine a variable funding element on top of a fixed portion. The fixed element is often linked to overheads, and the variable element is often linked to activity. Activity-based reimbursement has a number of common elements: there is a measure of activity, there is a price per activity, and there are a set of associated rules. Typically, activity-based funding design assumes a linear relationship between activity and costs. This is, however, almost never true: the cost-activity relationship almost invariably involves stepwise increases, depending on whether certain clinical services (such as specialist imaging or intensive care) are co-located, or depending on the geographic location of the hospitalstrategically important hospitals that make up a network covering the entire country (although one does not have an ED). The objective for the HNDP is to ensure the uniform availability of urgent and scheduled medical care. The Plan categorises hospitals into four groups, and mandates that each hospital treat emergency patients within their competence, defined as follows:

- Regional hospitals are the highest-level hospitals and must provide all emergency medical services, including neurosurgery and cardiothoracic surgery
- Central hospitals must provide all emergency medical services, except neurosurgery and cardiothoracic surgery
- General hospitals provide emergency medical services based on the specialties represented in the hospital
- Local hospitals, emergency assistance is provided within the competence of the doctor or until the arrival of an ambulance crew and the transport of the patient to a higher-level hospital

There is marked variation in the activity levels of different EDs. In 2017, North Estonia and East Tallinn Hospitals each dealt with around 200 ED attendees per day. In contrast, Läänemaa, Raplamaa, Valga, Põlva, Hiiumaa and Jõgeva Hospitals all dealt with around 20 per day or less. Attendees' severity also differs, as would be expected. Attendees with the most urgent need (triaged red or orange) are concentrated in the larger hospitals and are rarely seen in the smaller, less busy hospitals.

In 2017, the cost of specialised medical care was €629 million, of which approximately €153 million were ED costs. It is important to note that in Estonia, ED activity and other aspects of ambulatory activity, including specialist ambulatory care, are funded from the same budget line. This means that ED activity may crowd out provision of and hence access to specialist care. In comparison, €114 million were spent on family medical care in 2017.

A health information system records the tests, procedures and treatments for each ED attendee. Although this information is transmitted to other clinicians involved in the person's care, Family Doctors state that they receive it after a significant delay. Furthermore, if a patient re-attends ED, staff may not have an overview of previous tests, procedures and treatments given, because of the delay. Both facts limit the ability to provide appropriate, effective and efficient care.

Section 5 gives further detail on the provision of ED care in Estonia, including EHIF's reimbursement mechanisms.

Reimbursing EDs predominantly through activity-based funding carries risks. In a bigger, busier hospital where all ED costs could feasibly be covered by activity-based payment, there is a risk in not managing this reimbursement mechanism carefully. This is because, unless mitigated by other aspects of the payment system, the larger the activity payment the greater the incentive on hospitals to encourage ED attendances (or at least, not discourage them) as, at some level of volume, average payment will be greater than the hospital's marginal cost of treating an ED patient, up to an overcrowded limit. In order to respond to these incentives, the reimbursement mechanism might also establish individual ED-activity targets for each hospital, where over-target activity attracts no additional activity-based funding payment, or the additional payment is tapered, for example set at 50% of the ordinary, below-target, payment. This is in effect what EHIF does, with its overactivity coefficient set at 0.7 for out-patient and day care, and 0.3 for in-patient care for up to 5% above the contracted volume (beyond that, the hospital receives no additional funds). The problem is, though, that these funds are not separated off from routine/planned secondary care meaning that ED care can crowd out planned care, as discussed in Section 5.

Compared to activity-based or triage-based reimbursement, a prospective grant as the main basis for ED reimbursement has several advantages. A prospective grant can act as a minimum income guarantee for quiet EDs, or a cost-cap for busy EDs. It also enables a health insurance fund to *forecast* spending more easily, since it is an up-front prospective payment. Retrospective activity-based reimbursement mechanisms – even with volume caps, as in Estonia – can still cause unexpected fluctuations in spending if costs/prices change. A prospective grant also allows the health insurance fund to *control* spending more easily: the health insurance fund could put a brake on annual growth of the prospective grant, and/or exert downward pressure on the grant for some or all hospitals. As discussed in the companion report "*Financing a small island hospital in Estonia*", there is good international evidence that prospective payments (or "global budgets") are effective in controlling spending. Finally, a prospective grant also allows the health insurance fund to *reallocate* spending more easily. As primary care services develop, for example, EHIF could reduce the ED prospective grant by an amount equivalent to care provided for blue/green-triaged attendees and redirect to primary care (of note, this could also be done under a triage-based reimbursement mechanism).

As a separate issue, HIFs must also decide whether to separate ED off into a distinct funding stream. Care provided in the ED can either be seen as part of the in-patient care pathway, or distinct. If the former, then for a given patient group, the linked DRG-payment would need to include funds to cover the expected component of ED care. But the ED component is typically difficult to price, and hospitals are known to vary in the intensity of the services they offer in ED. Furthermore, hospitals without an ED will receive an inflated income. If, however, ED is separated off into a distinct funding stream, there is a risk that hospitals will double charge, that is, maximise the reimbursement that can be charged to both the

ED and general budget lines, perhaps by duplicating some services. This could be avoided if clear clinical guidelines are in place, which specify which activities should take place in the ED for particular patient groups.

Patients seek effective, convenient and comprehensive care

Patients may prefer to access health care through the ED for many reasons. The most obvious reason is a patient's severe and/or deteriorating acute-onset medical problems. Many of these patients are brought to the ED by ambulance and are only minimally involved in decisions about whether to present to an ED. Others, particularly patients experiencing an acute exacerbation of a chronic health care problem (e.g. chronic heart failure, asthma) may be aware of signs that they require hospitalisation and self-refer to an ED. In both these cases, patients are most often admitted for a stay in hospital and the hospital requires funding to manage the portion of their care provided in the ED.

Management of chronic conditions is a common reason for using ED services. Patients who have had contact with the hospital may feel that the ED is their best option for continuity of care, as out-patient and in-patient records and earlier test results are available to ED staff. ED presentations of patients for chronic conditions are sometimes used as a measure of failure of the primary care system (Codde et al. 2010a; Codde et al. 2010b; Dresden et al. 2016; Green et al. 2017; Smulowitz et al. 2018; Wallace et al. 2013). When there are waiting lists for specialist consultations, patients may judge that, despite typical long waits for low-acuity care in the ED, they will have access to more highly specialised care when they are seen. This appears to be happening in Estonia, as explained in Section 5.

Patients may also seek ED care for the convenience it offers. The ED is available 24 hours a day and provides a 'one stop shop' for a range of diagnostic tests and consultations. When alternative services require patients to take time off from work or family responsibilities, both features are attractive, as they typically entail less income sacrifice (being available outside normal working hours), allow for working parents to look after children at home while the patient seeks care, and reduce travel time for patients who require multiple medical or diagnostic appointments. Thus, the non-availability of other ambulatory services outside working hours may be influential in choosing to present to the ED. Against these clinical and convenience features of the ED, patients may be discouraged from using the ED when out of pocket patient charges are higher than in primary care , such as the case in Estonia (Habicht et al. 2018), or when waiting times are known to be excessive. Section 5 presents evidence that this is happening in Estonia.

Hospitals have limited ability to influence patients' use of ED

The ED is the hospital's 'front door'. Humanitarian and medico-legal principles require that EDs assess the urgency of the patient's status and at least stabilise their condition before admission to the ward, transfer to another facility or discharge. Triage is often used to prioritise patients so that the more urgent or life-threatening conditions are seen first. But triage is an inexact science (Chan et al. 2018) with judgements about seriousness and urgency varying between observers (Farrohknia et al. 2011; Parenti et al. 2014).

Hospitals are limited in the extent to which they can respond to incentives for ED care. Even if policy directs hospitals to modify ED activity, they have limited tools available to do so. Managers can regulate staffing of the ED to extend waiting times for ambulant patients to discourage 'convenience' use of the ED. This comes with the risk that sufficient staffing may not be available for treating, such as major trauma. Given the inexact nature of triage such a response also comes with additional clinical risks, should patients be wrongly assessed to lower triage ratings (but, of course, this is a risk with all triage judgements). Visual displays in the ED and online can alert potential patients to the expected waiting time in each ED if waiting time is chosen as a rationing mechanism. Hospitals could also offer separate general practice/primary care services so that lower acuity patients can be redirected to these, particularly as an 'overflow' facility at times of higher demand for more urgent care. Regular evening clinics might better meet the need for after-hours semi-urgent care. Telephone advice lines can also be offered as a way of helping patients determine the urgency of their health care needs, although research about the effectiveness of these programs is still equivocal, possibly because a large percentage of such enquiries result in advice to present at the ED because of the uncertainties entailed in assessing patients over the telephone (Armstrong 2018; Langabeer et al. 2017; Pope et al. 2017; Turner et al. 2015).

Box 2: Articulation between EDs and primary care in Estonia

Poor communications between primary care and secondary care, specifically the ED, complicates the efficient management. Currently, Family Doctors are not quickly or reliably informed when patients on their list visit ED, or what diagnosis/treatment they received. Although a patients' ED clinical records are generally uploaded to the Health Information System, the Family Doctor is not automatically notified, and it is often the patient themselves (or a carer) that will inform them. This limits the Family Doctor's ability to prevent or manage health issues, particularly for frequent ED attendees.

Poor access to primary care also drives ED attendance. The NAO report noted that ED attendees with a green triage category typically cite poor access to primary care as one of the main reasons for their visit to the hospital. The report also noted that EHIF has confirmed that need to better organize primary care to better meet unplanned care needs.

Patient-expectations and/or self-management also appears to be an issue. A special survey carried out for the NAO report found that 49% of patients with back pain, hypertension, and lower respiratory tract infections had poor self-management of their condition prior to coming to ED, and poor self-management following the ED visit in 34% of cases. The report concluded that patients should be offered better self-care advice, including appropriate sources of professional help when necessary.

In some cases, Family Doctors recommend ED attendance when it is not needed. The NAO report noted data from the North Estonia Hospital that showed that the vast majority of patients referred to the ED by their Family Doctor could have been managed in primary care: 51% had a green triage category, and 47% yellow. There are no national figures of triage category for ED attendees referred there by a Family Doctor, but the figures from North Estonia hospital suggest a substantial issue across the country.

Source: NAO report on Emergency Care in Estonia (2018)

The Estonian Health Insurance Fund must allocate funds in a transparent, fair and sustainable way

Funders of health care systems have a responsibility to balance access to needed care with stewardship of the funds allocated to provide this care. To the extent possible, they should be neutral as to the location/sponsorship of such services provided these are provided cost-effectively. In this regard, activity-based funding (for ED or other services) has an obvious attraction - a price is set based on relative costs of different in-patient treatments (DRGs) and the available budget. Funders can set fair and transparent payments to hospitals with the expectation that hospitals will manage internal budgets to treat patients while staying within their budget allocation. Activity-based funding of hospitals started with funding of in-patient services (Duckett 1995; Russell 1989), but subsequently has been used for funding emergency department activity, with new classifications and the added complexity of the interaction with funding of in-patient activity (Bell et al. 2014; Duckett and Jackson 2001; Health Policy Analysis 2014).

Several decisions around activity-based funding need to be made. In setting the relative weights for DRGs, funders must decide which services are included in the in-patient 'bundle' of services and which are funded separately. Some funders exclude intensive care unit (ICU) costs, for example, because not every hospital is equipped with an ICU. When these costs are incorporated into the DRG payment, hospitals with no ICU will fare relatively better financially because their payment for affected DRGs will include a loading for the more intensive treatments provided at other hospitals. When a system includes hospitals with no ED, they will similarly benefit from DRG payments that include ED costs. When separate activity-based payments are made, however, the risk arises that hospitals will 'double-dip', that is, maximise their funding by admitting more patients through the ED or by treating them in an ICU to gain additional funding even in patients who could have been safely managed without these services.

3. International trends in demand for emergency care

This section considers international trends in the demand for emergency care, so that Estonia's situation can be understood in context. Most health care systems are dealing with steadily upward trends in the demand for ED care. Evidence of effective strategies to reduce this demand, or divert it to other sources of care, is scarce. Strengthening primary care, however, is known to reduce demand on EDs.

Demand for ED care is growing in most OECD health systems

ED attendances are increasing in most, although not all, OECD countries. In a 2015 survey of trends in demand for ED care across OECD health systems, the average number of ED visits was reported to be about 31 per 100 population in 2011, although as high as 70 in countries such as Portugal. Estonia, in this survey, was close to the OECD average with visits per 100 population in 2011. Surveying trends over the previous decade, the report found that the rate of ED visits had increased by 5% on average, from 29.3 visits per 100 population in 2001 to 30.8 visits per 100 population in 2011. Notably, some countries (Chile, Israel, Poland, the Czech Republic and Ireland) reported a downward trend.

EDs must manage a diverse set of health care demands. The report noted that injuries (such as fracture, dislocation, sprain or strain) are the most frequent reason for visiting EDs in the seven OECD countries for which data were available. In a broader systematic review of the literature examining the demand for hospital EDs, He et al. (2011) show that in general, older people are more likely to use EDs for urgent medical conditions, while younger people tend to present more frequently to EDs for injury and less-urgent illness such as fever, cough, nausea or vomiting. Upward trends in ED attendance have been noted for other conditions, such as mental illness (including alcohol and substance misuse), or complications following day-case surgery and early discharge, as hospital length-of-stay decreases.

International evidence on strategies to reduce ED attendances is scarce

Telephone advice lines have little impact in diverting patients away from ED. In a systematic review of 40 studies examining the impact of initiatives to improve access to and choice of primary and urgent care in the United Kingdom, Tan and Mays (2014) found no significant reduction in ED attendance after the introduction of NHS Direct and NHS 111. This concurs with most international evidence on the impact of introducing telephone-based pre-ED triage, since most clinical advice ends with the recommendation to be seen in the ED anyway. It remains to be seen, however, whether administrative activities that EDs currently perform could be replaced by telephone-contact or other sources of advice. EHIF, for example, is planning to start a telephone-based service to partially administer sick-leave certificates and repeat-prescriptions. This has potential to divert patients who were using ED for these health care activities and will watched closely by other health systems.

Financial disincentives on the demand-side are not widely used. In a systematic review of the literature on strategies to reduce demand for ED, Raven et al. (2016) found that ED visit copayment was often, although not always, effective in reducing ED visits.. In practice, health insurance funds are often reluctant to charge a patient fee for using EDs, given the risk that they might discourage patients from seeking needed care. Estonia is an exception in this regard: hospitals are entitled to charge €5 for each self-referral

to ED attendance, but the fee is often waived. Fees for ED self-referral are also applied in Belgium, Finland, Italy, Ireland and Portugal. They tend to be larger than those applied in Estonia (€15-€25) and apply to large proportions of attendances (26-43%) but nevertheless have had little effect in reducing attendance rate. This suggests that it is hard to generalize the evidence on the effect of co-payments from one health system to another. As well as the size, impact of any co-payment will depend on mix of other (dis-)incentives (financial and non-financial) that patients face when making a choice over where to seek health care.

Some health systems apply financial incentives to hospitals to encourage quicker care and discharge from ED. A number of countries use pay for performance in ED, with the objective of either improving patient experience (by reducing waiting times) or improving efficiency (by reducing in-patient admissions via ED). The OECD concludes that such incentives have generally produced the benefits intended – for example, waiting times improved by 14% in Ontario and by 13-24% in Vancouver.. Japan has also introduced a financial incentive to encourage discharge from ED. Through its fee-for-service schedule, Japan now pays a higher fee when ED patients are discharged to primary care clinics (Berchet, 2015).

Enhanced primary care is associated with reduced ED attendance in several health systems. In each of the countries identified by the OECD as having decreasing rates of ED use, developments in primary care were associated with decreased demand for ED care; pp 21 – 27 of Berchet (2015) offers a detailed review of OECD experience. The decline in Ireland was associated with the introduction of primary care "walk-in clinics" and the opening of GP practices outside office hours. In Israel, a network of Medical Centres was established to offer primary care outside office hours, staffed by Family Doctors as well as paediatricians. In Chile, a new urgent primary care service (*Servicio de Atención Primaria de Urgencia,* SAPU) was created, offering OOH medical and nursing care services for low-complexity emergencies and general consultations.

A potential disadvantage of developing alternative sites of primary care is a reduction in the continuity of care with an individual's regular primary care provider. This impact could be reduced if good communications are in place between primary care providers, and if patients using alternative primary care providers have minor, self-limiting complaints rather than chronic problems. These aspects have not been well studied, however. There is also little evidence on whether such developments are cost-reducing for the health system as a whole.

These successes with enhanced primary care underlines the importance of properly establishing Estonia's current pilot of Enhanced Care Management. In a systematic review on reducing demand for ED referred to earlier, Raven et al. (2016) that case management for high-risk individuals is the only intervention that consistently reduces ED visits.

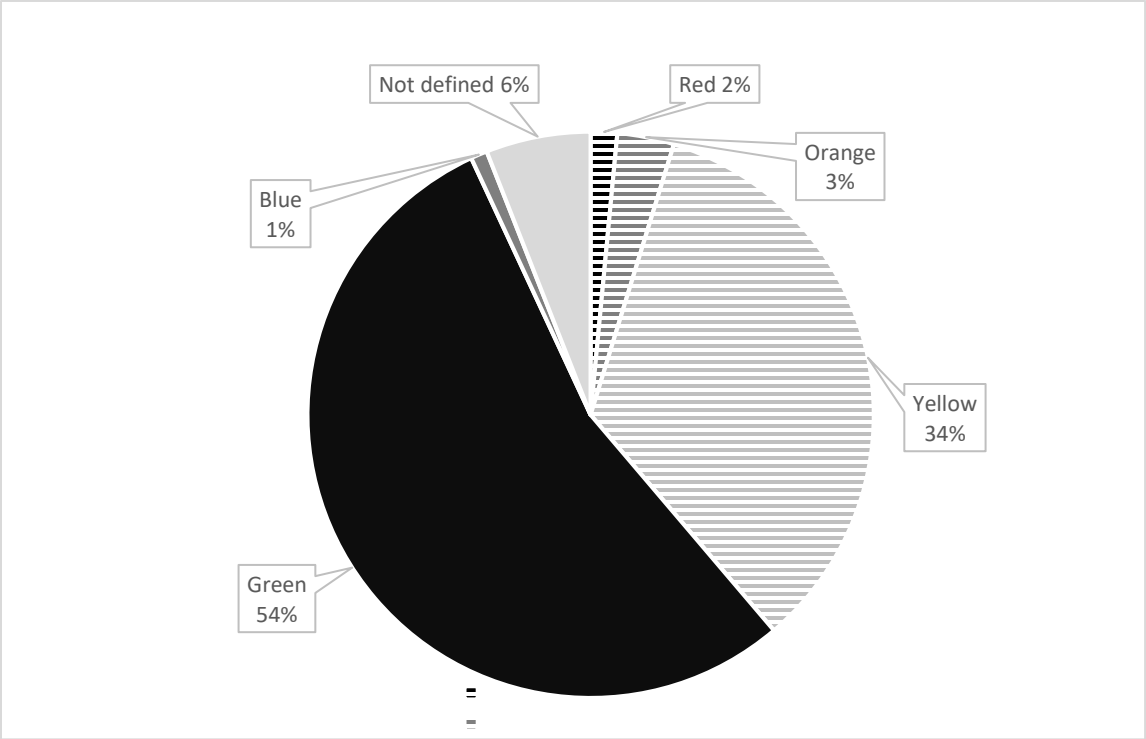
"Inappropriate" ED visits are much higher in Estonia than elsewhere

An increasing number of health systems are developing tools to measure "inappropriate" ED attendance. The OECD report referred to earlier also surveyed the share of ED visits that were deemed to represent non-emergencies. Definitions of appropriate ED use vary from one health system to another, implying caution when comparing countries. With this in mind, the report noted "avoidable",

"inappropriate" or non-urgent visits account for 11-15% of ED visits in England, 12% in the United States, 20% in Italy, 25% in Canada, 31% in Portugal, 32% in Australia and 56% in Belgium (OECD, 2015).

These figures are mostly much lower than the figure reported in Estonia. The recently published National Audit Office (NAO) report on emergency care found that 57% of ED attendances were non-urgent in nature and could have been dealt with by primary care (see Figure 1). This may be due to differences in the definition of inappropriate attendance but should alert policy makers to the high possibility that Estonians are using the ED as a substitute for planned care.

Figure 1. ED attendees by triage category, 2017



Source: *NAO, based on data of HNDP hospitals*

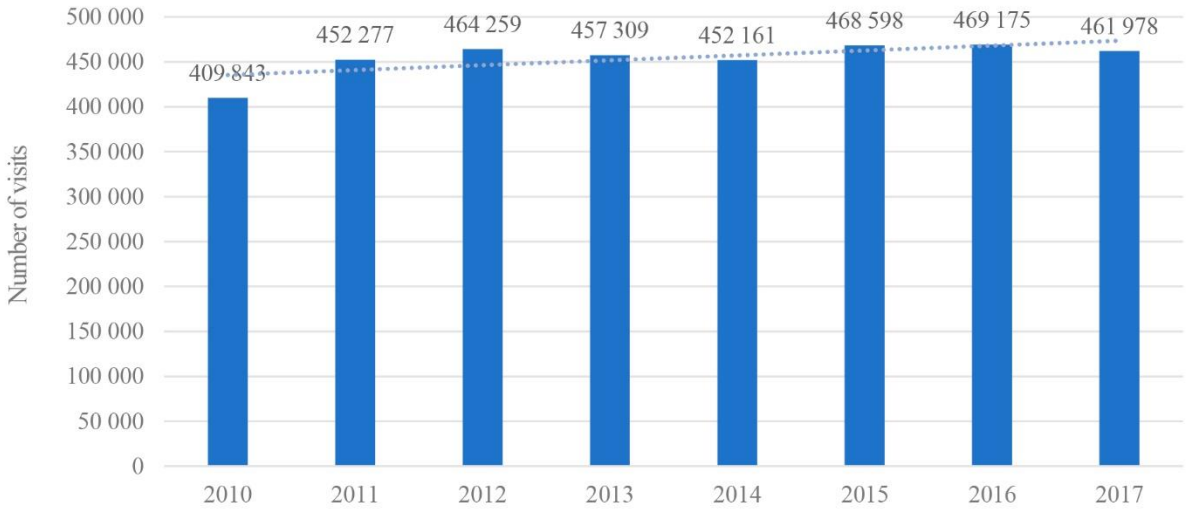
4. Delivery and reimbursement of emergency care in Estonia

This section assesses how Emergency Care is provided and paid for in Estonia. It finds that allocative efficiency is a concern because there is substantial evidence that Estonian's are using EDs as a substitute for primary care and out-patient secondary care. Technical efficiency is also concern because costs are going up but key aspects of ED performance, such as waiting times, are getting worse. Attempts to design a reimbursement mechanism that better contains costs have not yet proved successful.

The number of ED visits has stabilized in recent years, but the cost of admissions from ED are increasing

In Estonia, around 462,000 people attend the ED each year. Around 410,000 visits were recorded in 2010, but, as Figure 2 shows, most of the increase happened between 2010 and 2011. Since 2011, the number of visits has been quite stable. Most patients are sent home after attending the ED (which may include advice to see their primary care or out-patient secondary care provider). The number and cost of invoices for ED attendees who are hospitalised, however, has been increasing. In 2014, 10% of invoices sent by EDs to EHIF were for in-patient care (representing 77% of the cost of all invoices). In 2017, this figure had increased to 16% (representing 84% of the cost of all invoices). If these trends continue, the 2018 share of ED invoices for in-patient care may represent a doubling of the 2010 figure.

Figure 2. Total ED visits to HNDP hospitals, 2010–2017



Source: *NAO report, based on data of HNDP hospitals*

Estonians are using ED as a substitute for planned care

Most people attending ED are triaged as not in need of emergency care. As noted earlier, the NAO report found that more than 1 in 2 patients visiting ED were not in need of hospital emergency care: 57% were triaged as blue/green. A share of these patients will have had minor traumas that required ED attendance, but many could probably have had their needs met by primary care (Figure 1). The report noted that this figure is on an upward trend: a similar report from 2010 found that around 1 in 3 ED attendees could have been treated in primary care.

The timing of ED visits, and methods of arrival, suggests substitution for planned care. Of those who were triaged as blue/green/yellow, the majority attended ED during working hours on a working day between 08h00 and 18h00 (with a peak between 09h00 and midday). Most ED attendees arrive independently (i.e. walking or driving themselves), and most are sent home after attending, with or without routine secondary care follow-up. These observations strongly imply that people are substituting ED attendance for planned primary and secondary care appointments.

Poor availability of primary care is likely to explain substitution. The NAO report found that 40% of people attending ED with mild complaints stated that they were unable to find a primary care appointment at a time they considered convenient. Given that most ED attendances occur during working hours, this suggests a need to expand the number of available primary care appointments during these times. The report estimated that distributing all ED attendees in the blue/green triage categories among Estonia's current cohort of Family Doctors would consume fewer than two additional appointments per day per doctor. It is also worth noting that Family Doctors in Estonia are not required to offer appointments outside usual office hours (i.e. before 8:00, after 18:00 or on weekends). Less than 10% do so, and little data is available on the numbers of patients using these appointments, or unmet demand for these slots. ..

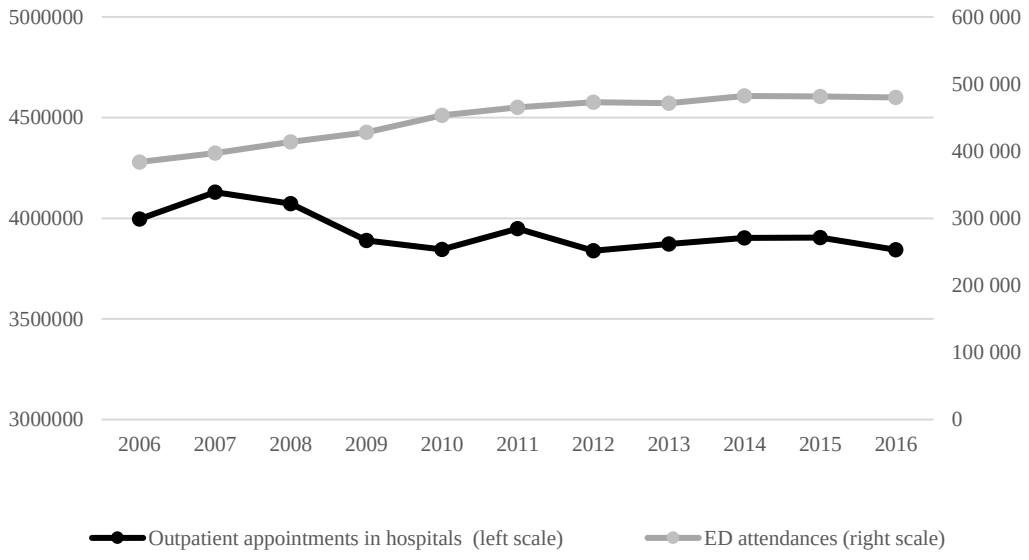
Quality of primary care may also be a concern for some patients. A special survey carried out for the NAO report found that the primary care preceding ED attendance for people with back pain, hypertension or lower respiratory tract infections was often inadequate. The report also noted considered that the service models and reimbursement mechanisms that currently operate in primary care might not provide strong incentives for Family Doctors to discourage ED attendance among their patients.

The capacity of hospital out-patient care is under pressure and is also likely to explain substitution. EHIF has established maximum waiting times for out-patient secondary care, but these were exceeded in several specialities. EHIF also estimates unmet (unfunded) need for secondary care as a share of total demand, which has increased from 5.1% in 2014 to 7.4% in 2018. This is equivalent to around 250,000 individuals. OECD data also shows that waiting times for planned secondary care are longer in Estonia for some patient groups. In 2015, for example, mean waiting time for a hip replacement was 289.6 days (median 202.0 days), compared to 159.2 (114.8) OECD average; and mean waiting time for a knee replacement was 392.7 days (median 286.0 days), compared to 181.6 (142.7) OECD average. Patient surveys confirm the problem. The NAO report noted findings from a 2016 international survey, where 13.5% of adults in Estonia report unmet medical need – the highest in Europe. The next highest rate was reported in Poland (3.9%), with most countries reporting less than 1%.

Currently, EHIF reimburses episodes of ED care as if they were episodes of planned out-patient care. As explained later, planned secondary care and ED attendance are funded from the same budget line. From a hospital's financial point of view, then, ED care and planned out-patient care are equivalent. This means that hospitals have no financial incentive to reduce ED volumes, and creates a risk that planned out-patient appointments will be crowded out by ED volumes. This issue is illustrated in practice when comparing trends in secondary care out-patient appointments and ED attendances over the past decade. They are clearly divergent, with the former decreasing and the latter going up (Figure 3). A vicious circle is thus set up – ED attendance crowds out funding to provide planned secondary care, further increasing the demand for ED.

Hospitals also have a theoretical financial incentive to convert ED attendances to admissions. Reassuringly, however, that this theoretical risk does not appear to be manifest in Estonia. Although, as noted earlier, the share of invoices sent by EDs to EHIF for in-patient care increased from 10% in 2014 (representing 77% of the cost of all invoices) to 16% in 2017 (representing 84% of the cost of all invoices), this probably reflects greater willingness to flag ED patients, rather than an increase in admission rate. Data from the National Institute for Health Development, submitted by hospitals, shows that the number of ED attendances leading to hospitalization is stable, or even falling slightly (from around 97 000 in 2014 to around 92 000 in 2017).

Figure 3. Secondary care out-patient appointments and visits to the ED, 2006–2016



Source: *NAO Report, based on data of the National Institute for Health Development*

Out-patient secondary care in the ED is more expensive than a primary care appointment and increasing in cost more rapidly. Given patients' substitution of primary care for ED care, comparing spending in the two sectors is instructive. The average cost of ED out-patient treatment invoice in 2017 was €67, compared to €17 for the average cost of a family physician appointment. Caution is required when

comparing the two since funding mechanisms are different. Furthermore, the average cost of a out-patient appointment would likely decrease if volumes were greater. Nevertheless,, the average ED out-patient treatment invoice increased by 44% between 2014 and 2017, compared to a 23% increase in the average cost of family physician appointment. Thus, in ED, the treatment of a patient becomes more expensive every year compared with treating him or her by a family physician. In short, EHIF is paying secondary care prices for large numbers of primary care cases.

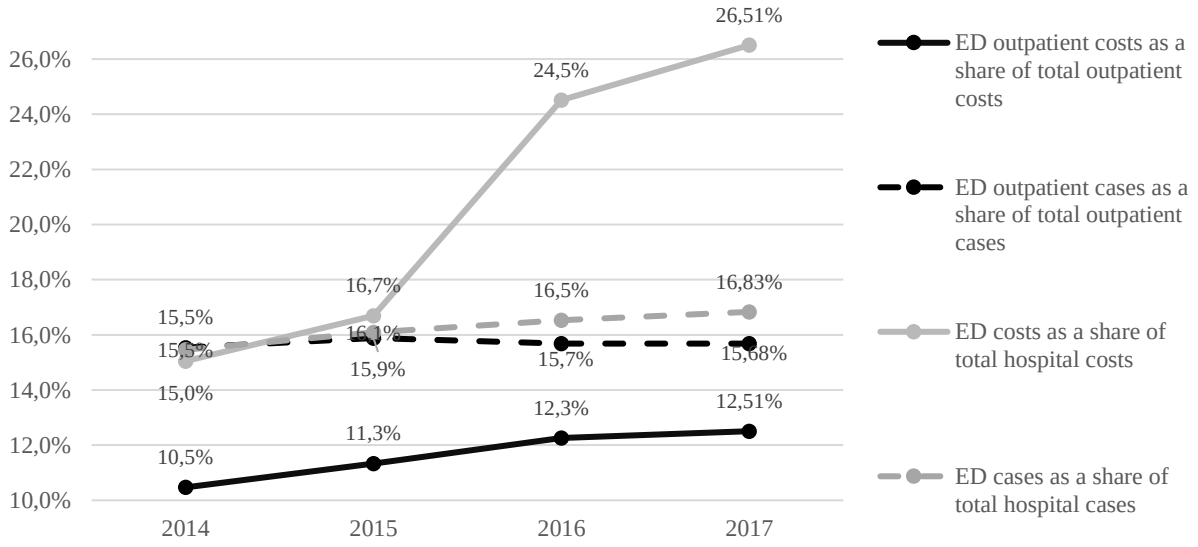
In summary, the evidence suggests that stable ED attendance rates should not offer reassurance regarding allocative efficiency across Estonia's health system. If there were better primary care and out-patient secondary care capacity, ED attendance rates would be falling. This evidence also illustrates that issues outside ED need to be addressed. Changing how EHIF reimburses ED may do little to address the lack of primary care and out-patient secondary care capacity.

Some measures of ED performance are worsening

EDs admit few patients, but those that are admitted generate most of the cost and costs are going up. In 2017, the proportion of out-patient treatment invoices was 84% of all ED invoices, but in-patient invoices accounted for 83% of the cost. The NAO report the average ED treatment invoice submitted by hospitals to EHIF increased by 24% annually between 2014-2017, reaching €341 in 2017. As a result, spending on care provided in EDs as a share of total health care spending almost doubled over that period, reaching 13% in 2017, and the share of ED costs out of total hospital costs increased from 15% to 26.5% (Figure 4). Within ED costs, the share of spending attributable to ED attendees who are eventually hospitalized has more than doubled, rising from €56.7 million in 2014 to €124.5 million in 2017, even though they account for less than 1 in 5 attendees.

Waiting times within EDs are getting longer. Data on the performance of EDs is not routinely collected. Special surveys, however, suggest that some aspects of performance are worsening. A study within the ED of Tartu University Hospital, for example, found that hospitalized attendees spend 22 minutes longer in the ED in 2017 compared to seven years previously. This is the group of patients with severe health problems, needing fast, effective care. Studies of similar patients in East Tallinn and North Estonia Hospitals also found a lengthening of the time spent in the ED. This may simply signal a shift in the severity of patients requiring hospitalization, a shift in clinical practice (with a longer time spent stabilizing the patient in ED) or, conversely, difficulty in arranging onward care in a timely and efficient manner.

Figure 4. ED cases and costs as a share of total cases and costs in HNDP hospitals, 2014-2017



Source: *NAO's Report, based on data of the Estonian Health Insurance Fund*

Growth in ED costs is not even across hospitals.. This suggests that understanding ED demand and service levels, as well as addressing individual issues in particular hospitals, will be a priority. This might include benchmarking various aspects of that hospital's ED against other hospitals in Estonia using a range of ED key performance indicators (Núñez et al. 2018 (in press)).

The rapid rise in ED costs is explained by several factors. As discussed earlier, the number of visits to the ED has been fairly stable over the years. The number of It is important to note, then, that increased demand is not driving higher spending. Instead, the NAO notes the following reasons for the rapid increase in ED spending:

- sicker patients: numbers in the red and orange triage categories increased by 98% and 51% respectively over 2014-2017, translating into a increasing rate of in-patient admission;
- more expensive treatment options: such as thrombolysis for ischaemic stroke;
- higher health care worker salaries: doctors' salaries increased by 23% over 2014–2017;
- the new ED payment system piloted in North Estonia and Tartu University hospitals (described next).

Even if, therefore, there is potential to reduce the number of ED attendees admitted, it should not be assumed that this will solve the problem of increasingly expensive EDs. Salary raises, technological advances and increases in red/orange attendances (driving a higher rate of conversion to in-patient admission) also explain increased ED costs, meaning that these drivers need to be addressed too.

The current reimbursement mechanism for ED is largely activity-based, alongside a rudimentary "readiness fee"

Currently, ED care is mostly reimbursed through retrospective activity-based payment. EHIF's reimbursement mechanisms for secondary care are generally sophisticated, as described in the companion report "*Financing a small island hospital in Estonia*". In contrast, reimbursement for ED care is relatively simple in design. Most ED costs are reimbursed through an activity-based mechanism, paid on invoices relating to ED investigations and procedures. For ED attendees that are admitted as in-patients, the hospital continues with the same claim and includes bed days and any additional investigations and procedures.

A small "readiness fee" accompanies activity-based reimbursement. The "readiness fee" is intended to compensate hospitals for ensuring access to essential services 24/7, beyond the standard 8 hour working day (the costs of which are assumed to be reimbursed through the activity-based payment). In most hospitals, the "readiness-fee" is equivalent to the salary of one doctor for 16 hours per day and is calculated by multiplying the additional staff time required to provide services (16 hours) by the agreed hourly wage. As explained in the Annex, in busier EDs, namely Tartu University Hospital and North Estonia Medical Centre, a larger readiness-fee equivalent to two doctors was paid (until they piloted a new payment system, described later). It is important to recall that planned secondary care and ED care are funded from the same budget line, meaning that ED attendance can crowd out planned secondary care.

The "readiness fee" is equivalent to a prospective grant but is rudimentary in its design. The Hospital Network Development Plan, in general, treats hospitals (and their EDs) as if they are all very similar: in most hospitals, the HNDP allows for one ED doctor for 16hrs, but no radiographers or technicians (see Annex). Marginal differences in activity are acknowledged. The Plan recognizes, for example, that regional EDs perform X-rays throughout the day/night, meaning that 24-hour availability of radiographers is required for these hospitals. In general, however, the current readiness-fee is both insufficient as well as too unitary, not recognizing the different services and activity levels provided in different hospitals. It is likely that central hospitals (and some general hospitals too) also perform x-rays throughout the day/night. Ideally, any prospective grant would capture each hospital's true level of activity by shift, which is likely to vary between day and night.

A new reimbursement mechanism piloted in North Estonia and Tartu hospitals did not deliver expected results. Concerned about the rising rate of in-patient admission from ED and the associated costs, EHIF has recently piloted a new ED payment system in in two of the largest and busiest EDs in Estonia - Tartu University Hospital and North Estonia Medical Centre. Hospitals had expressed concern that the current payment mechanism was not covering costs, generating the tendency toward more activity-based payment, including admission. The Emergency Care Specialist Association proposed that the tendency toward overactivity would be reduced if ED costs were better covered. The pilot was also intended to provide a means of better describing the demand for ED and patterns of service delivery within and across EDs.

In the pilot, ED attendees were triaged into five groups, based on severity, with a fixed amount reimbursed for each group. This triage-based payment system can be considered equivalent to a DRG-based reimbursement. The amount was derived from the current total cost of ED care in the pilot

hospitals, weighted by the Specialist Association's estimate of the cost division between different triage categories (see Box 2). The triage-based reimbursement is meant to cover most ED costs; hospitals were not allowed to claim additional reimbursement for additional staff time or the main investigations and procedures, although less routine investigations and procedures could be claimed separately.

Box 3: Triage categories used in Estonian Emergency Departments

The triage categories used in Estonian Emergency Departments are defined as follows:

- **red:** patients whose lives are directly threatened. These patients need immediate medical attention and treatment.
- **orange:** patients whose condition is potentially life-threatening. Waiting-time to see a doctor should be no more than 15 minutes.
- **yellow:** patients with significant illness or trauma and who require diagnostics and/or treatment, but whose condition is stable. Waiting-time to see a doctor should be no more than 60 minutes.
- **green**: patients whose problems do not require immediate emergency intervention. Waiting-time to see a doctor should be no more than 3 hours.
- **blue:** patients who do not need emergency care and whose health status does not qualify for prior triage categories. Waiting-time to see a doctor should be no more than 6 hours.

Initial results of the pilot find that it did not reduce ED costs or the rate of in-patient admission for ED attendees. Although disappointing, the failure to reduce costs or in-patient admission rate is perhaps not surprising. Under such as system, if triage-based reimbursement levels are higher than current average invoice, the health insurance fund will pay more. Furthermore, the financial incentive towards up-coding, over-activity and admission is not removed. Conversely, if triage-based reimbursement levels are lower than current average invoice, the health insurance fund may save money initially, but hospitals will have a stronger incentive towards up-coding, over-activity and admission – the problem that was intended to be solved. Only with a cap (either financial or volume) can costs be contained. In the particular case of the EHIF pilot with Tartu University Hospital and North Estonia Medical Centre, it has also been suggested that reimbursement levels were based upon biased data and are too generous.

In summary, the problems immediately related to ED reimbursement that EHIF must address are:

1. the overall cost of ED care is increasing, driven largely by increasingly expensive admissions from ED;
2. most ED costs are reimbursed through an activity-based mechanism. Although a "readiness fee", or prospective grant operates alongside, it is small in size and does not adequately recognize different activity levels in different hospitals;
3. the same budget line is used both for ED care and out-patient secondary care, meaning that the former risks crowding out the latter;
4. many patients also use the ED as a substitute for primary care, meaning that EHIF is paying secondary care prices for primary care services.

5. Steps to improve the reimbursement of ED in Estonia

This section provides recommendations on how EHIF can adapt its current reimbursement mechanism for ED care to a more sustainable model, whilst still adequately covering hospital costs. A critical step will be to separate funding for ED care from general hospital funding. Moving toward larger prospective grant (as a share of the reimbursement) is also recommended, but only after further work is undertaken to allow a prospective grant that accurately reflects individual hospitals' costs fee to be calculated.

Separate funding for emergency care and planned care into distinct streams

A fundamental step in improving the efficiency and sustainability of emergency care in Estonia is to **separate ED reimbursement from the budget line for planned secondary care**. This will bring several advantages. First, it will give EHIF and hospitals greater clarity on the funds available for ED care and out-patient care, helping prevent secondary care out-patient resources being crowded out by ED spending. Separation of budget lines will also enable better planning, which will be particularly important in better meeting the needs for out-patient secondary care. Finally, a separate budget line will also enforce more consistent flagging of ED activity and patients coming in through this route.

Two options present themselves:

i) under a scenario where no other modifications to the ED reimbursement system are made, EHIF should create a separate budget line for ED reimbursement, distinct to that used for out-patient secondary care;

ii) under a scenario where EHIF shifts from activity-based ED reimbursement to prospective grant based reimbursement, as described in a subsequent recommendation, a distinct ED funding stream will emerge *de facto*. Given that a small element of activity-based funding is nevertheless envisaged under this scenario, it will still be important to 'ring fence' funding for ED care as distinct from out-patient secondary care.

Under the first option, the existence of two budget lines risks making spending-control more difficult. Separation would need to be done carefully to ensure that overall hospital spending remains the same. This, as well as the transactional cost of implementing sequential budget reforms, means that the second option (where separation of budget lines is simultaneous with the change in reimbursement mechanism) is preferable.

Another risk in separating budget lines in the way described is that the ED becomes financially and operationally distinct from other parts of the hospital, perceiving itself (or being perceived) as an autonomous unit. The ED will have an incentive to minimize its own costs, possibly by offloading patient costs onto other areas of the hospital. EHIF will need to mitigate this risk by:

- **establishing clinical and cost-allocation guidelines,** in partnership with hospital and specialist associations, that specify which investigations and procedures should be performed by the ED for particular patient groups;

- **monitoring activity in individual EDs and auditing adherence to the clinical and cost-allocation guidelines** (see *"Define the normative scope of the ED prospective grant"*). Monitoring might also include the timing of expensive procedures and investigations in relation to the timing of the decision to admit, as well as performance benchmarks such as the in-patient admission rate from ED;
- **reallocating funds from or to EDs**, if monitoring and audit results indicate that reallocation is needed to match patient pathways.

Another risk of perceived financial autonomy is that ED clinicians and managers may claim that allocated funding as theirs to manage, resisting oversight from hospital managers and/or EHIF. This risk is largely dependent on personalities and organizational cultures. Hospital mangers and EHIF should mitigate it by emphasizing shared objectives around value-based health care and people-centred care, encouraging practical collaboration between ED and other hospital services to develop these themes.

Note: it is recognized that EHIF is considering, in the longer-term, options for shifting towards prospective grants ("global budgets") for hospital reimbursement more generally. If this happens, it would make sense for the ED/general funding streams to be merged together again. This would avoid two prospective grant systems operating, where there would be a risk of delivering too much care in the ED rather than in general hospital settings; duplicating services in both the ED and general setting; and, establishing the ED as an independent, autonomous 'hospital within a hospital'.

Shift towards prospective grants as the predominant reimbursement mechanism for ED

Beyond separation of budget lines, further modifications to the ED reimbursement system should be pursued. Specifically, EHIF should move toward **reimbursing a greater proportion of ED care through a prospective grant,** as opposed to retrospective activity-based funding.

As explained in Section 2, a prospective grant can act as a minimum income guarantee for quiet EDs, or a cost-cap for busy EDs, and has several advantages: it will enable EHIF to forecast, control and reallocate spending more easily. The international evidence that supports this assertion is discussed in the companion report "*Financing a small island hospital in Estonia".*

There are some risks that EHIF should be aware of. The main theoretical risk with prospective payment is that EDs will skimp on care (similar to the theoretical risk of capitation payment in primary care). This is unlikely, however, to occur. Most obviously, for moderately or severely ill patients, EDs naturally do all they can to rescue the patient; skimping on care is highly unlikely. EDs probably naturally follow the same approach is for less severe patients (blue/green triage). Here, though, skimping might even be desirable – given that some of these attendees should not be in the ED. Another theoretical risk of prospective payment is that competition between providers is diminished. Again, this is not applicable to EDs, since patients in urgent situations are not motivated by choice; plus, as before, the policy objective is to steer people away from EDs in any case. If carefully designed, the risks of skimping and non-competition could be turned into advantages: downward pressure on the prospective fee would be an incentive for EDs to direct attendees to other sources of care and, in particular, encourage closer working with primary care.

More practical risks in moving to a prospective grant is that hospitals become lax in recording ED activity (for example, patients' triage category) if data is no longer linked to payment. One way to overcome this

is to introduce ED performance indicators and benchmarks that require EDs to maintain high-quality coding. Another practical risk is that patients would complain about lack of ED access as downward pressure on the prospective fee is exerted. A degree of public dissatisfaction, however, would be a sign that the policy is working as intended. It should also be noted that a fixed prospective grant is not the same as an explicit cap on patient numbers which could force hospitals to turn patients away.

The most important consideration for hospitals is that a **prospective grant should accurately capture the cost of providing ED care**. A critical consideration, then, is how to determine the size of the prospective grant. Three issues are pertinent:

i) determining the normative *scope* of the grant (that is, what elements of ED activity, consumables and overheads should be captured in principle);
ii) accurately determining *volumes and prices* of elements within the scope of the ED prospective grant for individual EDs
iii) options around retaining *activity-based funding for selected ED services.*

Determine the normative scope of the ED prospective grant

Deciding what fixed and variable costs should be captured, normatively, by a prospective grant will already be familiar to EHIF and to hospitals, given that a rudimentary "readiness-fee" is already used for ED reimbursement, covering some staff and some premises requirements. In moving to a greater prospective grant, however, the general principle is that more elements should be captured within the scope of the ED prospective grant.

Within broad categories such as staff, consumables related to pharmaceuticals, procedures and diagnostics, administrative costs, premises costs and other overheads, more granular choices will have to be made around what should be included. Estonia's Hospital Network Development Plan already specifies the staff and equipment that should be available in an ED (see Annex); the cost of these elements should automatically form part of the prospective grant. In addition, EHIF is already developing cost allocation standards to facilitate identification of fixed and variable costs in EDs through the triage system. This also provides a basis upon which to identify elements to include in the prospective grant.

In addition to the elements specified in the Hospital Network Development Plan, **negotiation with hospitals and specialist associations may be needed to update or identify further staff or equipment that should be always available.** This might mean expanding the personnel element to contain staff costs across all categories - medical, nursing, health care assistants, porters, receptionists etc. In terms of the prospective grant, this should be based on the agreed staffing for an ED for specific times of the day. The agreed staffing levels may be greater than the minimum specified by regulation and may require changes to the current regulations. New regulations and specification of staffing levels for EDs of differing activity levels would also avoid excessive prospective grants for EDs which are historically over-staffed. EHIF has already started this negotiation with hospitals and specialist associations.

Clinical guidelines, in partnership with hospital and specialist associations, specifying the care, investigations and procedures that should be performed by the ED for particular patient groups, will help define the boundary of the ED, both clinically and administratively. Clinical guidelines for ED care exist in

Estonia but cost-allocation guidelines do not. By way of example, clinical guidelines specify that neuroimaging should be done after a stroke, but do not specify whether this should be considered a part of ED care or a part of in-patient care. Developing cost-allocation guidelines will help define both the administrative boundary (i.e. that used for accounting and payment purposes) of ED care with the clinically-defined boundary (i.e. what activities are undertaken in which department for a given patient group) and ensure that the two boundaries are aligned.

Regarding the reimbursement of capital investment and depreciation, there is a choice to be made between capturing these costs within the prospective grant or keeping them separate as occasional expenditures. As explained in the companion report "*Financing a small island hospital in Estonia*", EHIF currently opts for the first of these mechanisms in the prospective grant it makes to Hiiumaa hospital. It may wish to keep the same model, therefore, for the ED prospective grant.

Determine the volume and price of each element of ED care in individual hospitals

In principle, three approaches can be used to combine prices and volumes of each element within the prospective grant to determine the reimbursement for an individual ED: historical, capitation, or normative. The historical approach is the easiest and most commonly used approach. The normative approach entails the use of external sources of information to determine ideal volumes/prices. Actual price and volume may need to be negotiated with providers in practice, but the approach has the advantage of reducing variation and encouraging efficiency. Capitation is more complex and less often used, because it involves adjusting volumes/prices to match predicted health care demand.

It is worthwhile noting that EHIF has experience in using all three methods in secondary care. In the prospective grant (or "global budget") for Hiiumaa hospital, staffing levels were determined historically, and costs were determined normatively (using Hiiumaa's agreed hourly wage). Similarly, for other consumables and overheads, activity or volumes were also determined historically, and costs determined normatively (using the national average price for a given resource/input/consumable). EHIF used the capitation method in the triage-based ED reimbursement piloted in North Tallinn and Tartu hospitals, described in Section 5.

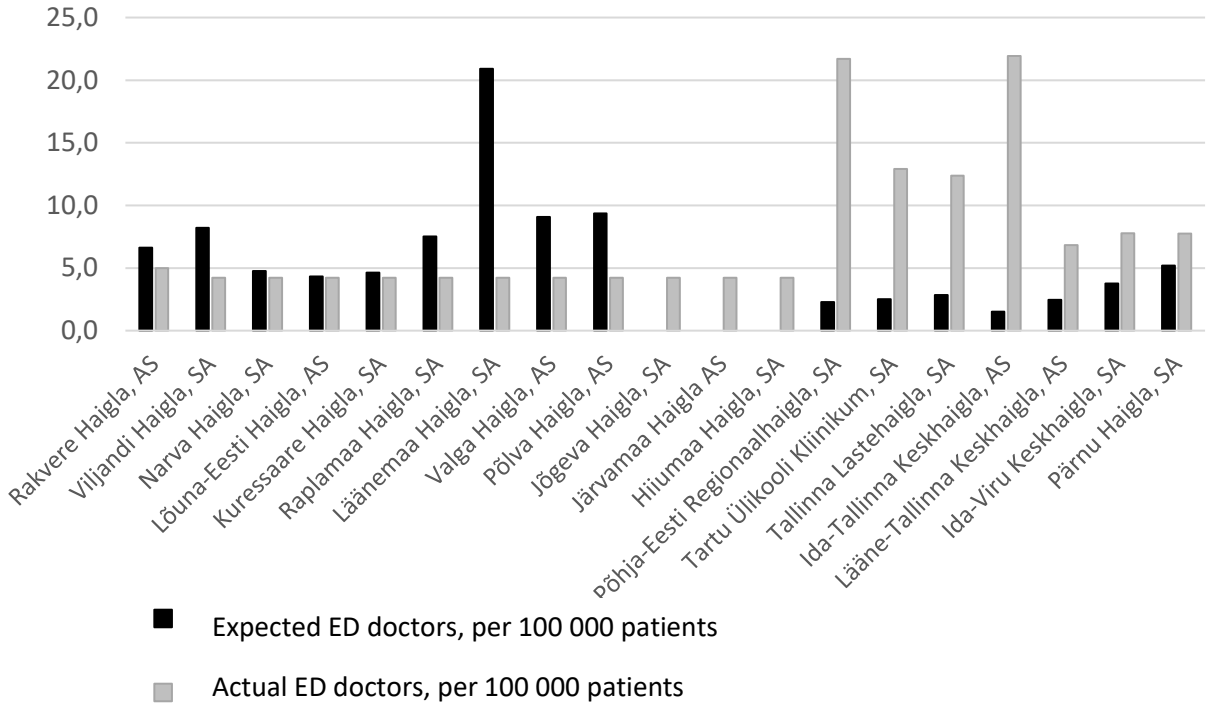
Given that the HNDP's current categorization and regulations of minimum staff and equipment are unlikely to reflect hospitals' true levels of activity, it would not form a good normative basis to determine the prospective grant. Similarly, given that the triage-based reimbursement system did not reduce expenditure as expected, capitation is not recommended as a basis for determining the ED prospective grant. Instead, a combined method broadly similar to that of Hiiumaa should be used initially:

- **volumes (of staff, of diagnostics and procedures, of drugs and devices etc) will be determined historically** using, for example, three-year rolling averages each hospital
- **prices of these elements will be determined normatively** using, for example, national average prices.

Within a few years, EHIF should also **consider determining volumes normatively**. Figure 5, for example, shows that staffing levels in some EDs are greater or less than expected (based upon current HDNP specifications of staffing level). This is a preliminary analysis and many factors could explain the difference

between expected and actual staffing levels. Some EDs, however, may be truly over-staffed or under-staffed, given the number of ED attendees. In these cases, normative setting of staffing levels (in a way that reflects activity levels more realistically than the current HNDP regulations, see Annex) will help correct under- or over-staffing. In any case, whether determined historically or normatively, **both volumes and prices will need to be updated regularly.**

Figure 5. Expected vs. actual medical staff in EDs



Source: EHIF data and calculations

EHIF must consider two trade-offs, closely related to each other, when determining the prospective grant for each ED:

i. stricter vs. looser equality within each HNDP hospital-category
ii. faster implementation with less detail vs. slower implementation with greater detail

Concerning the first trade-off, there will be a balance to be struck between individualized reimbursement for each hospital, and equality within broad categories of hospital. Although individual negotiations may provide an incentive for efficiency, they can expose the funder to political pressure to increase the size of prospective grant in the face of overstaffing. The alternative is to use the HNDP's categorization of hospitals and pay each ED in a particular category the same prospective grant. There is substantial variation within each category, however, in size and type of catchment area and triage categories of ED

attendees. For outliers, therefore, there will need to be some negotiation and some toleration of individualised contracts at the margin, including negotiations to select which ED services a given hospital provides. EHIF should recognize that this may require some **reclassification of hospitals, or changes to HNDP regulations that determine hospital category**.

Concerning the second trade-off, one option is to start simply (determining the prospective grant on staffing costs only for each shift; and, possibly the same payment for different hospital types) then become more sophisticated over time as more detailed data on staffing levels (including radiographers, technicians etc) and other elements are understood more precisely for each hospital. This will require disentangling fixed or non-variable costs and variable costs, to have a firm basis for determining the prospective grant (and, in the case of quieter EDs, possibly allowing occasional expenses such as one-off diagnostics, procedures or staff costs to be reimbursed).. This will require detailed understanding of staffing patterns at each hospital, as well as using the cost accounting systems (and allocation of overheads) in each hospital to understand patterns of variable costs, as shown in Box 4. A relatively sophisticated **patient-level information and costing system** (PLICS) will be needed for this.

Box 4: The data required to move to a more sophisticated ED prospective grant

Most or all of the following data will need to be collected from individual hospitals, to allow the ED prospective grant to be calculated in a way that accurately reflects costs, and that can be adjusted for need:

- headcounts of, and expenditure on, **staff** (by time of day, and by season)
- annual volumes of, and annual expenditures on, specified **diagnostics and procedures**
- annual volumes of, and annual expenditures on, specified **drugs and devices**
- annual volumes of, and annual expenditures on, specified **other supplies** (e.g. linen)
- annual expenditures on specified **utilities and other overheads** (e.g. cleaning and maintenance)
- estimates of annual **capital investment and depreciation**
- **triage category of attendees**, linked to shift and season

Staffing levels should include:

- clinical (doctor, nurse, clinical assistant), by speciality
- non-clinical (receptionist, porters etc.)

Much of this data is already known to EHIF, but at aggregate level for the hospital. Over time, patient-level activity and expenditure data will be needed for accurate determination of ED costs, relative to need (if linked to triage category). This could be achieved through a **patient-level information and costing system** (PLICS).

Retain activity-based reimbursement for selected ED services

It would be sensible to retain an element of retrospective activity-based reimbursement. In larger hospitals, activity-based reimbursement could be used to pay for special services not captured by the prospective grant, such as fast-track stroke pathways, or special programmes with primary care to jointly

manage frequent ED attenders. In smaller hospitals, activity-based reimbursement could be used to cover the costs of calling in x-ray technicians and other support staff, because the demand for these services is not sufficiently large to warrant scheduling these staff at all times. Retaining an element of activity-based reimbursement also builds in some flexibility and responsiveness into the payment system. Alternatively, to avoid any activity-based payment, a prospective fee that reimburses the costs of these staff being at home but ready for duty (and occasionally called-in) could be determined, using the data specified in Box 4.

Close monitoring and controls should be placed around activity-based payments. Target volumes, and tapering of reimbursement beyond the target, will be needed in some cases – such as expensive diagnostics. Hospitals are already familiar with this approach. In other cases, the activity-based payment might be designed as an incentive to increase activity, such as fast-track stroke pathways. Activity-based payments, as with the prospective grant, should be linked to patients' diagnosis and triage category to enable monitoring and design adjustments.

Begin by piloting ED prospective grants in selected hospitals, before extending to all

Once prospective grants are agreed for each hospital, EHIF should start paying EDs through the prospective grant mechanism, perhaps starting in a limited number of EDs that are not outliers in terms of expected versus observed staffing levels. Using Figure 5 as a preliminary guide, these might include Narva, South Estonia, and Kuressaare hospitals. Over time, this would be extended to all hospitals.

Another element of the transition process will be the phasing of the new payment for hospitals. Almost inevitably some hospitals will receive an increase in funding and some a reduction. Some form of phasing of the payment so that the change in funding is manageable within hospitals will be required. Any transition payments should be clearly identified as such so that they do not become a permanent feature of the funding arrangements.

As noted earlier, EHIF could start simply (possibly the same payment for different hospital types, calculated on basis of staffing levels for each shift). Over time, the prospective grant could become more sophisticated as activity levels and availability requirements are understood more precisely for each hospital, and can be disentangled from each other.

Develop ED performance benchmarks

In addition to changes to the ED reimbursement system, Estonia should **introduce national indicators of ED performance**. There are two reasons for this. First, open comparison (or "benchmarking") of these indicators would allow them to be used as 'adjunct incentives' to improve the quality and efficiency of care alongside the reimbursement system (Duckett 2008). Second, a move to prospective grant funding carries the risk that hospitals may become lax in reporting the detailed data on ED care needs, activities, costs and outcomes that EHIF needs. Committing to a system of public reporting of ED performance will help overcome that risk.

EHIF is already working with hospital and specialist associations to define such a set of ED performance benchmarks. These are:

- the share of doctors working in ED with a specialist qualification in emergency or intensive care
- average total time spent in ED
- proportion of ED attendees leaving before being seen
- proportion of ED attendees triaged within 10 minutes
- proportion of ED attendees leaving then returning to ED within 72 hours
- proportion of ED attendees leaving then being hospitalized within 24 hours
- for ED attendees with ischaemic stroke, the door to CT time and door to thrombolysis time
- for ED attendees with sepsis, the proportion receiving antibiotics within 1 hour of examination
- for ED attendees with pain, the proportion evaluated with a visual analogue score, and the proportion receiving pain medication within 30 minutes of triage
- for ED attendees with arriving by ambulance, the ambulance to hospital time

This proposed set compares well against the ED performance benchmarks used in other OECD health systems, such as the United Kingdom, Portugal and Japan: waiting times feature prominently in each case. One indicator that appears in other health systems but is missing in Estonia's proposed set however, concerns that rate of admission. Monitoring and encouraging an appropriate admission rate from ED is particularly important, since Smulowitz et al. (2013) has highlighted that reducing the rate of admissions to the hospital from ED may achieve more system-wide savings than affecting the rate of low-cost, primary-care-type presentations to the ED. In addition, the rate of admissions from ED is known to vary widely across Estonian hospitals (although some variance is expected, given differences in case-mix). **EHIF should work with the hospital and specialist association to develop an indicator of ED admission rate.** The proportion of cases in which a medical specialist is called in could also be considered as a benchmark (Van den Heede et al. 2016).

Initially, ED performance benchmarks should be used as non-financial incentives, leveraging EDs' inherent motivation to compare well against their peers. Overtime, EHIF could **consider using selected ED indicators in a pay-for-performance scheme**, thereby introducing financial incentives into the blend of ED reimbursement mechanisms. Waiting times or readmission rates could be included in a pay-for-performance scheme relatively easily, since "less" is clearly better. This is not the case for the proportion of patients admitted, however, which depends on the case-mix of attendees in a given ED. Although a higher proportion admitted may indicate higher complexity, a lower proportion of seriously ill patients admitted could indicate the ED is providing 'higher value' care, managing patients fully and reducing total system costs by avoiding expensive admissions (Smulowitz et al. 2013; Sugarman 2013). Nevertheless, it has been shown that funding incentives can be used to change the proportion of patients admitted from EDs (Galarraga et al. 2018 (in press)), and the context of a particular ED is important, given that the same physician may make different admission decisions when working in different EDs (Pines et al. 2017). Overall, then, whilst monitoring and benchmarking ED admission rate will be important, linking this indicator to ED reimbursement is not recommended since fewer admissions may signal better or worse quality, given the ED and other contextual factors.

The evidence about the efficacy of pay-for-performance in ED care is admittedly limited, and an eventual scheme might, at most, represent 5-10% of a typical ED's total income. Nevertheless, it could act as an

important tool to improve ED performance at the margin. Well-designed performance benchmarks could encourage EDs to work with other parts of the hospital, primary care and other organisations to encourage appropriate use of ED. Additional income through pay-for-performance might be of particular interest for larger EDs (who have expressed concern that shifting away from activity-based funding would leave them worse off). Conversely, if long ED waiting times become a serious issue, then health system authorities could use performance benchmarks as the basis of a system of financial penalties.

In summary, the final overall reimbursement mechanism would be along the following lines:

- **busy EDs:** prospective grant acts as a spending cap, approaching 80% - 90% total reimbursement; activity-based payments (including pay-for-performance elements) comprising 10 - 20% total reimbursement, to support quality and innovation;
- **quiet EDs**: prospective grant acts as a minimum income guarantee, approaching 100% of total reimbursement; activity-based payments to support quality and innovation, as well as variable expenses such as occcasional diagnostics, procedures or staff costs.

An interesting question arises for EDs that fall between these two types, i.e. those that are typically busy during the day, but quiet at night. Ideally the prospective grant would reflect this variation in activity (this would require detailed information on staffing levels by shift, day vs. night, as indicated in Box 4). Having the reimbursement mechanism vary from day to night may appear unusual. This is already, however, effectively in place: EHIF reimburses through activity-based payments for 8 hours by day, and through the "readiness fee" for the remaining 16 hours.

Focus most attention on fixing issues outside the ED

As discussed earlier, many factors affect the demand for ED services, many of which are outside the control of an ED. Consequently, many policy interventions have been directed at reducing ED demand that involve the out-of-hospital system. Typical interventions include:

- enhancement of the availability of alternatives to EDs, including expansion of primary care services, especially out of hours;
- relative financial incentives on the patient to encourage primary care rather than ED use, noting that Estonia already has a €5 payment for an ED attendance and no copayment for a primary-care attendance;
- strategies to improve the relative treatment convenience of primary-care compared to an ED e.g. increasing the availability of one-stop shops for necessary diagnostics;
- making available information to patients about the expected waiting times in emergency departments;
- demand reduction strategies such as telehealth and phone services.

It will be important for EHIF to work with Family Doctors to **improve the availability and effectiveness of primary-care.** All Estonians are registered with a primary-care practice, which provides a strong basis for managing chronic disease and first-contact care for minor conditions (Habicht et al. 2018). A mix of incentives and regulations could be developed to encourage primary-care practices to provide a wider

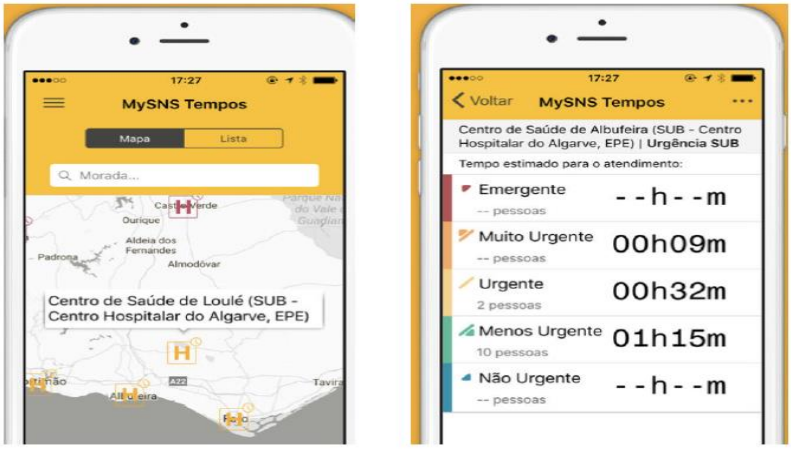
range of services (e.g. diagnostics) and to open for longer hours. This might include additional funds for primary-care to open on weekends or evenings. Estonia has made a step in this direction, with newer health centres opening until 6pm on weekdays, but further extension of opening hours will, at some point, need to be embraced.

Strengthening the effectiveness of primary care is also important. As noted earlier, case management for high-risk individuals is the only intervention that consistently reduces ED visits. Estonia's current **roll-out of Enhanced Care Management in primary care should be accelerated and sustained**, therefore. Further **development of Estonia's Quality and Quality Management Bonus Schemes**, such as pairing higher and poorly performing practices for mentorship, should be developed. New primary care roles may be required, such as clinical assistants, to allow Family Doctors to focus on management of complex, chronic disease. Detailed recommendations in this area are made in the NAO's report on ED care.

Estonia might also **cautiously consider increased or 'stepped' ED user fees to discourage primary-care-type visits.** A €5 co-payment for an ED attendance is already in place but does not appear to be effective in dissuading low-acuity attendance. The current co-payment could be increased, therefore, to €10 for ED attendances by patients whose primary-care practice is open and available at the time they attended the ED. The payment should revert to the lower €5 level if the patient has been referred by their primary-care practitioner, or their condition is of greater urgency or acuity than normally treated in primary care.

Better informing patients on sources and alternatives for care may also encourage appropriate use of ED. Written information on when ED use is appropriate is already available (such as the information leaflet produced in Estonian, Russian and English by North Estonia Hospital), but more personalized information in real-time would also help. Several OECD health systems, such as Portugal and Costa Rica, have developed apps that give patients current waiting times in local EDs and other services (Figure 6). The NAO also recommended concentrating information on health conditions, symptoms, health care services, including prevention and self-care in a single website, that could be linked to a patient's own health care portal or to their GP. Resources such as this could help people decide which problems require an ED visit, a family physician's appointment, or can be dealt with on their own.

Figure 6. Real-time monitoring of ED accessibility in Portugal



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Estonia could also **trial novel artificial intelligence (AI) technologies to manage ED demand**. This could involve establishing 'chatbot' artificial intelligence stations in ED waiting rooms, where patients with less urgent needs would access and print out advice about their current condition, including advice to seek treatment with their primary-care practitioner. Given that this technology is still in development (Divya et al. 2018; Razzaki et al. 2018), patients would need to take that advice back to triage staff who would then confirm or adapt the AI advice. Estonia is in a good position to trial and evaluate such technology as an alternative or supplement to telephone triage or face-to-face assessment. Other relatively new strategies includes design of nudges, using behavioural economics techniques, to shift demand (Watson and Blair 2018).

The NAO also suggested **consideration of a financial incentive for family physicians to ensure that patients visit them first for mild health problems**. This presumably would involve a financial penalty imposed on the primary care practitioner. This makes sense, in that the 'money would follow the patient' and reimbursement would not be paid twice, once to the Family Doctor and again to the ED. The converse solution would be to reduce to zero (or almost zero) the weighting for attendances triaged as blue-green in the ED payment formula. But more radical solutions such as these would first require a clearer understanding of the unmet need for primary care and out-patient secondary care as well as assurance that sufficient capacity exists in these sectors to obviate the need for inappropriate ED attendance. Further analytics and research in these areas, however, is needed, as explained next.

Finally, **better integration and communications between health care services** will also be critical to better manage patient flows. Currently, there is no mechanism to rapidly alert Family Doctors if their patients have attended ED or called an ambulance, limiting their ability to work with patients to ensure appropriate care. Similarly, alternatives to ED, such as telephone advice lines, are not able to access patients' primary care records – largely because verifying a caller's identity is not sufficiently reliable. This limits the

efficiency with which advice and management can be given. EHIF should work with care providers to allow Family Doctors to receive daily information on who has visited the ED or called an ambulance, and the action taken, as well as enable mechanisms that enable access to primary care records.

6. Recommendations for further analysis and research

In addition to the reforms to ED reimbursement recommended above, further research and analytics are also needed to clarify Estonia's need for hospital-based emergency care, and the best way to pay for it.

One key area for further research concerns better understanding how many ED attendances are 'inappropriate'. In international comparison, Estonia appears to have an unusually high rate of inappropriate ED use. The extent to which this is due to differences in how 'inappropriate' is defined, however, is not known. Modelling different definitions of 'inappropriate' on Estonian data would clarify whether Estonia truly is an outlier in this regard, and the effort that might be required to bring Estonia's ED use more in line with international norms.

A related topic concerns the relationship between ED and primary care (especially out-of-hours primary care). There is substantial evidence that substitution is happening, as earlier presented, but the underlying reasons are unclear. It is not known, for example, how many people use ED because they have been advised to by their Family Doctor, or because they cannot obtain a primary care appointment quickly enough or at a convenient time. In particular, little is known about the need for, or current use of, out-of-hours primary care appointments, meaning that EHIF cannot estimate the extent to which additional appointments would reduce ED attendances. A linked area for research would be a strategic review of other substitutes for ED care, such as nurse-led minor injury units, telemedicine, artificial intelligence etc; offering a stock-take of the current level of development of these substitutes in Estonia, estimating their potential contribution to meeting ED demand under different scenarios, and proposing an investment plan to develop them.

Finally, there are issues within hospitals themselves that should be further explored. The admission rate for ED attendees appears to be increasing for example, but the balance between demand-side drivers (sicker patients, and the reasons for this) and supply-side drivers (too much in-patient capacity, or badly designed incentives) has not been explored. Another area for research would be to model the effects of a day/night payment mechanism for moderately-sized EDs as described earlier.

References

Agarwal, S, et al. (2012), 'Potentially avoidable emergency department attendance: interview study of patients' reasons for attendance', *Emergency Medicine Journal,* 29 (12), e3-e3.

Armstrong, Stephen (2018), 'The apps attempting to transfer NHS 111 online', *BMJ: British Medical Journal (Online),* 360.

Bell, Anthony, et al. (2014), 'Funding emergency care: Australian style', *Emergency Medicine Australasia,* 26 (4), 408-10.

Berchet, C (2015), 'Emergency Care Services: trends, drivers and interventions to manage the demand'. OECD Health Working Papers, No. 83. OECD Publishing, Paris.

Bobrovitz, Niklas, Lasserson, Daniel S., and Briggs, Adam D. M. (2017), 'Who breaches the four-hour emergency department wait time target? A retrospective analysis of 374,000 emergency department attendances between 2008 and 2013 at a type 1 emergency department in England', *BMC Emergency Medicine,* 17 (32).

Chan, Wendy, Mason, Jessica, and Grock, Andrew (2018), 'The Long and Winding Triage Road', *Annals of Emergency Medicine,* 71 (5), 575-77.

Codde, Jim, et al. (2010a), 'Quantification of the proportion of transfers from residential aged care facilities to the emergency department that could be avoided through improved primary care services', *Australasian Journal on Ageing,* 29 (4), 167-71.

Codde, Jim, et al. (2010b), 'Transfers from residential aged care facilities to the emergency department are reduced through improved primary care services: An intervention study', *Australasian Journal on Ageing,* 29 (4), 150-54.

Di Somma, Salvatore, et al. (2015), 'Overcrowding in emergency department: an international issue', *Internal and Emergency Medicine,* 10 (2), 171-75.

Divya, S, et al. (2018), 'A Self-Diagnosis Medical Chatbot Using Artificial Intelligence', *Journal of Web Development and Web Designing,* 3 (1).

Dresden, Scott M., et al. (2016), 'Ambulatory Care Sensitive Hospitalizations Through the Emergency Department by Payer: Comparing 2003 and 2009', *The Journal of Emergency Medicine,* 50 (1), 135-42.

Duckett, Stephen (1991), 'Hospital role delineation: The technology and the politics', *The International Journal of Health Planning and Management,* 6 (2), 133-42.

--- (1995), 'Hospital payment arrangements to encourage efficiency: The case of Victoria, Australia.', *Health Policy,* 34, 113-34.

--- (2008), 'Design of price incentives for adjunct policy goals in formula funding for hospitals and health services', *BMC Health Services Research,* 8 (72).

Duckett, Stephen and Jackson, T. (2001), 'Paying for hospital emergency care under a single-payer system', *Annals of Emergency Medicine,* 37 (3), 309-17.

European Commission. Directorate-General for Health and Food Safety (2017), 'State of health in the EU: companion report 2017', (Luxembourg: European Union).

Farrohknia, Nasim, et al. (2011), 'Emergency Department Triage Scales and Their Components: A Systematic Review of the Scientific Evidence', *Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine,* 19 (42).

Galarraga, Jessica E, Frohna, William J, and Pines, Jesse M (2018 (in press)), 'The Impact of Maryland's Global Budget Payment Reform on Emergency Department Admission Rates in a Single Health System', *Academic Emergency Medicine*.

Geissler, Alexander , et al. (2011), 'Introduction to DRGs in Europe: Common objectives across different hospital systems', in Reinhard Busse, et al. (eds.), *Diagnosis-Related Groups in Europe: Moving towards transparency, efficiency and quality in hospitals* (Maidenhead: Open University Press).

Green, Emilie, et al. (2017), '"They Shouldn't Be Coming to the ED, Should They?": A Descriptive Service Evaluation of Why Patients With Palliative Care Needs Present to the Emergency Department', *American Journal of Hospice and Palliative Medicine,* 34 (10), 984-90.

Habicht, Triin, et al. (2018), 'Estonia: Health system review', *Health Systems in Transition,* 20 (1), 223.

Han, Alice, et al. (2015), 'Patients presenting to the emergency department: the use of other health care services and reasons for presentation', *Canadian Journal of Emergency Medicine,* 9 (6), 428-34.
Harrison, Mark J, et al. (2014), 'Effect of a national primary care pay for performance scheme on emergency hospital admissions for ambulatory care sensitive conditions: controlled longitudinal study', *BMJ : British Medical Journal,* 349.
Health Policy Analysis (2014), 'Investigative review of classification systems for emergency care - Final report', (Sydney: Independent Hospital Pricing Authority).
HOPE - European Hospital and Healthcare Federation (2015), 'Emergency care: A HOPE survey ', (Brussels: HOPE).
Jayaprakash, Namita, et al. (2009), 'Crowding and Delivery of Healthcare in Emergency Departments: The European Perspective', *Western Journal of Emergency Medicine,* 10 (4), 233-39.
Kiil, Astrid and Houlberg, Kurt (2014), 'How does copayment for health care services affect demand, health and redistribution? A systematic review of the empirical evidence from 1990 to 2011', *The European Journal of Health Economics,* 15 (8), 813-28.
Laffont, J-J. and Tirole, J. (1993), *A theory of incentives in procurement and regulation* (Cambridge, Mass.: The MIT Press).
Langabeer, James R, et al. (2017), 'Cost–benefit analysis of telehealth in pre-hospital care', *Journal of Telemedicine and Telecare,* 23 (8), 747-51.
National Audit Office of Estonia (2018), 'Emergency medicine: Does the department of emergency medicine treat patients whose health situation requires emergency assistance?', (Talinn: NAO).
Newhouse, J.P. and the Health Insurance Experiment Group (1993), *Free for all? Lessons from the RAND health insurance experiment* (Cambridge, Massachusetts: Harvard University Press).
Núñez, Alicia, et al. (2018 (in press)), 'Emergency departments key performance indicators: A unified framework and its practice', *International Journal of Health Planning and Management*.
Parenti, Nicola, et al. (2014), 'A systematic review on the validity and reliability of an emergency department triage scale, the Manchester Triage System', *International Journal of Nursing Studies,* 51 (7), 1062-69.
Pines, Jesse M., et al. (2017), 'How (ED) admission decisions differ when the same physician works in two different emergency department', *The American Journal of Emergency Medicine,* 35 (7), 970-73.
Pines, Jesse M., et al. (2016), 'A Conceptual Model for Episodes of Acute, Unscheduled Care', *Annals of Emergency Medicine,* 68 (4), 484-91.e3.
Pope, Catherine, et al. (2017), 'Has the NHS 111 urgent care telephone service been a success? Case study and secondary data analysis in England', *BMJ Open,* 7 (5).
Raven, Maria C, et al. (2016), 'The effectiveness of emergency department visit reduction programs: a systematic review', *Annals of emergency medicine,* 68 (4), 467-83. e15.
Razzaki, Salman, et al. (2018), 'A comparative study of artificial intelligence and human doctors for the purpose of triage and diagnosis', *arXiv preprint arXiv:1806.10698*.
Russell, L.B. (1989), *Medicare's new hospital payment system: Is it working?* (Washington, D.C.: The Brookings Institution) 114.
Sagan, Anna and Richardson, Erica (2015a), 'Out-of-hours primary care and demand for emergency medical services', *Eurohealth,* 21 (4), 6-9.
--- (2015b), 'The challenge of providing emergency medical care', *Eurohealth,* 21 (4), 3-5.
Smulowitz, Peter B., Honigman, Leah, and Landon, Bruce E. (2013), 'A Novel Approach to Identifying Targets for Cost Reduction in the Emergency Department', *Annals of Emergency Medicine,* 61 (3), 293-300.
Smulowitz, Peter B., Friedman, Ari B., and Pines, Jesse M. (2018), 'Appropriations for “appropriate” visits: Payment denials for emergency department care', *The American Journal of Emergency Medicine,* 36 (8), 1511-12.
Sugarman, Thomas J. (2013), 'Time to Focus on Improving Emergency Department Value Rather Than Discouraging Emergency Department Visits', *Western Journal of Emergency Medicine,* 14 (6), 617-18.
Sullivan, Clair, et al. (2016), 'The National Emergency Access Target (NEAT) and the 4-hour rule: time to review the target', *The Medical Journal of Australia,* 204 (9), 354.
Turner, Janette, et al. (2015), 'Managing demand for urgent care – the English NHS 111 experience', *Eurohealth,* 21 (4), 3-5.
Van den Heede, Koen and Van de Voorde, Carine (2016), 'Interventions to reduce emergency department utilisation: A review of reviews', *Health Policy,* 120 (12), 1337-49.

Van den Heede, Koen, et al. (2016), 'Organisation and payment of emergency care services in Belgium: Current situation and options for reform', (Brussels: Belgian Health Care Knowledge Centre).
Viner, Russell M, et al. (2018), 'The impact of out-of-hospital models of care on paediatric emergency department presentations', *Archives of Disease in Childhood,* 103 (2), 128-36.
Wallace, Elaine M., et al. (2013), 'Why do Palliative Care Patients Present to the Emergency Department? Avoidable or Unavoidable?', *American Journal of Hospice and Palliative Medicine,* 30 (3), 253-56.
Watson, Mando and Blair, Mitch (2018), 'Emergency departments and minor illness: some behavioural insights', *Archives of Disease in Childhood,* 103 (4), 309-10.

Annex

Current regulations within the National Hospital Development Plan specify that:

A general hospital must ensure 24/7 provision of or access to:

- two doctors, at least one of whom must be an emergency care doctor, or doctor with emergency care training / intensive care training or an anesthetist;
- a gynecologist, if woman about to give birth is in the hospital;
- general nurses on the wards; anesthesia and intensive care nurses; a midwife; and at least two emergency care nurses or general nurses in the emergency care department.

A central hospital must ensure 24/7 provision of or access to:

- emergency care doctor or doctor with emergency care training; a specialist in internal medicine; pediatrician; general surgeon; orthopedic surgeon; gynecologist, anesthesiologist, psychiatrist in acute psychiatry department and,
- if necessary, an infectious disease specialist;
- nurses in the ward departments, midwife, at least three emergency care nurses or general nurses in the emergency department;
- one nurse in an acute psychiatric ward or unit of a ward for up to six patients.

A regional hospital must ensure 24/7 provision of or access to:

- at least two emergency care doctors; internist; cardiologist; neurologist; pediatrician; psychiatrist; pulmonologist; surgical specialist; orthopedic surgeon; otorhinolaryngologist; gynecologist; anesthetist; and radiologist;
- an infectious disease doctor, unless already provided by a neighbouring hospital;
- general nurses on the wards; at least six emergency care nurse or general nurse in the emergency care department, of which at least 75% are emergency care nurses or nurses with emergency care training,
- one nurse in an acute psychiatric ward or unit of a ward for up to six patients;
- a radiologist or technician;
- In a regional hospital providing outpatient and inpatient health services only for children, at least one emergency care doctor or a doctor with emergency care training; a pediatric surgeon; a pediatrician and an anesthetist.